Pecyn Dogfen Gyhoeddus

Gareth Owens LL.B Barrister/Bargyfreithiwr
Chief Officer (Governance)
Prif Swyddog (Llywodraethu)

Swyddog Cyswllt:
Margaret Parry-Jones 01352 702427
margaret.parry-jones@siryfflint.gov.uk

At: Cyng David Evans (Cadeirydd)

Y Cynghorwyr: Mel Buckley, David Coggins Cogan, Ray Hughes, Richard Lloyd, Dave Mackie, Roz Mansell, Vicky Perfect, Mike Peers, David Richardson, Dan Rose a Roy Wakelam

Dydd Mercher, 8 Ionawr 2025

Annwyl Gynghorydd,

RHYBUDD O GYFARFOD HYBRID
PWYLLGOR TROSOLWG A CHRAFFU'R AMGYLCHEDD A'R ECONOMI
DYDD MAWRTH, 14EG IONAWR, 2025 10.00 AM

Yn gywir

Steven Goodrum
Rheolwr Gwasanaethau Democrataidd

Sylwch: Gellir mynychu'r cyfarfod hwn naill ai wyneb yn wyneb yn Ystafell Bwyllgor Delyn, Cyngor Sir y Fflint, Yr Wyddgrug, Sir y Fflint neu ar-lein.

Bydd y cyfarfod yn cael ei ffrydio'n fyw ar wefan y Cyngor. Bydd y ffrydio byw yn dod i ben pan fydd unrhyw eitemau cyfrinachol yn cael eu hystyried. Bydd recordiad o'r cyfarfod ar gael yn fuan ar ôl y cyfarfod ar https://flintshire.publici.tv/core/portal/home

Os oes gennych unrhyw ymholiadau, cysylltwch ag aelod o'r Tîm Gwasanaethau Democrataidd ar 01352 702345.

R H A G L E N

1 **YMDDIHEURIADAU**

Pwrpas: I dderbyn unrhyw ymddiheuriadau.

2 **DATGAN CYSYLLTIAD (GAN GYNNWYS DATGANIADAU CHWIPIO)**

Pwrpas: I dderbyn unrhyw ddatganiad o gysylltiad a chynghori'r Aelodau yn unol a hynny.

3 **COFNODION** (Tudalennau 5 - 10)

Pwrpas: I gadarnhau, fel cofnod cywir gofnodion y cyfarfod ar 10 Rhagfyr 2024.

4 **RHAGLEN GWAITH I'R DYFODOL AC OLRHAIN CAMAU GWEITHRED** (Tudalennau 11 - 22)

Adroddiad Hwylusydd Trosolwg a Chraffu yr Amgylchedd a Gofal Cymdeithasol - Aelod Cabinet Gwasanaethau Corfforaethol

Pwrpas: Ystyried Rhaglen Gwaith i'r Dyfodol y Pwyllgor Trosolwg a Chraffu'r Amgylchedd a'r Economi a rhoi gwybod i'r Pwyllgor am y cynnydd yn erbyn camau gweithredu o gyfarfodydd blaenorol.

5 **ADRODDIAD CANOL BLWYDDYN AR BERFFORMIAD CYNLLUN Y CYNGOR (2023-28) 2024/25** (Tudalennau 23 - 104)

Adroddiad Prif Swyddog (Cynllunio, Amgylchedd ac Economi), Prif Swyddog (Stryd a Chludiant) - Aelod Cabinet Newid Hinsawdd a'r Economi, Aelod Cabinet Cynllunio, Iechyd y Cyhoedd a Gwarchod y Cyhoedd, Aelod Cabinet Gwasanaethau Stryd a Chludiant

Pwrpas: Adolygu a monitro perfformiad canol blwyddyn y Cyngor, gan gynnwys camau gweithredu a mesurau, fel y nodir yng Nghynllun y Cyngor (2023-28) ar gyfer 2024/25.

6 **COFRESTR RISGIAU GORFFORAETHOL** (Tudalennau 105 - 158)

Adroddiad Prif Swyddog (Cynllunio, Amgylchedd ac Economi), Prif Swyddog (Stryd a Chludiant) - Aelod Cabinet Newid Hinsawdd a'r Economi, Aelod Cabinet Cynllunio, Iechyd y Cyhoedd a Gwarchod y Cyhoedd, Aelod Cabinet Gwasanaethau Stryd a Chludiant

Pwrpas: I adolygu Cofrestr Risgiau Corfforaethol y Cyngor.

7 **ADOLYGIAD PERFFORMIAD TORRI GLASWELLT A RHEOLI CHWYN** (Tudalennau 159 - 174)

Adroddiad Prif Swyddog (Stryd a Chludiant) - Aelod Cabinet Gwasanaethau Stryd a Chludiant

Pwrpas: Darparu adolygiad o dymor glaswellt 2024.

8 **CYNLLUN YNNI ARDAL LEOL SIR Y FFLINT** (Tudalennau 175 - 552)

Adroddiad Prif Swyddog (Cynllunio, Amgylchedd ac Economi) - Aelod Cabinet Newid Hinsawdd a'r Economi

Pwrpas: Ceisio cefnogaeth y o ran Prif Adroddiad ac Adroddiad Technegol Cynllun Ynni Ardal Leol Sir y Fflint.

9 **ADRODDIAD ÔL TROED CARBON CYNGOR SIR Y FFLINT 2023-24** (Tudalennau 553 - 562)

Adroddiad Prif Swyddog (Cynllunio, Amgylchedd ac Economi) - Aelod Cabinet Newid Hinsawdd a'r Economi

Pwrpas: Nodi'r cynnydd a wnaed wrth leihau ôl troed carbon y Cyngor.

10 **DEDDF IECHYD Y CYHOEDD (CYMRU) 2017 A CHYFLWYNIAD TRWYDDEDU TRINIAETHAU ARBENNIG** (Tudalennau 563 - 574)

Adroddiad Prif Swyddog (Cynllunio, Amgylchedd ac Economi) - Aelod Cabinet Cynllunio, Iechyd y Cyhoedd a Gwarchod y Cyhoedd

Pwrpas: I ofyn am ddirprwyaeth y Cabinet/Aelodau mewn perthynas â darpariaethau Deddf Iechyd y Cyhoedd (Cymru) 2017 a fydd yn galluogi swyddogion i gyflawni gofynion trefn drwyddedu 'Triniaethau Arbennig' newydd.

11 **ADOLYGU'R POLISI PARCIO CEIR** (Tudalennau 575 - 610)

Adroddiad Prif Swyddog (Stryd a Chludiant) - Aelod Cabinet Gwasanaethau Stryd a Chludiant

Pwrpas: Adolygu a diweddaru polisi parcio ceir y Cyngor.

Sylwch, efallai y bydd egwyl o 10 munud os yw'r cyfarfod yn para'n hirach na dwy awr.

Mae'r dudalen hon yn wag yn bwrpasol

ENVIRONMENT & ECONOMY OVERVIEW & SCRUTINY COMMITTEE
10 DECEMBER 2024

Minutes of the Environment & Economy Overview & Scrutiny Committee of Flintshire County Council held as a hybrid meeting on Tuesday, 10 December 2024

PRESENT:	**Councillor David Evans (Chair)** Councillors Mel Buckley, Richard Lloyd, Dave Mackie, Vicky Perfect, Mike Peers, David Richardson, Roy Wakelam and Sean Bibby (substitute for Ray Hughes)
OBSERVERS:	Councillors: Helen Brown, Dave Hughes and Richard Jones
APOLOGIES:	Councillor Roz Mansell
CONTRIBUTORS:	Councillor Glyn Banks (Cabinet Member for Streetscene and Transportation); Councillor Paul Johnson (Cabinet Member for Finance and Social Value), Councillor Chris Bithell (Cabinet Member for Planning, Public Health and Public Protection); Councillor Chris Dolphin (Cabinet Member for Economy, Environment and Climate); Chief Officer (Streetscene and Transportation); Chief Officer (Planning, Environment & Economy); Regulatory Services Manager; Highway Network Manager; Operational Manager - Central and Road Space; Bereavement Services Manager and Service Manager - Countryside Access and Natural Environment
IN ATTENDANCE:	Democratic Services Manager, Overview & Scrutiny Facilitators and Democratic Services Officer

45. APPOINTMENT OF CHAIR (Link to Recording)

The Democratic Services Manager advised that it had been confirmed at the County Council meeting held on 4 December, 2024 that the Chair of the Committee should come from the Labour Group. The Committee was advised that Councillor David Evans had been appointed to this role for the remainder of the municipal year.

RESOLVED:

That the appointment of Councillor David Evans as Chair of the Committee be noted.

46. APPOINTMENT OF VICE-CHAIR (Link to Recording)

Councillor Bibby moved Councillor Ray Hughes as Vice-Chair of the Committee which was seconded by Councillor Lloyd.

RESOLVED:

That Councillor Ray Hughes be appointed Vice-Chair of the Committee.

47. DECLARATIONS OF INTEREST (INCLUDING WHIPPING DECLARATIONS)

None.

48. MINUTES (Link to Recording)

Councillor Bithell asked that his attendance be recorded in the minutes.

Councillor Peers referred to his request for the cost of implementation of moving to the 3 weekly kerbside collection model and said that he had not been provided with this information. The Chief Officer explained that information had been provided to Members as part of the Agenda from the call in meeting and said that she would ensure this was circulated following the meeting.

RESOLVED:

That the minutes of the meeting held on 12 November 2024 be approved as a correct record.

49. CONSIDERATION OF A MATTER REFERRED TO THE COMMITTEE PURSUANT TO THE CALL IN ARRANGEMENTS (Link to Recording)

The Democratic Services Manager advised that Cabinet had considered a report on 'Residual Waste Collection Change Implementation and Policy Review' at a meeting held on 19 November 2024. The decision (Record of Decision 4307) had been called in.

Copies of the Cabinet report, record of decision and Endorsement of Call in (agenda item number 7) were included in the agenda pack.

The Democratic Services Manager explained the procedure for the call in of a Cabinet decision as detailed in the supporting document (agenda item number 6) which was included in the agenda.

The Chair invited the signatories to present the reasons for the call-in to the Committee.

50. RESIDUAL WASTE COLLECTION CHANGE IMPLEMENTATION AND POLICY REVIEW (Link to Recording)

Representations from Call In Signatories

Councillor Swash, on behalf of the signatories, outlined the reasons for the Call In, expanding on the reasons outlined within the Agenda.

Responses from the Decision Makers

The Cabinet Member for Streetscene and Transportation responded that the Policy would be amended in light of the concerns raised by Councillor Swash.

The Chair invited Members of the Committee to ask questions of the Decision Makers and Call In signatories.

The Chair invited the initiators of the call in to sum up.

Councillors Swash summed up on behalf of the call in signatories. The Cabinet Member for Streetscene and Transportation thanked the signatories for bringing the issue to his attention.

The Chair invited the Democratic Services Manager to remind Members of the options for decision making as detailed in item 6 of the Agenda.

Councillor Bibby proposed Option 3 and this was seconded by Councillor Peers.

On being put to the vote, the proposal for Option 3 was carried.

RESOLVED:

That, having considered the decision, the Committee refers the decision back to Cabinet for reconsideration, setting out in writing the nature of its concerns.

51. FORWARD WORK PROGRAMME AND ACTION TRACKING (Link to Recording)

The Overview & Scrutiny Facilitator presented a report (agenda item number 8) to consider the current Forward Work Programme (FWP) and Action Tracking progress.

Following a request from Councillor Peers, it was agreed that a review of the 3 weekly kerbside collection model following its implementation be added to the FWP for January, 2026.

In response to a query from Councillor Peers, it was agreed that an item on Bus Services be added to the FWP to include the national and local position, an update on the Fflecsi bus service and the reliability of services.

In response to a question from Councillor Wakelam it was agreed that the Access Barrier Review report be kept on the FWP.

The recommendations of the report were supported.

RESOLVED:

(a) That the Forward Work Programme be noted;

(b) That the Facilitator, in consultation with the Chair of the Committee, be authorised to vary the Forward Work Programme between meetings, as the need arises; and

(c) That the progress made in completing the outstanding actions be noted.

52. IN-YEAR OVERSPEND ACTION PLAN 2024/25 (Link to Recording)

The Chief Officer (Streetscene & Transportation) presented a report (agenda item number 9) to update Members with the in-year action plan, which aimed to address the projected revenue budget monitoring 2024/25 overspend position (month 6) for the Streetscene & Transportation portfolio.

In response to a suggestion from Councillor Peers, the Highway Network Manager suggested that a report on illuminated signs be presented to the Committee in 2025.

In response to a query around the proposed savings relating to the local bus re-procurement/service changes to Service 5, the Chief Officer agreed to address this with Councillor Peers following the meeting.

In response to a question from Councillor Ibbotson around legal authorisation given by Cabinet for spending in excess of the budget, Councillor Ibbotson was requested to provide a written request to the Section 151 Officer following the meeting.

The recommendation of the report was supported.

RESOLVED:

That the Committee note the measures within the 2024/25 action plan being considered for inclusion towards improving the financial position by the end of the financial year.

53. COST RECOVERY FOR SUPPORTING PUBLIC EVENTS AFFECTING THE HIGHWAY (Link to Recording)

The Chief Officer (Streetscene & Transportation) and Highway Network Manager presented a report (agenda item number 10) which set out the methodology for achieving full cost recovery to achieve the approved budget.

It was agreed that the proposals outlined within the report that there is no charge for national commemoration events, such as Remembrance Sunday, be included within the Policy document.

The recommendations of the report were supported.

RESOLVED:

That in order to achieve the savings target set within the budget for 2024/2025 by Council, the Committee notes:

i. the introduction of a formalised policy; and
ii. the methodology for achieving full cost recovery for public events impacting or on the highway.

54. PROPOSALS BY THE LAW COMMISSION TO REFORM BURIAL AND CREMATION LEGISLATION (Link to Recording)

The Chief Officer (Streetscene and Transportation) and Bereavement Services Manager presented a report (agenda item number 11) to outline the Law Commission's consultation paper and detail the Council's proposed response to the consultation, whilst also providing an overview of the legislative reform proposals and the potential risks and impacts on the local authority in terms of additional duties, costs, and resources.

It was agreed that the comments made by the Committee would be included within the consultation response.

The recommendations of the report were supported.

RESOLVED:

(a) That the Committee note the proposed changes to burial and cremation law that were being consulted upon by the Law Commission; and

(b) That subject to the comments made by the Committee, it endorses the submission of the proposed response to the public consultation on behalf of Flintshire County Council.

55. ACCESS BARRIER UPDATE (Link to Recording)

The Chief Officer (Planning, Environment & Economy) and Service Manager - Countryside Access and Natural Environment presented a report (agenda item number 12) to summarises the ongoing phased approach to the removal of all the 'A Frame' access barriers.

In response to comments made by Councillor Bibby, the Committee were advised that local members, along with other stakeholders would be made aware of proposals within their ward areas.

RESOLVED:

That the Committee note the update and support the work to increase accessibility to the Wales Coastal Path

56. MEMBERS OF THE PRESS AND PUBLIC IN ATTENDANCE

None.

(The meeting started at 10am and ended at 12 noon)

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Chair

Meetings of the Environment & Economy Overview & Scrutiny Committee are webcast and can be viewed by visiting the webcast library at http://flintshire.public-i.tv/core/portal/home

ENVIRONMENT & ECONOMY OVERVIEW & SCRUTINY COMMITTEE

Date of Meeting	Tuesday 14 January 2025
Report Subject	Forward Work Programme and Action Tracking
Report Author	Environment & Economy Overview & Scrutiny Facilitator
Type of Report	Operational

EXECUTIVE SUMMARY

Overview & Scrutiny presents a unique opportunity for Members to determine the Forward Work programme of the Committee of which they are Members. By reviewing and prioritising the Forward Work Programme Members are able to ensure it is Member-led and includes the right issues. A copy of the Forward Work Programme is attached at Appendix 1 for Members' consideration which has been updated following the last meeting.

The Committee is asked to consider, and amend where necessary, the Forward Work Programme for the Environment & Economy Overview & Scrutiny Committee.

The report also shows actions arising from previous meetings of the Environment & Economy Overview & Scrutiny Committee and the progress made in completing them. Any outstanding actions will be continued to be reported to the Committee as shown in Appendix 2.

RECOMMENDATION	
1	That the Committee considers the draft Forward Work Programme and approve/amend as necessary.
2	That the Facilitator, in consultation with the Chair of the Committee be authorised to vary the Forward Work Programme between meetings, as the need arises.
3	That the Committee notes the progress made in completing the outstanding actions.

REPORT DETAILS

1.00	EXPLAINING THE FORWARD WORK PROGRAMME AND ACTION TRACKING
1.01	Items feed into a Committee's Forward Work Programme from a number of sources. Members can suggest topics for review by Overview & Scrutiny Committees, members of the public can suggest topics, items can be referred by the Cabinet for consultation purposes, or by County Council or Chief Officers. Other possible items are identified from the Cabinet Work Programme and the Improvement Plan.
1.02	In identifying topics for future consideration, it is useful for a 'test of significance' to be applied. This can be achieved by asking a range of questions as follows: 1. Will the review contribute to the Council's priorities and/or objectives? 2. Is it an area of major change or risk? 3. Are there issues of concern in performance? 4. Is there new Government guidance of legislation? 5. Is it prompted by the work carried out by Regulators/Internal Audit? 6. Is the issue of public or Member concern?
1.03	In previous meetings, requests for information, reports or actions have been made. These have been summarised as action points. Following a meeting of the Corporate Resources Overview & Scrutiny Committee in July 2018, it was recognised that there was a need to formalise such reporting back to Overview & Scrutiny Committees, as 'Matters Arising' was not an item which can feature on an agenda.
1.04	It was suggested that the 'Action tracking' approach be trialled for the Corporate Resources Overview & Scrutiny Committee. Following a successful trial, it was agreed to extend the approach to all Overview & Scrutiny Committees.
1.05	The Action Tracking details including an update on progress is attached at Appendix 2.

2.00	RESOURCE IMPLICATIONS
2.01	None as a result of this report.

3.00	CONSULTATIONS REQUIRED / CARRIED OUT
3.01	In some cases, action owners have been contacted to provide an update on their actions.

4.00	RISK MANAGEMENT
4.01	None as a result of this report.

5.00	APPENDICES
5.01	Appendix 1 – Draft Forward Work Programme Appendix 2 – Action Tracking for the Environment & Economy OSC.

6.00	LIST OF ACCESSIBLE BACKGROUND DOCUMENTS
6.01	Minutes of previous meetings of the Committee as identified in Appendix 2. **Contact Officer:** Margaret Parry-Jones Overview & Scrutiny Facilitator **Telephone:** 01352 702427 **E-mail:** Margaret.parry-jones@flintshire.gov.uk

7.00	GLOSSARY OF TERMS
7.01	**Improvement Plan:** the document which sets out the annual priorities of the Council. It is a requirement of the Local Government (Wales) Measure 2009 to set Improvement Objectives and publish an Improvement Plan.

Mae'r dudalen hon yn wag yn bwrpasol

Environment & Economy Overview & Scrutiny Forward Work Programme 2024/25

Date of Meeting	Subject	Purpose of Report/Presentation	Scrutiny Focus	Responsible/Contact Officer	Submission Deadline
11 Feb 25 **10.00 am**	Review of Ring and Ride Service in Flintshire Place Making Plans Update on the North Wales Corporate Joint Committee and Delivery of the Regional Transport Plan	To receive an update To provide an update on the development of Place Making Plans in Flintshire To receive an update	Assurance Assurance Assurance	Chief Officer Streetscene & Transportation Niall Waller Chief Officer Streetscene & Transportation	
11 March 25 **10.00 am**	Strategy for Public Conveniences Deposit Return Scheme and Extended Producer Responsibility	To receive an update on the Strategy as requested on 8 October 2024 To receive an update	Assurance Information	Chief Officer – Streetscene & Transportation Chief Officer – Streetscene and Transportation	

Tudalen 15

Date of Meeting	Subject	Purpose of Report/Presentation	Scrutiny Focus	Responsible/Contact Officer	Submission Deadline
	Place Making Plans for Holywell and Shotton	To receive the specific plans for Holywell and Shotton	Assurance	Chief Officer – Planning & Environment	
	Climate Change Strategy	To receive an update	Assurance	Chief Officer – Planning & Environment	
	Streetscene Standards	To consider the recommendations of the Task & Finish Group	Pre-decision	Chief Officer – Streetscene and Transportation	
	Waste Compliance and Duty of Care Across the Council	To receive an update	Assurance	Chief Officer – Streetscene and Transportation	
8 April 25 **10.00 am**	Update on bus services	To include national and local position, update on flexi-bus and reliability of services.	Assurance	Chief Officer – Streetscene & Transportation	
	Corporate Risk Register	To review the Council's Corporate Risk Register.	Assurance	Chief Officers	
6 May 25 **10.00 am**					

ENVIRONMENT & ECONOMY OVERVIEW & SCRUTINY FORWARD WORK PROGRAMME
APPENDIX 1

Date of Meeting	Subject	Purpose of Report/Presentation	Scrutiny Focus	Responsible/Contact Officer	Submission Deadline
10 June 25 **10.00 am**					
8 July 25 **10.00 am**	Annual Performance Report 2024/25 to incorporate the Council Plan End of Year Performance Report 2024/25 Corporate Risk Register	To review the levels of progress in the achievement of activities and performance levels identified in the Council Plan and to consider the Annual Performance Report. To review the Council's Corporate Risk Register.		Chief Officers Chief Officers	

Tudalen 17

Items to be added :-

Update report on Bailey Hill in the Spring 25 with Site Visit in advance
Additional Licensing for Houses of Multiple Occupation (when consultation has been completed)
Workshop on HAMP for Members of the Committee Jan/Feb 25
Workshop on ULEV & Fleet Jan/Feb 25
Illuminated Signs (Barry Wilkinson)
Review of 3 Weekly Bin Collection – January 2026- (post decision scrutiny)
Corporate Risk Register – October
Place Making Plan Buckley

Mae'r dudalen hon yn wag yn bwrpasol

Action tracking for Environment & Economy OSC January 2025

Item/Date	Discussion	Action	By whom	Status
11 June 2024	Streetscene Standards Task & Finish Group – change of membership	Further meetings required	Chris Goddard/ Facilitator	Ongoing
	A discussion took place around the 5 min parking outside schools and it was said that this matter was being considered by the School Parking Task and Finish Group.	It was requested that confirmation be sought that this was correct and if so that members of the Environment Overview and Scrutiny Committee receive an update on progress.	Facilitator	Ongoing T & F Group are meeting on the 30th of October. Update will be provided once available.
Annual Performance Report & Performance Report	Members felt that a Members briefing would be helpful to assist Members understanding of the revised format for the Performance Report & Annual Performance report	Members briefing to be arranged	Emma Heath	Ongoing Briefing to be held in April 25 to include Risk Management
REVIEW OF HIGHWAYS ASSET MANAGEMENT PLAN (HAMP) AND HIGHWAY AND CAR PARK INSPECTION POLICY	Workshop on HAMP for Members of the Committee in the New Year Leader of the Council and Cabinet Member for Streetscene & Transportation to write to the First Minister about the lack of funding and investment in the highway network, and liabilities this creates for the local authority, along	Workshop to be arranged Leader to write to the First Minister	Facilitator Leader/ Chief Officer Streetscene & Transportation	Ongoing Completed

	with the impact on local communities and the economy.			
	The Chief Officer (Streetscene and Transportation) agreed to give consideration to the suggestion made by Councillor Mike Peers that Town and Community Councils be asked to make a contribution to the cost of repairs and maintenance of the public conveniences sited in their area.	Chief Officer to give consideration to the suggestion.	Chief Officer Streetscene & Transportation	Ongoing
December 2024 Minutes	Information on the costs of implementation of moving to 3-weekly kerbside collection model to be recirculated to the Committee as requested by Cllr Mike Peers.	Re-circulate information.	Chief Officer Streetscene & Transportation	Completed
Forward Work Programme	Item on Bus Services requested. Access Barrier Review to be kept on FWP Review of 3-weekly bin collection to be added to FWP for Jan 26	Add to Forward Work Programme Add to Forward Work Programme Add to Forward Work Programme	Facilitator Facilitator Facilitator	Completed Completed Completed
In-year Overspend Action Plan 2024-25	Barry Wilkinson to provide a report on Illuminated signs in	To be added to Forward Work Programme	Barry Wilkinson/ Facilitator	Completed

	2025. To be added to the FWP for 2025. Cllr Alistair Ibbotson to provide written request to Section 151 Officer regarding legal authorisation by Cabinet for spending in excess of budget.	Cllr Ibbotson to provide written request	Cllr Ibbotson	Ongoing
Cost Recovery for supporting public events affecting the highway	Include wording in Policy document in relation to Remembrance Sunday and national commemoration events.	Sam Tulley to include in Policy document.	Sam Tulley	Completed
Proposals by the Law Commission to Reform Burial and Cremation Legislation	Comments made by members of the Committee to be included in the consultation response.	Chief Officer to build in the comments made by Members into the consultation response.	Katie Wilby	Completed
Wales Coast Path Access Barrier Review Update	Ensure local members are involved along with other stakeholders and are aware of what is happening in their ward areas.	Tom Woodall agreed to ensure local members are involved with developments in their ward areas.	Tom Woodall	Ongoing

Mae'r dudalen hon yn wag yn bwrpasol

ENVIRONMENT & ECONOMY OVERVIEW & SCRUTINY COMMITTEE

Date of Meeting	Tuesday, 15th January 2025
Report Subject	Council Plan 2024/25 Mid-Year Performance Monitoring Report
Cabinet Member	Cabinet Member for Economy, Environment and Climate Cabinet Member for Planning, Public Health and Public Protection Cabinet Member for Streetscene and Transportation
Report Author	Chief Officer (Planning, Environment and Economy) Chief Officer (Streetscene and Transportation)
Type of Report	Strategic

EXECUTIVE SUMMARY

The Council Plan 2023/28 was adopted by the Council in June 2023. This report presents a summary of performance of progress against the Council Plan priorities identified for 2024/25 at the mid-year (Quarter 2) position.

This report is an exception-based report and concentrates on those areas of performance which are not currently achieving their target, relevant to the Environment & Economy Overview & Scrutiny Committee.

Recommendations	
1.	To support the levels of progress and confidence in the achievement of priorities as detailed within the Council Plan 2023/28 for delivery within 2024/25.
2.	To support overall performance against Council Plan 2024/25 performance indicators/measures.
3.	To be assured by explanations given for those areas of underperformance.

REPORT DETAILS

1.00	**EXPLAINING THE COUNCIL PLAN 2024/25 PERFORMANCE AT MID-YEAR**
1.01	The Council Plan Mid-Year Performance Report provides an explanation of the progress made towards the delivery of the priorities set out in the 2023/28 Council Plan for delivery within 2024/25. The narrative is supported by information on performance indicators and/or milestones.
1.02	This report is an exception-based report and concentrates on those areas of performance which are not currently achieving their target.
1.03	**Monitoring our Performance** Each of the sub-priorities under each priority within the Plan have high level activities which are monitored over time. 'Progress' shows action against scheduled activity and is categorised as: • **RED**: Limited Progress, delay in scheduled activity and not on track • **AMBER:** Satisfactory Progress, some delay in scheduled activity, but broadly on track • **GREEN:** Good Progress, activities completed on schedule and on track
1.04	**Progress against Council Plan activity (Actions)** In summary, our overall progress against the quarterly activities /actions (135) identified in the Council Plan for 2024/25 is: • Good (green) progress was achieved in 67% (91) of activities. • Satisfactory (amber) progress was achieved in 29% (39) of activities. • Limited (red) progress was made in 4% (5) of activities
1.05	The activities which show a **Red RAG** status and are off track at mid-year (Quarter 2), relevant to the Environment & Economy Overview & Scrutiny Committee are listed below:-

PRIORITY	ACTIONS		
	GREEN	AMBER	RED
Poverty	12	1	0
Affordable and Accessible Housing	7	9	1
Green Society and Environment	19	7	1
Economy	15	7	1
Personal and Community Well-being	10	2	0
Education and Skills	15	5	0
A Well Managed Council	13	8	2
Overall Progress	**91 (67%)**	**39 (29%)**	**5 (4%)**

PRIORITY: GREEN SOCIETY AND ENVIRONMENT

Sub Priority: Circular Economy

CST025T - Achieve Welsh Government recycling targets.

The year end recycling performance for 2023/24 was 62.77% (unverified by Natural Resources Wales). This was below the 64% required by the in-year target and well below the 70% target for 2024/25 (this year). Quarter 1 (April - June 2024) data submission has shown no improvement to the existing recycling performance.

Cabinet has approved a transition to a three weekly residual waste model that will see a potential increase in recycling performance by 4.5%. A further report will be presented through the governance cycle in November to present an implementation and communication plan to members ahead of the service change.

Other interventions set out in the Resource and Waste Strategy are being progressed which will further improve recycling performance.

PRIORITY: ECONOMY

Sub Priority: Rural Regeneration

CPE052T - Recruit a Digital Connectivity Officer to support rural communities to access better quality connectivity options.

Recruitment has been frozen due to Council budget constraints.

1.06 **Performance against the Council Plan Performance Indicators (Measures)**

Analysis of performance against the performance indicators is undertaken using the RAG status. This is defined as:

- **RED** - Under-performance against target.
- **AMBER** - Where improvement may have been made but performance has missed the target.
- **GREEN** - Positive performance against target.

1.07 Analysis of the mid-year (Quarter 2) performance measures (52) against the targets set for 2024/25 shows:

- 38 (73%) measures have a green RAG status
- 5 (10%) measures have an amber RAG status
- 9 (17%) measures have a red RAG status

PRIORITY	MEASURES		
	GREEN	AMBER	RED
Poverty	8	1	0
Affordable and Accessible Housing	11	0	5
Green Society and Environment	6	2	0
Economy	2	1	1
Personal and Community Well-being	9	1	0
Education and Skills	0	0	0

A Well Managed Council	2	0	3
Overall Progress	**38 (73%)**	**5 (10%)**	**9 (17%)**

1.08 The performance indicators/measures which show a **Red RAG** status for performance against the target set, relevant to the Environment & Economy Overview & Scrutiny Committee are listed below:

PRIORITY: ECONOMY

Sub Priority: Reducing Worklessness

CPE013M - Number of individuals receiving support.

(Actual 108 – Target 142)

In Quarter 2, 56 participants registered on the C4W+ programme. Referrals obtained via Job Centre Plus, Working Wales, Employment hubs, the Council's website and outreach events. In order for participants to register onto the programme database, the relevant identification must be obtained. This is not a true reflection on the number of referrals within this Quarter as mentors are still working with participants to obtain the identification required by Welsh Government therefore, flagging red.

2.00	**RESOURCE IMPLICATIONS**
2.01	There are no specific resource implications for this report.

3.00	**IMPACT ASSESSMENT AND RISK MANAGEMENT**

3.01

Ways of Working (Sustainable Development) Principles Impact

The Council Plan 2023/28 continues to be aligned to the Sustainable Development Principles:

Long-term	Throughout the Mid-Year Performance Monitoring Report there are demonstrable actions and activities which relate to all the Sustainable Development Principles. Specific case studies will be included in the Annual Performance Report for 2024/25.
Prevention	
Integration	
Collaboration	
Involvement	

By completing a high-level IIA for the Council Plan (2023-28), it enabled the Council to have an overview of the various additional IIA's that will be carried out to support the Council Plan (2023/28) priorities.

Well-being Goals Impact

The Council Plan (2023/28) continues to provide evidence of alignment with the seven Well-being Goals (part of the Well-being of Future Generations (Wales) Act 2015 and Five Ways of Working (Sustainable Development Principle). To do this effectively the Council ensures that specific strategic and policy reports include impact and risk assessments and considers the Well-being Goals.

Prosperous Wales	Throughout the Mid-Year Performance Monitoring Report there is evidence of alignment with the Well-being Goals. Specific strategic and policy reports include impact and risk assessments.
Resilient Wales	
Healthier Wales	
More equal Wales	
Cohesive Wales	
Vibrant Wales	
Globally responsible Wales	

Council's Well-being Objectives

The Council undertook a review of its Well-being Objectives during the development of the Council Plan. The updated set of Well-being Objectives are a more focused set of seven. The Well-being Objectives identified have associated priorities for which they resonate. See the full list below.

Priority	**Well-being Objective**
Poverty	Protecting our communities and people from poverty by supporting them to meet their basic needs and to be resilient
Affordable and Accessible Housing	Housing in Flintshire meeting the needs of our residents and supporting safer communities
Green Society and Environment	Limiting the impact of the Council's services on the natural environment and supporting the wider communities of Flintshire to reduce their own carbon footprint
Economy	Connecting communities and enabling a sustainable economic recovery and growth

Personal and Community Well-being	Supporting people in need to live as well as they can
Education and Skills	Enabling and Supporting Learning Communities
A Well Managed Council	A responsible, resourceful, and trusted Council operating as efficiently as possible

The information detailed within the Council Plan Mid-Year Performance Report 2024/25 demonstrates the progress made against the Well-being Objectives.

Risks are identified as part of the annual review of the Council Plan and are detailed within Council Plan (Part 2 Document). In accordance with the Risk Management Framework, risks are reviewed monthly and reported upon.

4.00	**CONSULTATIONS REQUIRED / CARRIED OUT**
4.01	Consultation with Senior Managers and Chief Officers was undertaken in setting the actions and measures to support performance of the Council Plan 2023/28.
4.02	The actions/measures detailed within the Council Plan are monitored by the respective Overview and Scrutiny Committees according to the priority area of interest.

5.00	**APPENDICES**
5.01	Appendix 1 - Council Plan 2024/25 Mid-Year Performance Monitoring Report Appendix 2 - Council Plan 2024/25 Part 2: Milestones and Measures Document

6.00	**LIST OF ACCESSIBLE BACKGROUND DOCUMENTS**
6.01	**Council Plan 2023/28** https://www.flintshire.gov.uk/en/PDFFiles/Council-Democracy/Council-Plan-and-Well-Being-Objectives/Council-Plan-2023-28.pdf
7.00	**CONTACT OFFICER DETAILS**
7.01	**Contact Officer**: Sam Perry **Telephone**: 01352 701476 **Email**: sam.perry@flintshire.gov.uk

8.00	GLOSSARY OF TERMS
8.01	**Council Plan:** the document which sets out the annual priorities of the Council. It is a requirement of the Local Government and Elections (Wales) Act 2021 for organisations to 'set out any actions to increase the extent to which the council is meeting the performance requirements.' Plans for organisations should be robust; be clear on where it wants to go; and how it will get there.
8.02	**An explanation of the report headings:** **Measures (Key Performance Indicators - KPIs)** **Actual (YTD)** – the year-to-date performance identified i.e., by numbers, percentages, etc. **Target (YTD)** – The target for the year to date which is set at the beginning of the year. **Current RAG Rating** – This measures performance for the year against the target. It is automatically generated according to the data: • **Red** = a position of under performance against target • **Amber** = a mid-position where improvement may have been made but performance has missed the target; and • **Green** = a position of positive performance against the target.

Mae'r dudalen hon yn wag yn bwrpasol

Council Plan Mid-Year Performance Monitoring Report 2024/25

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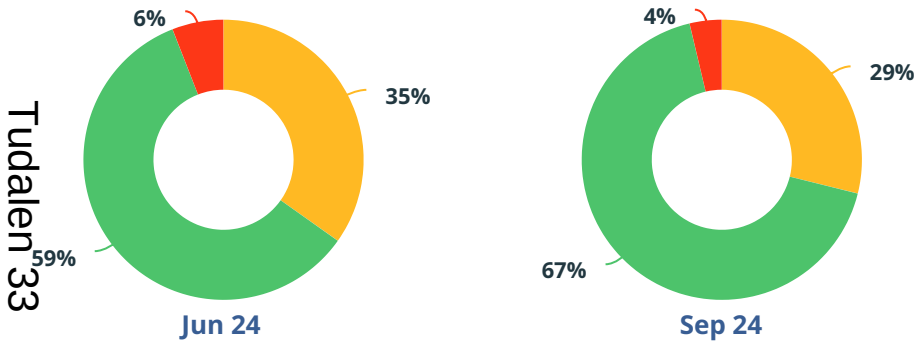
Council Plan 2023-28

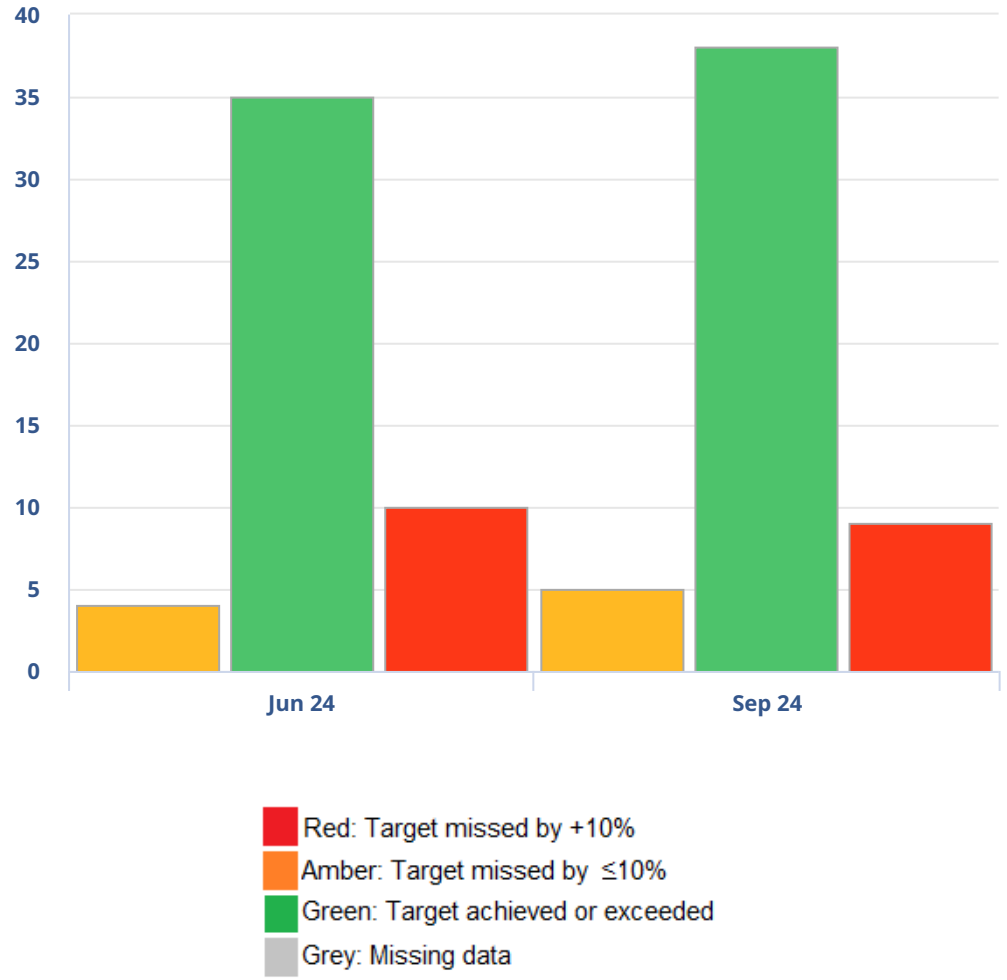
Mid-year Performance Report 24/25

Performance Summary

Actions RAG Status (Mid-year)



Quarterly and Bi-annual Measures RAG Status (Mid-year)



Total Actions	Quarterly Actions	Annual Actions
140	135	5 (reported in Q4 only)

Red	Amber	Green	Missing Update
5	39	91	0

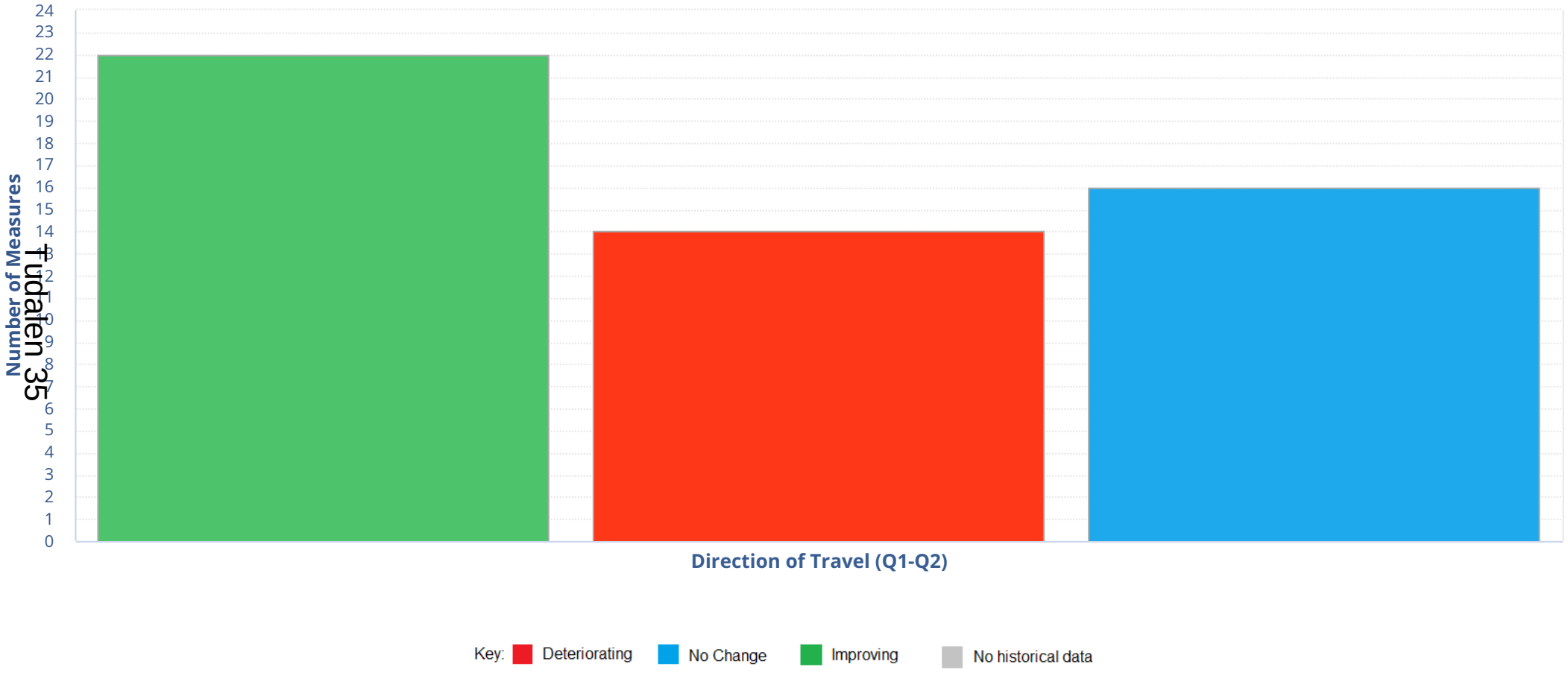
Actions Off Track

	Priority	Action	RAG
CFI005T	A Well-Managed Council	Ensure the funding needs of the Council over the medium term are met through financial planning	▲
CFI007T	A Well-Managed Council	Ensure an adequate level of reserves is maintained by the Council	▲
CHS036T	Affordable and Accessible Housing	Identify a site for a young person's supported housing provision offering accommodation and support services	▲
CPE052T	Economy	Recruit a Digital Connectivity Officer to support rural communities to access better quality connectivity options	▲
CST025T	Green Society and Environment	Achieve Welsh Government recycling targets	▲

Total Measures	Quarterly Measures	Bi-annual Measures	Annual Measures
88	49	3 (reported in Q2 and Q4 only)	36 (reported in Q4 only)

Q2 Measure Performance

This chart indicates the performance of measures against target compared to the previous period



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Poverty

Well-being Objective: Protecting our communities and people from poverty by supporting them to meet their basic needs and to be resilient.

Poverty

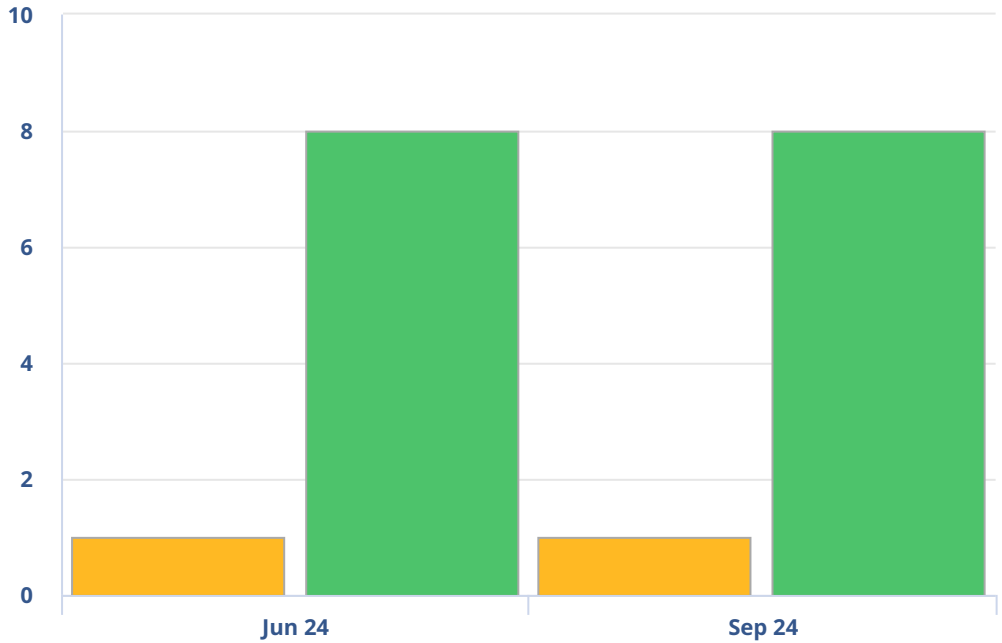
Protecting our communities and people from poverty by supporting them to meet their basic needs and to be resilient

Performance Summary

Actions RAG Status (Q1 and Q2)

- Red: Off Track - delay in progress
- Amber: Monitor - some delay in progress but broadly on track
- Green: On Track - completed or progressing as planned
- Grey: Missing data

Measures RAG Status (Q1 and Q2)



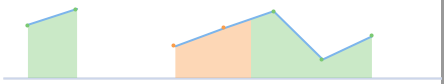
- Red: Target missed by +10%
- Amber: Target missed by ≤10%
- Green: Target achieved or exceeded
- Grey: Missing data

Fuel Poverty

Households that spend more than 10% of their income (after housing costs) on energy

	Action	RAG	Comments
CPE057T	Reduce the risk of fuel poverty for residents by increasing the energy efficiency of homes	★	To date, 746 measures have been delivered (Quarter 1 - 327, Quarter 2 - 419) against an annual target of 1200. The measure is made up of various component parts delivered by the Domestic Energy Efficiency Project team. Included within the statistic are work carried out on private and public housing stock for renewable heating, gas central heating, loft and cavity insulation and solar photo voltaic installations.
CPE058T	Engage, support and refer vulnerable households to reduce fuel poverty and improve health and well-being	★	During Quarters 1 and 2, 168 households were supported (target for 2024/25 is 200). This measure consists of work carried out on private and public housing stock for pre and post installation work carried out as well as energy advice, help and guidance for the general public to assist with fuel poverty.

Fuel Poverty - Quarterly Measures

Measure	Measure Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CPE001M	Total number of households receiving energy efficiency improvements	746	600	566	★	
The measure is made up of various component parts delivered by the Domestic Energy Efficiency Project team. Included within the statistic are work carried out on private and public housing stock for renewable heating, gas central heating, loft and cavity insulation and solar photo voltaic installations.						
CPE014M	Providing advice and signposting support to vulnerable households	168	100	246	★	
Measure consists of work carried out on private and public housing stock for pre and post installation work carried out on various property types and potential measures as well as energy advice, help and guidance for the general public to assist with fuel poverty and the current energy crisis in general.						

Green Society and Environment

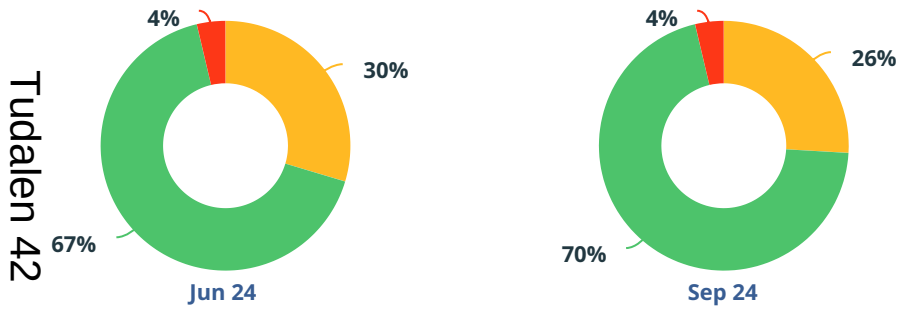
Well-being Objective: Limiting and enhancing the impact of the Council's services on the natural environment and supporting the wider communities of Flintshire to reduce their own carbon footprint.

Green Society and Environment

Limit impact of our services on the environment and support our community to reduce carbon footprint

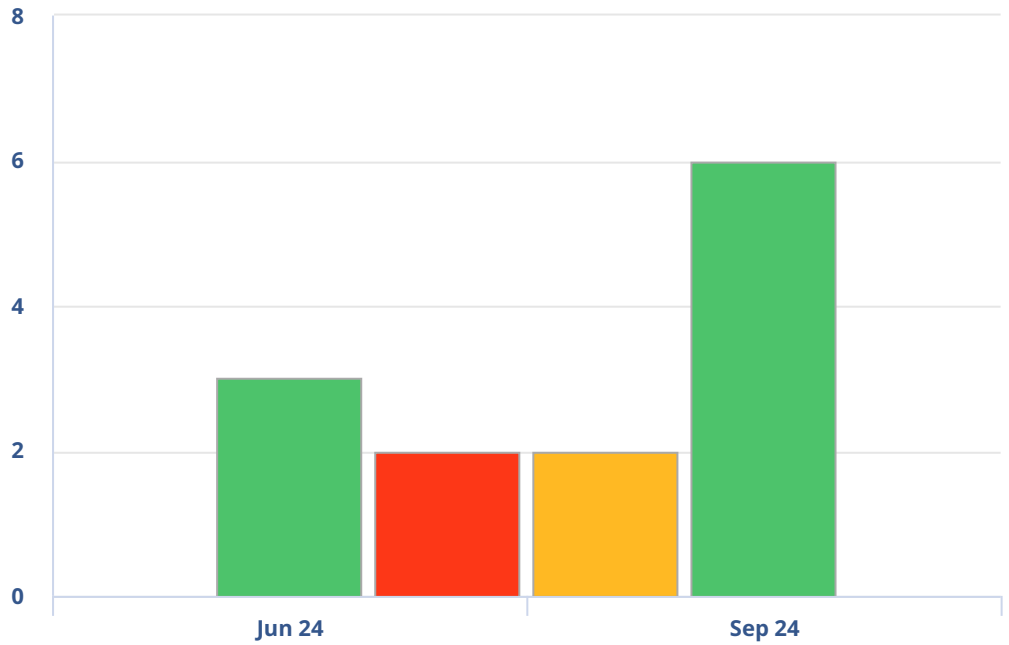
Performance Summary

Actions RAG Status (Q1 and Q2)



- Red: Off Track - delay in progress
- Amber: Monitor - some delay in progress but broadly on track
- Green: On Track - completed or progressing as planned
- Grey: Missing data

Measures RAG Status (Q1 and Q2)



- Red: Target missed by +10%
- Amber: Target missed by ≤10%
- Green: Target achieved or exceeded
- Grey: Missing data

Actions off Track

Action Code	Action	RAG
CST025T	Achieve Welsh Government recycling targets	▲

Measures off Track

This report does not contain any data

Deteriorating Quarterly Measures (Q1-Q2)

	Measure	Jun 24	Sep 24	Trend
No Data				

Deteriorating Bi-annual Measures (Q4-Q2)

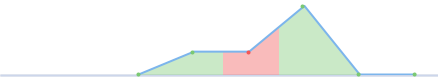
	Measure	Mar 24	Sep 24	Trend
CPE049M	Percentage of Town and Community Councils accessing support	59%	82%	
CPE050M	Percentage of schools accessing the support package	25.0%	41.0%	

Active and Sustainable Travel Options

Create opportunities to increase levels of walking and cycling (Active Travel) and the use of sustainable public transport options, enabling the undertaking of multi-modal transport journeys to access key destinations

	Action	RAG	Comments
CST024T	Promote active travel and further develop the County's walking and cycleway network	★	Successful funding applications totaling £1.882 million has been allocated by the Welsh Government to deliver a wide range of Active Travel improvements. The following schemes are proposed: • **Upper & Lower Aston Hall Lane - £720k**: This will facilitate the implementation of a footway to improve hazardous walking conditions between Aston and Hawarden. • **Holywell Safer Routes - £450k**: This will enhance existing walking and cycling routes to schools, including the installation of pedestrian crossings. • **Active Travel Core Funding - £712k**: This will enable the implementation of five pedestrian crossings at key school sites throughout Flintshire, various isolated improvements countywide such as the provision of dropped kerbs and tactile paving, and the purchase of land for future scheme developments. Schemes are currently at various stages of development, however, all schemes are on target for completion in accordance with grant funding conditions.
CST028T	Implement formalised crossing facilities at existing school crossing patrol sites	★	Welsh Government funding has been secured to implement a total of A total of 5 formalised crossing facilities at existing designated School Crossing Patrol sites. Detailed design currently underway. Individual crossing points are at various stages of progression, however, all crossings are on target for implementation in accordance with grant funding conditions.
CST030T	Implementation of 20mph exceptions across the County	★	Following welsh governments listening campaign, Flintshire have received in excess of 1,000 requests for roads to be reverted back to 30mph. Speed limit assessments have been prioritised for A and B classification roads. Those roads that have met the criteria for change are in the process of being formally advertised which commenced on 8th November and will continue into the new year (excluding Christmas). For those schemes that proceed, works to implement the changes will commence in the new year. An additional £645k funding has been awarded by Welsh Government to progress the works this financial year.
CST032T	Support the development of public electric vehicle charging network	●	Procurement – for supply, installation and ongoing maintenance: We're extending our existing contract with SWARCO as the Charge Point Operator (CPO). When we tendered previously using the ORCS funding, we included within the tender that further sites could be considered. For the continuation of the EV Strategy (decarbonisation plan) we're looking to utilise the SEWTAPS framework and appointing AMEY via direct award All commissioning forms have been completed this week.
CST033T	Declassification of hazardous routes across the county where appropriate through the implementation of engineering initiatives	●	A550 Hope to Penyffordd Active travel scheme was completed last financial year enabling a safe walking route to nearby schools. Completion of the scheme has declassified a previously identified hazardous route. Approval required to formally declassify.

Active and Sustainable Travel Options - Quarterly Measures

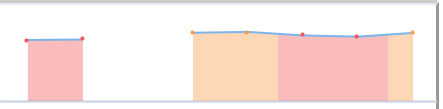
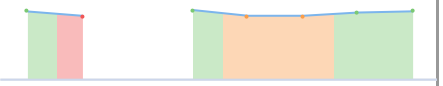
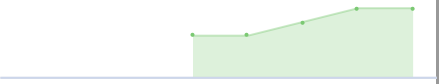
Measure	Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CST014M	Number of formalised crossing facilities implemented at existing School Crossing Patrol sites	0	0	1	★	
A total of 9 sites are proposed for the implementation of formal pedestrian facilities. 5 sites have been formally advertised with the remaining 4 scheduled to be advertised in the coming weeks following localised consultation. Construction anticipated to commence after Christmas following tender exercise.						

Circular Economy

Support and promote the Welsh Government's strategy to create a sustainable, circular economy in Flintshire

	Action	RAG	Comments
CST025T	Achieve Welsh Government recycling targets	▲	The year end recycling performance for 2023/24 was 62.77% (unverified by Natural Resources Wales). This was below the 64% required by the in year target and well below the 70% target for 2024/25 (this year). Quarter 1 (April - June 2024) data submission has shown no improvement to the existing recycling performance. Cabinet has approved a transition to a three weekly residual waste model that will see a potential increase in recycling performance by 4.5%. A further report will be presented through the governance cycle in November to present an implementation and communication plan to members ahead of the service change. Other interventions set out in the Resource and Waste Strategy are being progressed which will further improve recycling performance.
CST026T	Work in partnership, actively support and engage with community led groups by developing recycling initiatives	●	We have successfully engaged with residents to improve recycling uptake at kerbside (and HRC sites) by attending local events, carrying out door knocking campaigns, promoting recycling information on communication channels and working with local council members to spread key messages. A communication plan to support 3-weekly collection will assist with engagement opportunity and allow us to identify resident barriers to recycling which will help identify initiatives like recycling sack trials, recycling vapes at HRCs and more accessible small WEE disposal (all of which are underway).
CST031T	Undertake a feasability study for future operational depots	★	Work is underway by WRAP and Local Partnerships to undertake a full audit of all operational depots, locations and facilities. Discussions have also taken place with Welsh Government regarding the Councils aspirations and funding requirements.

Circular Economy - Quarterly Measures

Measure	Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CST004M	Percentage of waste reused, recycled or composted	66.4%	70.0%	66.6%	●	
The recycling percentage for Quarter 1 is 66.44%, an minimal decrease in comparison to the same period in the previous year. This shows sustained performance across the service. *Quarter 1 data can not be utilised alone to evaluate the Councils overall recycling performance as certain waste streams (garden waste) are much higher during the summer months.						
CST005M	Average Recycling rate across Household Recycling Centres (HRCs)	81.5%	80.0%	83.0%	★	
The Quarter 2 performance remains above the 80% target as waste input such a garden waste and DIY waste are at their highest yields throughout the summer months.						
CST021M	Number of education campaigns on recycling and waste minimisation undertaken to improve recycling performance	5	3	3	★	

There have been five significant recycling campaigns undertaken throughout Quarter 2. These were:

- Spring clean event (Mold) which entailed a "recycle as you go" litter pick with wash stations and a local charity turning the clean plastic litter into art and household items.
- Community Engagement: attended over 20 engagement events to educate residents on how they can recycle more and minimise waste whilst supporting them to reuse household items.
- Created learning resources for schools to deliver educational lessons on the importance of recycling and it's benefits, while attending primary schools to deliver assemblies and ran educational competitions.
- Continue to promote our internal services such as furniture donations and bulky collections for reuse, small WEE / cable recycling and new initiative such as recycling vapes at HRCs.
- Delivered a programme of improving recycling collections for our flats estate to improve customer experience and increase recycling collected.

Climate Change and Adaptation

Be more resilient to the changes that have happened due to climate change and prepare for predicted future change

	Action	RAG	Comments
CPE012T	Review the Council's Flood Risk Management Strategy	★	This work is being undertaken with support from Waterco and is ongoing. Risk based community specific and policy action plans have been derived from national flood maps and most recent historic flood incidents in Flintshire (notably Storm Christoph and Storm Babet) which underpin areas for future investment with grant support from Welsh Government and statutory responsibilities required by legislation. Working draft is being finalised for HRA and SEA appraisal and programme for internal and public consultations to be confirmed.
CPE015T	Assess the feasibility of schemes within land assets for resisting flood and drought while enhancing biodiversity and increasing carbon storage	★	The report is in final draft and undergoing internal review with cross portfolio teams.
CPE047T	Identify projects to further support climate adaptation ambitions following Welsh Government guidance	★	Climate risk and adaptation that is directly linked to the Council will be included in the reviewed strategy this year. Workshops continue with internal officers and Members. The public survey was open over the Summer and the results of this are now being collated. The Public Services Boards (PSB) in the region have committed to developing a regional climate risk assessment that the Council will feed into as a key stakeholder.
CPE060T	Carry out flood investigations and alleviation works where appropriate	★	A number of formal Section 19 investigations have been completed for key areas affected by Storm Babet and used to inform grant support bids. Current Welsh Government FCERM programme includes five schemes in Flintshire wholly funded by the Welsh Government Grant are on track for delivery of Outline Business Cases (OBC`s) for future years delivery. Delivery and construction programmes will be discovered as Expressions of Interest (EOI`s) during November 2024, and design and delivery in future years and in line with available support funding from Welsh Government and internal match funding at 15% of overall Project costs. Formal investigation will be ongoing as routine, where required, by flood incidents.
CPE076T	Ensure climate change and biodiversity are considered a priority in key decision making across all Council services	★	A management action was agreed within the recent internal audit to identify all strategies and plans across each portfolio of the Council so that when these strategies and plans are due for review, carbon commitments and ambitions can be reflected within the necessary service areas. Carbon is now a mandatory module within the Elected Members training plan and the Climate Essentials e-learn has been launched to help facilitate this training and ensure decision makers are considering carbon within their roles.
CPE093T	Produce draft strategy by April 2024 for consultation and submit to Welsh Government by October 2024	★	Good progress is being made.

Fleet Strategy

Reducing the environmental impact of our fleet

	Action	RAG	Comments
CST015T	Reduce the environmental impact of our fleet by transitioning to ultra low emission vehicles (ULEV)		Sept 2024 Comment - Work is progressing on bringing fleet services back in-house following the insolvency of the previous contractor. This includes renewing the fleet through new suppliers to ensure service continuity. Looking ahead, the Council is committed to expanding its Ultra Low Emission Vehicle (ULEV) fleet beyond 2024. This will be supported by a thorough review of electric vehicle (EV) infrastructure needs and an operational estate feasibility study.

Flintshire Forest

Development of a plan to establish a Flintshire Forest that will identify available land assets, budget requirements and a realistic delivery timescale

	Action	RAG	Comments
CPE083T	Establish the Flintshire Forest and put forward sites which will contribute towards the National Forest	★	The Flintshire Forest Plan is awaiting Cabinet approval. The first site has been approved to become part of the National Forest.

Flood Risk Management Strategy

Refresh the Council’s flood risk management strategy to align with the national strategy and identify communities at most risk in Flintshire and the actions required to mitigate this risk

	Action	RAG	Comments
CPE012T	Review the Council's Flood Risk Management Strategy	★	This work is being undertaken with support from Waterco and is ongoing. Risk based community specific and policy action plans have been derived from national flood maps and most recent historic flood incidents in Flintshire (notably Storm Christoph and Storm Babet) which underpin areas for future investment with grant support from Welsh Government and statutory responsibilities required by legislation. Working draft is being finalised for HRA and SEA appraisal and programme for internal and public consultations to be confirmed.

Green Access

The promotion, good management and protection of our green spaces to deliver multiple benefits to the environment and our residents and visitors

	Action	RAG	Comments
CPE063T	Deliver the Rights of Way Improvement Plan with a focus to ensure improved access for all	★	The project for 2024/25 is on track and in terms of physical Improvements, the team have achieved a spend of £34,330 against the total £70,513. The team has replaced 14 stiles with kissing gates out of a target of 35, and undertaken 75 meters of surface improvement works, which included installing boardwalks drainage pipe crossings and stone. Improvements to information and promotion and Improvements to access/egress points to open access land and green space have yet to start but is programmed in for the winter season. The detailed update to the Local Access forum was well received. No further comment was given but the forum wished to be kept updated and in particular with regard to the funding for 2025/26 Delivery of the 2024/25 work programme is on track. Access Improvement Grant has been secured and actively delivered, 6 month report received by Flintshire Local Access Forum
CPE082T	Complete the Shared Prosperity Funding programme and launch the Flintshire Coast park	★	The profiled claim 5 deadline was met and reported on the status of individual outputs: The Interpretation audit is complete and is informing the interpretation strategy, to be completed by November 2024. The Marketing strategy has been completed with detailed design and branding guidelines produced. A new logo is being used and signs installed. Eight feasibility studies associated with key project aspirations at each hub are either complete or drawing to final draft. A five year Management Plan has been commissioned and the final draft is due to be received in November 2024. £40,000 of spend to 'improve' asset is 80% complete and will see new benches, footpaths, signage and other public realm improvements. Consultation on linking Connah's Quay is complete and briefing sessions with all coastal community councils are complete. Project delivery in final stages and on track

Green Environment

Enhance and increase biodiversity and trees to deliver multiple benefits for people, wildlife and the environment

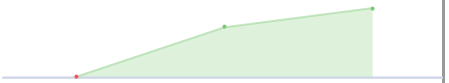
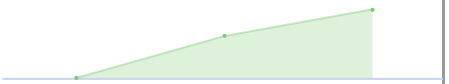
	Action	RAG	Comments
CPE061T	Enhance the natural environment through the delivery of the Environment (Wales) Act 2016 - Section 6 Biodiversity Duty	★	Progress against the 20 actions outlined in the Section 6 Plan is continuing well. Three of the 20 actions are behind schedule but the rest are In progress with 1, "Obtaining bee friendly status" completed. Progress against the Plan is highly dependent on resourcing and capacity, which at the moment is provided through the Local Places for Nature Welsh Government Biodiversity grant. The Plan will undergo review this year with an updated Section 6 Plan from 2025.
CPE062T	Deliver an increase in canopy cover as part of the Urban Tree and Woodland Plan	★	Tree planting is carried out in the autumn/winter period. Planning and procurement is currently being carried out and is on track.
CPE077T	Progress Ash Dieback Action Plan	●	Survey season completed. Awaiting data analysis from the new Natural Environment Technician to contact private landowners. The Tree Inspector is currently planning and procuring winter works to mitigate the risk of Flintshire owned trees.

Net Zero Carbon Council

A net carbon zero Council by 2030 and supporting wider decarbonisation actions across the County

	Action	RAG	Comments
CPE045T	A net zero carbon Council by 2030 and supporting wider decarbonisation actions across the County	★	The Council's carbon footprint for 2023/24 has been calculated and submitted to Welsh Government. The latest carbon footprint report will be presented to Cabinet in the coming months. The current strategy is being reviewed this year and will highlight the actions of focus in continuing to decarbonise the Council's assets and services while also using the Council's influence to our communities and local businesses. The programme of activities to decarbonise the Council's assets and services continues to work to plan by meeting interim targets.
CPE059T	Develop plans towards net zero carbon for our assets in line with Welsh Government guidance	★	The Council's investment in the RE:fit contract will see a suite of energy efficiency and renewable energy works carried out across our building assets with prioritisation being given to those that are higher risk / have high emission output. A programme of works is being developed by the contractor, who will use the Council's investment as match funding to levy additional funds from external sources.
CPE090T	Review of Climate Change Strategy	★	A review of the Climate Change Strategy is underway with both internal and external workshops. A public survey was launched over the summer, and results of this are being collated for input into the revised strategy.

Net Zero Carbon Council - Bi-annual Measures

Measure	Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CPE048M	Number of contracts with carbon impact assessed	3	2	0	★	
Engagement with large contracts continues to make the biggest impact and show best practice.						
CPE049M	Percentage of Town and Community Councils accessing support	82%	60%	0%	★	
Since launch there has been several engagement activities to drive awareness and uptake of the Toolkits. These include; 6 x Toolkit Workshops (March and June 2024) where stakeholders were invited to learn about the materials and how to use them, and 4 x Town & Community Council Meeting Presentations (Saltney, Connah's Quay, Shotton and Mostyn). Workshop communications were issued to all Schools and Town & Community Councils supported by Keep Wales Tidy and One Voice Wales. Additionally, a Press Release was issued on 16th August 2024 raising further awareness. The % accessing the support package is taken from the number of downloads of the toolkit documents, and schools and Town & Community Councils have been actively engaging with the team to work through it.						
CPE050M	Percentage of schools accessing the support package	41.0%	30.0%	0.0%	★	
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Phosphates Mitigation

Provision of viable and deliverable options to mitigate the impact of phosphates from new development on Special Areas of Conservation protected rivers

	Action	RAG	Comments
CPE075T	Produce guidance on viable and deliverable options to mitigate the impact of phosphates from new development on Special Areas of Conservation (SAC) protected rivers	★	The need for mitigation measures to support housing allocations in the Local Development Plan is no longer applicable. Natural Resources Wales, following collaboration with, Dwr Cymru Welsh Water have issued revised permits for the Mold, Buckley and Hope waste water treatment works. Each waste water treatment works is operating well within the permit levels for phosphates creating the 'headroom' to accommodate waste water from housing allocations, without harming the Bala Lake and River Dee Special Area of Conservation.

Strategic Flood Consequences Assessment

Review the Council's Strategic Flood Consequences Assessment in light of the Ministerial letter of November 2021, to prepare for the implementation of revised TAN15 Development and Flood Risk guidance which became operational in June 2023

	Action	RAG	Comments
CPE088T	Review completed Strategic Flood Consequences Assessment in view of delays in publishing TAN15 incurred by Welsh Government, and the need to update by 1st June 2024. Publication of TAN15 by Welsh Government is delayed until at least the end of 2024		Review completed of Strategic Flood Consequences Assessment. Publication of the updated TAN15 by Welsh Government is delayed until at least the end of 2024
CPE091T	Submit the final Strategic Flood Consequences Assessment to Welsh Government		The SFCA has been largely completed by the Council's specialist consultants, with the exception of a few remaining minor queries. These will be resolved as soon as possible and submitted to Welsh Government. The SFCA shows that there are no concerns relating to LDP allocated sites. The publication of the revised TAN15 is delayed until the end of 2024 at the earliest but no recent updates have been provided by Welsh Government.

Strategic Flood Consequences Assessment - Quarterly Measures

Measure	Measure Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CPE026M	Percentage compliance with Welsh Government delivery timetable	95.0%	100.0%	95.0%		
Final queries to be raised with the consultants WaterCo before report is finalised.						

Economy

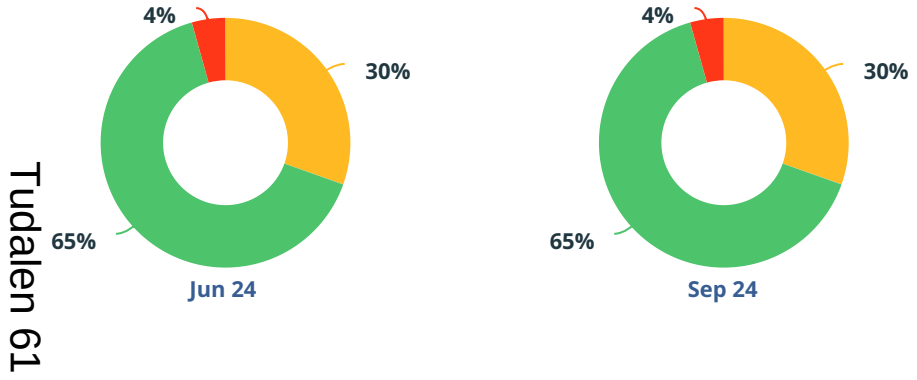
Well-being Objective: Connecting communities and enabling a sustainable economic recovery and growth.

Economy

Connecting communities and enabling a sustainable economic recovery and growth

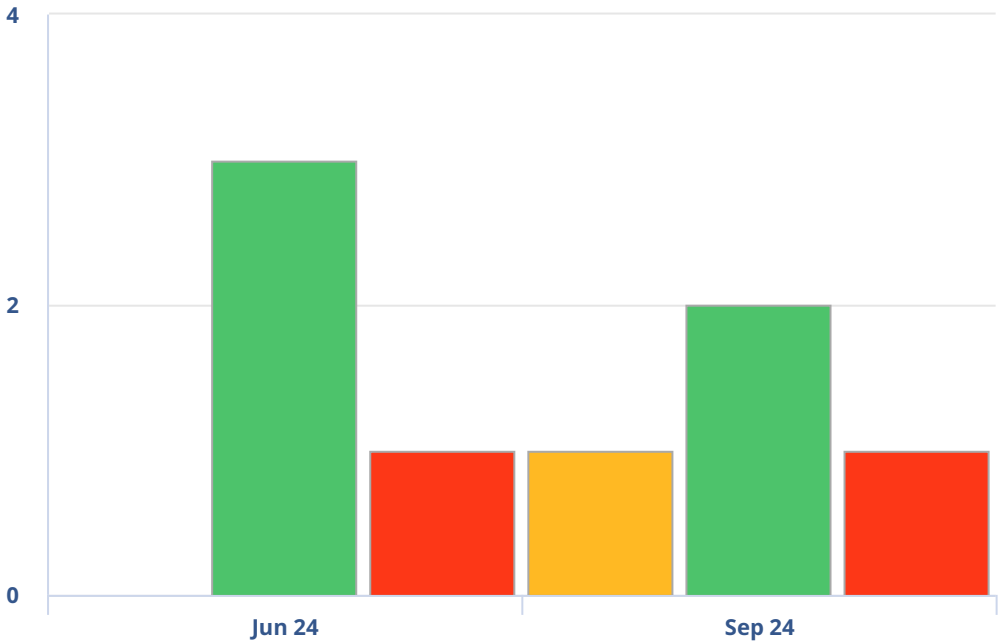
Performance Summary

Actions RAG Status (Q1 and Q2)



- Red: Off Track - delay in progress
- Amber: Monitor - some delay in progress but broadly on track
- Green: On Track - completed or progressing as planned
- Grey: Missing data

Measures RAG Status (Q1 and Q2)



- Red: Target missed by +10%
- Amber: Target missed by ≤10%
- Green: Target achieved or exceeded
- Grey: Missing data

Actions off Track

Action Code	Action	RAG
CPE052T	Recruit a Digital Connectivity Officer to support rural communities to access better quality connectivity options	▲

Measures off Track

	Measure	Actual	Target	RAG
CPE013M	Number of individuals receiving support	108	142	▲

Deteriorating Quarterly Measures (Q1-Q2)

	Measure	Jun 24	Sep 24	Trend
CPE041M	Percentage of decision made on planning applications in accordance with officer recommendation	100.0%	99.0%	↘
CPE012M	Number of individuals entering employment, learning or volunteering	32	57	↘

Business

Enable business continuity and encourage appropriate investment

	Action	RAG	Comments
CPE067T	Support small and/or local businesses to engage with public sector procurement opportunities	★	Business Development has worked with Robertson Construction (Mynydd Isa School development), Read Construction (Flint Primary School development) Wall-Lag Ltd (Domestic Energy) and Gilbert Ash (Theatr Clwyd development) to support local supply chain engagement with 149 independent businesses through delivery of Meet the Buyer sessions; develop corporate social responsibility activities and encourage added social value commitments from Tier 1 and Tier 2 contractors.
CPE068T	Support the County's street and indoor markets to thrive and grow	★	Mold Street Market continues to thrive with an average of 65 traders attending each market day. Mold Indoor Market is currently 100% occupied. Holywell Market has an average of 5 traders each week. Market events and activities include Young Traders Market to encourage the next generation of traders to start-up; group travel engagement and live radio broadcasts; all of which have increased footfall from residents and visitors to the towns. A dedicated Markets Promotion and Engagement Officer has been funded through the Shared Prosperity Fund to raise the profile of the county markets and the market offer to wider audiences through promotional campaigns and social media activity.
CPE069T	Support growth of the local and regional food and drink business sector through marketing and collaborative projects	★	The Council supported the Mold Food and Drink Festival organising group with arrangements for the three day festival in September 2024 which had 7,000 attendees over the weekend. Ongoing work is underway with the Clwydian Range Food and Drink Group and Flintshire Tourism Association to develop ideas on how we can improve Flintshire's profile as a high-quality food destination.
CPE070T	Support local businesses in their efforts to reduce their carbon footprint and become more resource efficient	★	Business Development works in partnership with Deeside Decarbonisation Forum to deliver network events that are designed to share best practice within private sector decarbonisation work programmes and encourage business collaboration across Flintshire. Since April 2024, 84 businesses have been engaged. Shared Prosperity Fund has been awarded to support a number of carbon reduction projects across Flintshire (ranging from private sector business grants to academic research) to encourage businesses to adopt greener technologies, reduce carbon footprints and become more resource efficient.

	Action	RAG	Comments
CPE071T	Increase the scale and impact of the social business sector	★	During this reporting period, 38 business support sessions were delivered to 15 social enterprises across Flintshire. This included, but was not restricted to, Business Planning, Cash Low Forecasting and Preparing for Investment, Social Impact reporting and Business Registrations. Three new social enterprises were supported through the registration process to become new Community Interest Companies; Sunday Gathering CIC, Core Impact Group CIC and Our Growing Space CIC. Another organisation was supported with an organisational review and conversion into a Community Interest Company; Cambrian Aquatics. Development of Flintshire's Social Enterprise Social Impact Toolkit is ongoing with 17 Flintshire based social enterprises now reporting on it. The current social value generated by the Flintshire Social Impact Toolkit for this financial years stands at £738,554. During this reporting period, a Networking for Social Good event was developed in Partnership with Robertson Construction. This event gave Flintshire based social enterprises the opportunity to pitch to sub-contractors working on the new school in Mynnydd Isa for free pieces of work, materials and knowledge exchange etc. and this was attended by 12 social enterprises from within Flintshire.
CPE084T	Liaise with UK and Welsh Governments to take the sub-regional Investment Zone through its gateway process.	●	The Gateway process is underway. The first Gateway is complete and signed off by UK and Welsh Governments. Preparation for Gateways two and three are underway. Open call for sites and projects held with very positive response. Workshops underway to determine interventions related with skills, innovation and transport. Finance and governance development underway.
CPE087T	Support the growth and development of the tourism and hospitality sector	★	Ongoing delivery of the new Flintshire Destination Management Plan which acts as a framework for tourism development and access to external funding. Developing the Flintshire Coast Park – Improving connectivity to our coast and countryside including visibility of assets by implementing a programme of new and upgraded tourist and boundary signs packages for sites of cultural, heritage and natural significance. New county boundary signs are being installed which replace the old outdated signs. Local industry tourism industry data received this Quarter for 2023. Tourism is currently worth £380m to our economy in Flintshire - up 16% from 2022. Supports in the region of 3,430 jobs - up 2.5% from 2022. Number of staying visitors 875K – up 1.6% on 2022. Number of day visitors 3m – up 5% on 2022 Around 300 visitor accommodation businesses in Flintshire 18,392 visitor accommodation bedspaces (86% in caravan and camping establishments). Flintshire Tourism Growth Scheme continues to provide support to tourism businesses wanting to invest in improving visitor experiences and target new markets. 30 tourism and hospitality businesses have successfully applied for financial support through this Shared Prosperity Funded project so far.

Digital Infrastructure

Ensure the digital networks facilitate and support recovery and growth

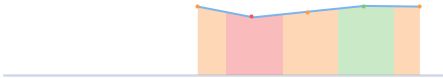
	Action	RAG	Comments
CPE080T	Improve digital connectivity across the County for businesses and residents	●	There are considerable programmes underway delivered by the private sector and UK Government to improve digital connectivity. In addition, a number of regional Growth Deal projects are in place and will invest in areas that have not benefitted from the major programmes once it is clear where gaps in coverage remain.
CPE089T	Reduce barriers to investment for network operators.	★	Open Access Agreements have now been signed with two companies who operate on behalf of Mobile Network Operators.

Local Development Plan (LDP) Targets

Achieve LDP policy objectives for growth, protection and enhancement

	Action	RAG	Comments
CPE038T	Monitor overall Local Development Plan performance via the Annual Monitoring Report and submit to Welsh Government	★	Following the adoption of the Local Development Plan (LDP) in January 2023, the first Annual Monitoring Report (AMR) has been prepared covering the period 01/04/23 to 31/03/24. The AMR was endorsed by the Planning Strategy Group on 13th September 2024 and will be reported to Cabinet for approval to be submitted to Welsh Government by the deadline of 31st October 2024. The AMR demonstrates that the Plan is performing well in terms of its strategy, policies and growth.
CPE039T	Maintain and update the Local Development Plan Housing Trajectory in line with planning decisions made	★	The updating of the housing trajectory forms part of the first Annual Monitoring Report (AMR) to be submitted to Welsh Government by 31/10/24. Work on monitoring housing delivery is undertaken each April and the housing trajectory for the first AMR has been updated accordingly.
CPE041T	Reference the Local Development Plan growth strategy in early work on a North Wales Strategic Development Plan	●	Responsibility for the Strategic Development Plan (SDP) rests with the Corporate Joint Committee (CJC) who have appointed a Project Coordinator to oversee the process. The Planning Strategy Manager is preparing a context report for all of the North Wales authorities covering a range of topics and issues and also preparing a draft structure for the SDP.

Local Development Plan (LDP) Targets - Quarterly Measures

Measure	Measure Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CPE041M	Percentage of decision made on planning applications in accordance with officer recommendation	99.0%	100.0%	99.0%		

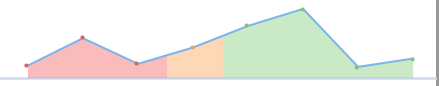
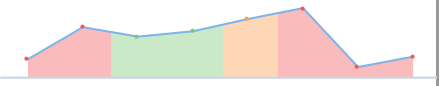
The vast majority of planning applications are approved by Officers under delegated powers in accordance with the Local Development Plan (LDP). Of the eight planning applications reported to Planning Committee for determination, five were approved in accordance with officer recommendations and three were refused contrary to officers recommendations. However, this was due to the types of development and differing assessments of local impacts rather not adhering to LDP policies.

Reducing Worklessness

Work with our partners to support individuals to gain employment

	Action	RAG	Comments
CPE073T	Co-ordinate a multi-agency approach to support businesses to recruit people from disadvantaged groups	★	In Quarter 2, The Jobs, Skills and Training events group which is a partnership between Communities for Work+, Job Centre Plus and Careers Wales, delivered a Health and Well-being event on the 18th September 2024, in Connahs Quay Civic Hall. Training was secured by the group for civil engineering in water utilities and participants completed the training and secured employment within this sector. Communities for Work+ in conjunction with the Council's Education department delivered information sessions over the summer months in Saltney, Queensferry and Holywell.
CPE074T	Deliver mentoring and wider support programmes to assist disadvantaged people to re-engage with the labour market	●	Individuals referred to the programme have been allocated a mentor who will assist the participant on their journey into employment eliminating any barriers they have to obtain meaningful employment opportunities. The employment hubs have been piloted over Quarter 2 located in Flint library, Connahs Quay Connects and Holywell Connects. The hubs give the residents of Flintshire the opportunity to gain information about the programme and sign up to receive support.

Reducing Worklessness - Quarterly Measures

Measure	Measure Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CPE012M	Number of individuals entering employment, learning or volunteering	57	46	90	★	
In Quarter 2, 25 participants of the Communities for Work+ programme gained employment, entered learning and voluntary opportunities. Individuals have been successful in securing roles within the following sectors:- hospitality, retail, warehouse, education, water utilities, trainee pharmacist and self employment in teeth whitening and cafe owner.						
CPE013M	Number of individuals receiving support	108	142	245	▲	
In Quarter 2, 56 participants registered on the C4W+ programme. Referrals obtained via Job Centre Plus, Working Wales, Employment hubs, the Council's website and outreach events. In order for participants to register onto the programme database, the relevant identification must be obtained. This is not a true reflection on the number of referrals within this Quarter as mentors are still working with participants to obtain the identification required by Welsh Government therefore, flagging red.						

Rural Regeneration

Ensure that Economy interventions consider and meet the needs of rural businesses and individuals

	Action	RAG	Comments
CPE052T	Recruit a Digital Connectivity Officer to support rural communities to access better quality connectivity options	▲	Recruitment has been frozen due to Council budget constraints.
CPE053T	Commission a data review for rural Flintshire and hold community consultation to better understand rural community needs	●	The commissioning process for this study has started in conjunction with Wrexham University. Work is underway to link the study to wider rural needs work that is being undertaken across Wales.
CPE078T	Ensure that Economy interventions consider and meet the needs of rural businesses and individuals.	●	All the current main economy interventions cover all of Flintshire not just urban unless specifically targeted at town centre properties and businesses. There are a number of interventions that are more likely to benefit rural businesses and rural, particularly those focused on tourism.

Town Centre Regeneration

Regenerate and re-invent our town centres

	Action	RAG	Comments
CPE064T	Monitor the health and vitality of town centres to support effective management and business investment decisions	★	Work has continued between July and September 2024, to capture and monitor data sets and also obtain anecdotal feedback from town centre businesses regarding performance indicators such as footfall, dwell times, sales. This work is ongoing throughout 2024/25 as part of the wider Place Making Plan development work programme and implementation of externally funded activity. Footfall data for towns across Flintshire continues to demonstrate a correlation between events and activities being delivered in town centres and an increase in footfall. Public consultation continued during the last 3 months has focussed on towns of Connah's Quay, Flint, Mold and Queensferry and provides the Council with insightful information about when local people choose to visit town centres, when and what for and their perceptions of the town centres. This will influence the development of emerging plans and activities for these towns. Vacant property levels across towns in Flintshire remain at between 14% and 24%. Vacant properties are known to affect people's perception and likelihood of visiting towns, and therefore, targeted interventions to support investment in this area continues to be available/ offered as an opportunity to owners and leaseholders
CPE065T	Encourage and support investment in town centre properties to facilitate more sustainable uses and including improvements to the environment	★	£1.8 million has been secured by the Council's Regeneration from Welsh Government's Transforming Towns and UK Government's Shared Prosperity Fund (SPF) to be implemented across towns in Flintshire during 2024/25. Good progress has been demonstrated to deliver this programme, and evidence tangible benefits to local people, businesses, community organisations, local economy and the environment. A range of capital and revenue funded projects have been completed through the SPF funded programme, some at delivery phase as of 30th September 2024, and there are at least a further eight projects which will be delivered with external funding secured over the coming months. These include property improvement grants for commercial premises (15), grants to develop and deliver town centre events and activities (12), tailored business support provision for 45 businesses, place making development activity for seven towns across the county and work to develop 12 feasibility studies and new project proposals for future investment beyond the current financial year. Work is ongoing throughout 2024/25 to support the investment of capital and revenue funding into town centres across Flintshire, as well as the Council's Regeneration Team working to identify, apply for and secure any additional funding for 2024/25 and also 2025/26. Between July and September 2024, the following funding approvals were secured from Welsh Government: • £200,000 extra Transforming Towns Capital investment in town centre premises (increasing the total to £639,000 for 2024/25). • £35,110 Revenue Grant award to cover costs associated to Place Making Plan development and community engagement/ consultation

	Action	RAG	Comments
CPE066T	Engage town centre small businesses and promote support packages available to them	★	The Council's Regeneration Team has commissioned 'Save The High Street' to engage with businesses across towns in Flintshire and deliver a tailored business support project and package of interventions via the 'JoinJo' support platform online. In Quarter 2 of 2024/25, 14 businesses have benefitted from detailed 'Business Health Checks' (an audit of all aspects of their business and how they are currently performing and identification of areas of the business to focus on as improvement areas). 14 businesses from across town centres in Flintshire have participated in a eight week support project, which is designed to help them to deliver their identified business improvement goals and actions. Excellent feedback has been received from this project, which is being delivered with external funding secured from UK Government's Shared Prosperity Fund. As of 30th September 2024, a further 22 businesses are signed up to participate in the next cohort of the ''Save The High Street' support programme. Several in-person meetings and events have been delivered as part of the Save The High Street tailored business support project between July and September 2024, and additional to this, online training sessions for businesses around themed areas of support have been developed and promoted (some are also upcoming in October and November 2024) Social media coverage, press releases and direct e-mailing to businesses in towns across Flintshire have been used as methods of engaging town centre businesses. This project will run until the end November 2024, the end of the funding project - funding secured through UK Government's Shared Prosperity Fund. The project is being evaluated (feedback from businesses who participated, external evaluation consultant and the support and benefits featured in a film to showcase the projects delivered in town centres across Flintshire with funding secured from the UK Government's Shared Prosperity Fund. The findings of these pieces of work will inform future support packages/ services developed to support town centre businesses across Flintshire.

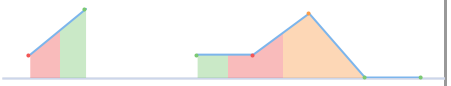
	Action	RAG	Comments
CPE079T	Understand the needs of and supporting community enterprises in town centre locations	★	Work has been ongoing during July and September 2024, to understand the needs of community enterprises across town centres in Flintshire. This includes: 1) Supporting NEWCIS to attract and begin spending a capital investment to create a new hub facility to operate from (bringing a vacant former bank building in Mold back into use with £100,000 investment). 2) Supporting the Rivertown Organisation to explore other funding opportunities in addition to the £750,000 Welsh Government funding award secured in Quarter 1 of 2024/25, arrange decant premises (for whilst the premises is refurbished) and manage the project in line with grant funding terms and conditions. 3) Supporting property improvement grant take-up amongst community enterprises. 4) Supporting community enterprises to take-up grant funding opportunities to deliver events and activities in the town centre. 5) Supporting community enterprises to participate in 'Save The High Street' tailored business support programme. 6) Encouraging existing community enterprises located in Holywell and Greenfield to engage in the Holywell Hub Feasibility Study and Greenfield Visioning Study projects to ensure non-duplication of services/ scoping out local needs and demands amongst the local population and service providers. 7) Eight town centre social enterprises were supported by the Council's Social Enterprises Officer during Quarter 2, of this reporting period delivering a total of 23 business support sessions. 8) Two business registrations were supported and completed during Quarter 2. Sunday gatherings CIC (completed 5th September 2024) and Cambrian Aquatics CIC (completed 19th September 2024) 9) The Council's Social Enterprise Officer developed and delivered an event in partnership with Robertson Construction, "Networking for Social Good", which gave Flintshire based social enterprises the opportunity to pitch to sub-contractors working on the Robertson Contract for free pieces of work, material, skills exchange etc. This was attended by town centre organisations: Daniel Owen Centre, Cambrian Aquatics CIC, Care and Repair, Cobra Life CIC and VC Hub. The outcomes of this work will be available during the next reporting period (Quarter 3 of 2024/25).

Transport Connectivity

Develop and promote effective transport connectivity while supporting recovery and economic growth

	Action	RAG	Comments
CST021T	Review and update the Councils Integrated Transport Strategy	●	The Council has provided feedback to the Corporate Joint Committee on the Case for Change along with current status of Strategic projects and feedback from local member workshops held in Autumn 2023. Transport for Wales have appointed ARUP to progress the Regional Transport Plan document and the Council have submitted a response confirming transport priorities for purposes of forthcoming sifting exercise. This will enable the councils integrated transport strategy to be updated accordingly.
CST022T	Support the establishment of Corporate Joint Committee and delivery of the Joint Regional Transport Plan	★	The Council has provided feedback to the Corporate Joint Committee on the Case for Change along with current status of Strategic projects and feedback from local member workshops held in Autumn 2023. Transport for Wales have appointed ARUP to progress the Regional Transport Plan document and the Council have submitted a response confirming transport priorities for purposes of forthcoming sifting exercise.

Transport Connectivity - Quarterly Measures

Measure	Description	Actual	Target	Last Year (Q2)	RAG	Performance Trend
CST008M	Number of schemes delivered through the Welsh Government Active Travel Fund	0	0	1	★	

Successful funding applications totaling £1.882 million has been allocated by the Welsh Government to deliver a wide range of Active Travel improvements.
The following schemes are proposed:

- **Upper and Lower Aston Hall Lane - £720k**: This will facilitate the implementation of a footway to improve hazardous walking conditions between Aston and Hawarden.
- **Holywell Safer Routes - £450k**: This will enhance existing walking and cycling routes to schools, including the installation of pedestrian crossings.
- **Active Travel Core Funding - £712k**: This will enable the implementation of five pedestrian crossings at key school sites throughout Flintshire, various isolated improvements countywide such as the provision of dropped kerbs and tactile paving, and the purchase of land for future scheme developments.

Mae'r dudalen hon yn wag yn bwrpasol

FLINTSHIRE COUNTY COUNCIL

Council Plan 2023/28

Content for 2024/25

PART 2

December 2024

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Sub-Priority:	**Fuel Poverty**
Definition:	**Households that spend more than 10% of their income (after housing costs) on energy**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE057T	Reduce the risk of fuel poverty for residents by increasing the energy efficiency of homes	31/03/2025
CPE058T	Engage, support and refer vulnerable households to reduce fuel poverty and improve health and well-being	31/03/2025

How we will measure success (quarterly)

	Measure Description	Jun			Sep			Dec			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CPE001M	Total number of households receiving energy efficiency improvements	300		300	600	566	600	900	896	900	1,200	1,203	1,200
CPE014M	Providing advice and signposting support to vulnerable households	25		50	50	246	100	75	389	150	100	508	200

*CPE001M - Targets are based on the level of grant funding the Council recieves and what can be delivered within the confines of that grant funding. We will always aim to maximise the number of improvements within the available funding, but this may mean that targets fluctuate year on year.

What could impact our objective

Risk Title	Risk Description
RPE25 - Domestic Energy Service	Domestic energy service is self-funding so risk that projected income fails to materialise creating a financial pressure on the Council

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Priority:	Green Society and Environment

Well-being Objective:	Limiting and enhancing the impact of the Council's services on the natural environment and supporting the wider communities of Flintshire to reduce their own carbon footprint

Sub-Priority:	Active and Sustainable Travel Options
Definition:	Create opportunities to increase levels of walking and cycling (Active Travel) and the use of sustainable public transport options, enabling the undertaking of multi-modal transport journeys to access key destinations
Lead Officer(s)	Chief Officer Streetscene and Transportation

What we will do

	Action	Target Completion Date
CST024T	Promote active travel and further develop the County's walking and cycleway network	31/03/2025
CST028T	Implement formalised crossing facilities at existing school crossing patrol sites	31/03/2025
CST030T	Implementation of 20mph exceptions across the County	31/03/2025
CST032T	Support the development of public electric vehicle charging network	31/03/2025
CST033T	Declassification of hazardous routes across the county where appropriate through the implementation of engineering initiatives	31/03/2025

How we will measure success (quarterly)

	Measure Description	Jun			Sep			Dec			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CST014M	Number of formalised crossing facilities implemented at existing School Crossing Patrol sites	0	0	0	1	1	0	2	1	3	3	3	5

How we will measure success (annually)

	Measure Description	Target (23/24)	Actual (23/24)	Target (24/25)
CST016M	Number of hazardous routes declassified through the Implementation of Active Travel infrastructure to provide safe routes to schools	1.00	0.00	

What could impact our objective

Risk Title	Risk Description
RST21 - Reputation	Damage to reputation resulting in negative media reporting and adverse publicity e.g. 20mph
RST33 - Workforce Skillset	Inability to deliver transport/highway network schemes and infrastructure projects due to service skill levels, training, experience, capacity and resilience
RST66 - Public EV Charging Infrastructure	Failure to meet Welsh Government targets for the implementation of public EV charging infrastructure
RST67 - 20mph National Rollout	Failure to implement the required infrastructure changes as required by the 20mph National Rollout
RST[illegible] - Active Travel Core Programme	Failure to deliver annual Active Travel Core Programme
RST72 - Designated School Crossing Patrol	Failure to provide resilience to the County's designated school crossing patrol sites through the implementation of permanent infrastructure
RST74 - Classified Hazardous Routes	Failure to declassify the County's Hazardous Routes through the implementation of improved infrastructure
RST75 - Speed Limit Review	Failure to complete the Councils ongoing speed limit review with the delivery of a County wide Consolidation Oder

*Note: Reference to municipal bus companies has been omitted at this stage given the legislative proposals have yet to be concluded by Welsh Government.

Sub-Priority:	**Circular Economy**
Definition:	**Support and promote the Welsh Government's strategy to create a sustainable, circular economy in Flintshire**
Lead Officer(s)	**Chief Officer Streetscene and Transportation**

What we will do

	Action	Target Completion Date
CST025T	Achieve Welsh Government recycling targets	31/03/2025
CST026T	Work in partnership, actively support and engage with community led groups by developing recycling initiatives	31/03/2025
CST031T	Undertake a feasability study for future operational depots	31/03/2025

How we will measure success (quarterly)

	Measure Description	Jun			Sep			Dec			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CST004M	Percentage of waste reused, recycled or composted	70.0%		70.0%	70.0%	66.6%	70.0%	70.0%	67.4%	70.0%	70.0%	64.0%	70.0%
CST005M	Average Recycling rate across Household Recycling Centres (HRCs)	80.0%		80.0%	80.0%	83.0%	80.0%	80.0%	76.1%	80.0%	80.0%	76.1%	80.0%
CST021M	Number of education campaigns on recycling and waste minimisation undertaken to improve recycling performance	3		3	3	3	3	3	3	3	3	4	3

What could impact our objective

Risk Title	Risk Description
RST07 - Increase in Residual Waste	Inability to achieve national recycling targets due to increased residual waste tonnages collected
RST08 - Materials Recovery Facility	Inability to deliver Materials Recovery Facility
RST09 - Legislation & Regulations	Regulatory risk and the effect of a change in legislation and regulation on responsibilities, costs, resources, service delivery and reputation e.g. enforcement responsibilities, trade waste, bus reform
RST13 - Statutory and Regulatory Compliance	The lack of compliance to established processes and regulatory/statutory requirements within the Portfolio leading to financial penalties, limitations on activities, legal actions and reputation damage to the council
RST17 - Services by External Providers	Potential failure of major outsourced / contracted service provider / partnership (e.g. NWRWTP) resulting in disruption to service due to an inability to dispose of waste and recycling materials.
RST43 - Public Behaviour	Inability to influence public behaviours and habits which negatively impact service delivery and income streams eg recycling, parking, littering.

Sub-Priority:	**Climate Change and Adaptation**
Definition:	**Be more resilient to the changes that have happened due to climate change and prepare for predicted future change**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE012T	Review the Council's Flood Risk Management Strategy	31/03/2025
CPE015T	Assess the feasibility of schemes within land assets for resisting flood and drought while enhancing biodiversity and increasing carbon storage	31/03/2025
CPE047T	Identify projects to further support climate adaptation ambitions following Welsh Government guidance	31/03/2025
CPE060T	Carry out flood investigations and alleviation works where appropriate	31/03/2025
CPE076T	Ensure climate change and biodiversity are considered a priority in key decision making across all Council services	31/03/2025
CPE093T	Produce draft strategy by April 2024 for consultation and submit to Welsh Government by October 2024	31/03/2025

What could impact our objective

Risk Title	Risk Description
RPE11 - Net Zero Carbon Goal	Affordability of the Council being able to achieve its net zero carbon goal. Inability to commit or attract sufficient resource to coordinate the programme and deliver on projects, leading to opportunities not being maximised, actions not delivered and benefits not realised.
RPE36 - Net Carbon Zero Goal	Inability to achieve the Council's goal of net zero carbon and non conformance with Welsh government requirements, due to advances in carbon calculation methodologies and pace of technological improvements required by 2030.
RPE37 - Climate Change Initiatives	Unable to meet climate change initiatives by designated deadlines leading to reputational damage for the Council.
RPE46 - Impact of Climate Change	Inability of the Council to identify the risks associated with the impacts of climate change, causing risk to the resilience of Council services and its communities and the ability to adapt to a changing climate.

Sub-Priority:	**Fleet Strategy**
Definition:	**Reducing the environmental impact of our fleet**
Lead Officer(s)	**Chief Officer Streetscene and Transportation**

What we will do

	Action	Target Completion Date
CST015T	Reduce the environmental impact of our fleet by transitioning to ultra low emission vehicles (ULEV)	31/03/2030

How we will measure success (annually)

	Measure Description	Target (23/24)	Actual (23/24)	Target (24/25)
CST023M	Number of Ultra Low Emission Vehicles on Fleet	10	8	10

What could impact our objective

Risk Title	Risk Description
RST65 - Ultra Low Emission Vehicles	Inability to reduce the environmental impact of our fleet by failing to transition to ultra low emission vehicles (ULEV) leading to failure to meet Welsh Government carbon reduction targets in 2025 and 2030

Sub-Priority:	**Flintshire Forest**
Definition:	**Development of a plan to establish a Flintshire Forest that will identify available land assets, budget requirements and a realistic delivery timescale**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE083T	Establish the Flintshire Forest and put forward sites which will contribute towards the National Forest	31/03/2025
CPE096T	Produce a revised 3 year Delivery Plan in accordance with Environmental (Wales) Act 2016 - Section 6 Duty	31/03/2025

How we will measure success (annually)

	Measure Description	Target (23/24)	Actual (23/24)	Target (24/25)
CPE046M	Put forward 6 Flintshire Forest sites to contribute to the National Forest			6

*CPE046M - New measure within Council Plan for 2024/25

What could impact our objective

Risk Title	Risk Description
RPE32 - FCC Forest Plan	Council land use data, staffing capacity and long term budgetry provision are not adequate to capture the information required to timely report for the production of a FCC Forest Plan?

Sub-Priority:	**Flood Risk Management Strategy**
Definition:	**Refresh the Council's flood risk management strategy to align with the national strategy and identify communities at most risk in Flintshire and the actions required to mitigate this risk**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE012T	Review the Council's Flood Risk Management Strategy	31/03/2025

What could impact our objective

Risk Title	Risk Description
RPE2 - Recruitment	Risk to service delivery through inability to recruit into vacant posts
RPE3 - Flood Risk	Failure to update the Council's Flood Risk Management Strategy to mitigate the flood risk to vulnerable communities

Sub-Priority:	**Green Access**
Definition:	**The promotion, good management and protection of our green spaces to deliver multiple benefits to the environment and our residents and visitors**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE063T	Deliver the Rights of Way Improvement Plan with a focus to ensure improved access for all	31/03/2025
CPE082T	Complete the Shared Prosperity Funding programme and launch the Flintshire Coast park	31/03/2025

How we will measure success (annually)

	Measure Description	Target (23/24)	Actual (23/24)	Target (24/25)
CPE[illegible]M	Install Kissing Gates on the network	40	46	50
CPE[illegible]M	Improve standards on Public Rights of Way	1,500	1,620	2,000

What could impact our objective

Risk Title	Risk Description
RPE30 - Availability of Grant Funding	Ability of the Portfolio to deliver projects that rely on external funding due to decreasing grant funding

Sub-Priority:	**Green Environment**
Definition:	**Enhance and increase biodiversity and trees to deliver multiple benefits for people, wildlife and the environment**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE061T	Enhance the natural environment through the delivery of the Environment (Wales) Act 2016 - Section 6 Biodiversity Duty	31/03/2025
CPE062T	Deliver an increase in canopy cover as part of the Urban Tree and Woodland Plan	31/03/2025
CPE077T	Progress Ash Dieback Action Plan	31/03/2025

How we will measure success (annually)

	Measure Description	Target (23/24)	Actual (23/24)	Target (24/25)
CPE005M	Number of Green infrastructure improvement and planting projects			20

What could impact our objective

Risk Title	Risk Description
RPE12 - Ash Dieback	The implications of Ash Die back on finances and reputation of the Council due to the scale of the problem and the ability to make safe trees on or adjacent to Highways and Council amenity land which pose a risk to life or property

Sub-Priority:	**Net Zero Carbon Council**
Definition:	**A net carbon zero Council by 2030 and supporting wider decarbonisation actions across the County**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE045T	A net zero carbon Council by 2030 and supporting wider decarbonisation actions across the County	31/03/2030
CPE059T	Develop plans towards net zero carbon for our assets in line with Welsh Government guidance	31/03/2025
CPE090T	Review of Climate Change Strategy	31/03/2025

How we will measure success (bi-annually)

	Measure Description	Sep			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CPE048M	Number of contracts with carbon impact assessed	5	0	2	10	3	5
CPE049M	Percentage of Town and Community Councils accessing support	5%	0%	60%	15%	59%	40%
CPE050M	Percentage of schools accessing the support package	0.0%	0.0%	30.0%	15.0%	25.0%	80.0%

How we will measure success (annually)

	Measure Description	Target (23/24)	Actual (23/24)	Target (24/25)
CPE004M	Reduction in Council greenhouse gas emissions	33,521	32,328	33,280
CPE018M	Percentage of Councillors received carbon related training	80.0%	48.0%	80.0%
CPE019M	Percentage of employees received carbon related training	5.0%	0.9%	5.0%

What could impact our objective

Risk Title	Risk Description
RPE11 - Net Zero Carbon Goal	Affordability of the Council being able to achieve its net zero carbon goal. Inability to commit or attract sufficient resource to coordinate the programme and deliver on projects, leading to opportunities not being maximised, actions not delivered and benefits not realised.
RPE36 - Net Carbon Zero Goal	Inability to achieve the Council's goal of net zero carbon and non conformance with Welsh government requirements, due to advances in carbon calculation methodologies and pace of technological improvements required by 2030.
RPE37 - Climate Change Initiatives	Unable to meet climate change initiatives by designated deadlines leading to reputational damage for the Council.
RPE55 - Carbon Reduction Strategy Cost Assessment	Inability of the Council to cost its carbon reduction strategy causing issues with identification and commitment of funds to realise the actions needed to become a net zero carbon Council.

Sub-Priority:	**Phosphates Mitigation**
Definition:	**Provision of viable and deliverable options to mitigate the impact of phosphates from new development on Special Areas of Conservation protected rivers**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE075T	Produce guidance on viable and deliverable options to mitigate the impact of phosphates from new development on Special Areas of Conservation (SAC) protected rivers	31/03/2025

What could impact our objective

Risk Title	Risk Description
RPE33 - Phosphates	Prevent delays in development proceeding by mitigating the impact of Phosphates

Sub-Priority:	**Strategic Flood Consequences Assessment**
Definition:	**Review the Council's Strategic Flood Consequences Assessment in light of the Ministerial letter of November 2021, to prepare for the implementation of revised TAN15 Development and Flood Risk guidance which became operational in June 2023**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE088T	Review completed Strategic Flood Consequences Assessment in view of delays in publishing TAN15 incurred by Welsh Government, and the need to update by 1st June 2024. Publication of TAN15 by Welsh Government is delayed until at least the end of 2024	31/03/2025
CPE091T	Submit the final Strategic Flood Consequences Assessment to Welsh Government	31/03/2025

How we will measure success (quarterly)

	Measure Description	Jun			Sep			Dec			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CPE026M	Percentage compliance with Welsh Government delivery timetable	100.0%		100.0%	100.0%	95.0%	100.0%	100.0%	95.0%	100.0%	100.0%	100.0%	100.0%

What could impact our objective

Risk Title	Risk Description
RPE28 - Recruitment	Risk to service delivery through inability to recruit into vacant posts
RPE35 - Strategic Flood Risk Assessment	Ensure that the Council's Strategic Flood Risk Assessment is refreshed prior to the publication of the revised TAN15 to allow the risks to communities and growth areas to be fully understood

Priority:	Economy

Well-being Objective:	Connecting communities and enabling a sustainable economic recovery and growth

Sub-Priority:	Business
Definition:	Enable business continuity and encourage appropriate investment
Lead Officer(s)	Chief Officer Planning, Environment and Economy

What we will do

	Action	Target Completion Date
CPE067T	Support small and/or local businesses to engage with public sector procurement opportunities	31/03/2025
CPE068T	Support the County's street and indoor markets to thrive and grow	31/03/2025
CPE069T	Support growth of the local and regional food and drink business sector through marketing and collaborative projects	31/03/2025
CPE070T	Support local businesses in their efforts to reduce their carbon footprint and become more resource efficient	31/03/2025
CPE071T	Increase the scale and impact of the social business sector	31/03/2025
CPE084T	Liaise with UK and Welsh Governments to take the sub-regional Investment Zone through its gateway process.	31/03/2025
CPE087T	Support the growth and development of the tourism and hospitality sector	31/03/2025

How we will measure success (annually)

	Measure Description	Target (23/24)	Actual (23/24)	Target (24/25)
CPE008M	Number of businesses receiving support	600	837	648
CPE009M	Number of social enterprises receiving support	48	49	48
CPE010M	Number of local businesses supported to reduce their carbon footprint and become more resource efficient	48	271	60

What could impact our objective

Risk Title	Risk Description
RPE03 - Town Centre Regeneration Strategy	Unable to regenerate Town Centres through implementation of the Town Centre Strategy due to insufficient resources and wider economic trends

Sub-Priority:	**Digital Infrastructure**
Definition:	**Ensure the digital networks facilitate and support recovery and growth**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE080T	Improve digital connectivity across the County for businesses and residents	31/03/2025
CPE089T	Reduce barriers to investment for network operators.	31/03/2025

What could impact our objective

Risk Title	Risk Description
RPE27 - Regional Growth Deal	Failure to deliver the Flintshire element of Regional Growth Deal projects due to insufficient resources locally

Sub-Priority:	**Local Development Plan (LDP) Targets**
Definition:	**Achieve LDP policy objectives for growth, protection and enhancement**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE038T	Monitor overall Local Development Plan performance via the Annual Monitoring Report and submit to Welsh Government	31/01/2025
CPE039T	Maintain and update the Local Development Plan Housing Trajectory in line with planning decisions made	31/03/2025
CPE041T	Reference the Local Development Plan growth strategy in early work on a North Wales Strategic Development Plan	31/03/2025

How we will measure success (quarterly)

	Measure Description	Jun			Sep			Dec			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CPE041M	Percentage of decision made on planning applications in accordance with officer recommendation	100.0%		100.0%	100.0%	99.0%	100.0%	100.0%	83.3%	100.0%	100.0%	91.7%	100.0%

What could impact our objective

Risk Title	Risk Description
RPE38 - LDP Annual Monitoring Report	Failure to deliver Annual Monitoring Report to Welsh Government on time
RPE39 - Housing Trajectory	Annual Monitoring Report shows Local development Plan falling behind its housing trajectory
RPE40 - Local Development Plan	The need to condsider an early review of the LDP
RPE41 - Planning Application Decisions	Failing to make planning decisions in accordance with the Local Development Plan
RPE42 - Transition to LDP Part 2	Slow progress with the Strategic development Plan fails to set context for LDP 2

Sub-Priority:	**Reducing Worklessness**
Definition:	**Work with our partners to support individuals to gain employment**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE073T	Co-ordinate a multi-agency approach to support businesses to recruit people from disadvantaged groups	31/03/2025
CPE074T	Deliver mentoring and wider support programmes to assist disadvantaged people to re-engage with the labour market	31/03/2025

How we will measure success (quarterly)

	Measure Description	Jun			Sep			Dec			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CPE012M	Number of individuals entering employment, learning or volunteering	46	41	23	92	90	46	138	155	69	185	206	60
CPE013M	Number of individuals receiving support	106	216	72	212	245	142	318	311	213	425	370	240

*CPE012M - The target for 2024/25 has decreased due to reduced funding.

*CPE013M - The target for 2024/25 has decreased due to reduced funding.

What could impact our objective

Risk Title	Risk Description
RPE43 - Employment, Learning, Volunteering for Individuals	Failure to help individuals to move into employment, learning or volunteering outcomes

Sub-Priority:	**Rural Regeneration**
Definition:	**Ensure that Economy interventions consider and meet the needs of rural businesses and individuals**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE052T	Recruit a Digital Connectivity Officer to support rural communities to access better quality connectivity options	31/03/2025
CPE053T	Commission a data review for rural Flintshire and hold community consultation to better understand rural community needs	31/03/2025
CPE078T	Ensure that Economy interventions consider and meet the needs of rural businesses and individuals.	31/03/2025

What could impact our objective

Risk Title	Risk Description
RPE - Rural Regeneration	Ensure that Economy interventions consider and meet the needs of rural businesses and individuals

Sub-Priority:	**Town Centre Regeneration**
Definition:	**Regenerate and re-invent our town centres**
Lead Officer(s)	**Chief Officer Planning, Environment and Economy**

What we will do

	Action	Target Completion Date
CPE064T	Monitor the health and vitality of town centres to support effective management and business investment decisions	31/03/2025
CPE065T	Encourage and support investment in town centre properties to facilitate more sustainable uses and including improvements to the environment	31/03/2025
CPE066T	Engage town centre small businesses and promote support packages available to them	31/03/2025
CPE079T	Understand the needs of and supporting community enterprises in town centre locations	31/03/2025
CPE094T	Complete and circulate the town centre performance data analysis report	31/03/2025
CPE095T	Complete the initial 3 (of 7) Place Making Plans in partnership with a range of stakeholders	31/03/2025

What could impact our objective

No associated risks identified

Sub-Priority:	**Transport Connectivity**
Definition:	**Develop and promote effective transport connectivity while supporting recovery and economic growth**
Lead Officer(s)	**Chief Officer Streetscene and Transportation**

What we will do

	Action	Target Completion Date
CST021T	Review and update the Councils Integrated Transport Strategy	31/03/2025
CST022T	Support the establishment of Corporate Joint Committee and delivery of the Joint Regional Transport Plan	31/05/2025

*CST022T - Regulations were made by the Welsh Government on 17 March 2021 creating four Corporate Joint Committees in Wales, and the North Wales Corporate Joint Committee (CJC) was established on 1 April 2021 for the delivery of statutory functions. The CJC must exercise functions relating to strategic development planning and regional transport planning, as well as being able to promote economic well-being. One of the immediate mandatory functions prescribed to be discharged by the CJC is the development of a Regional Transport Plan (RTP) with policies for regional transport.

How we will measure success (quarterly)

	Measure Description	Jun			Sep			Dec			Mar		
		Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)	Target (23/24)	Actual (23/24)	Target (24/25)
CST008M	Number of schemes delivered through the Welsh Government Active Travel Fund	0		0	1	1	0	2	1	2	3	3	3

What could impact our objective

Risk Title	Risk Description
RST73 - Rural Community Bus Services	Failure to provide adequate local bus services to connect rural communities to the core bus network
RST76 - Joint Local Transport Plan	Failure to adequately represent the County's aspirations within the forthcoming Joint Local Transport Plan (JLTP)

Mae'r dudalen hon yn wag yn bwrpasol

ENVIRONMENT & ECONOMY OVERVIEW & SCRUTINY COMMITTEE

Date of Meeting	Tuesday, 14th January 2025
Report Subject	Risk Management - Corporate Risk Register Report
Cabinet Member	Cabinet Member for Economy, Environment and Climate Cabinet Member for Planning, Public Health and Public Protection Cabinet Member for Streetscene and Transportation
Report Author	Chief Officer (Planning, Environment and Economy) Chief Officer (Streetscene and Transportation)
Type of Report	Strategic

EXECUTIVE SUMMARY

Risk Management is the process of identifying and assessing risks, evaluating their potential consequence, and mitigating them to ensure priorities are achieved. The aim is to minimise the severity of their consequence and likelihood of occurring where possible. Overall Risk Management should:

- Create value to the organisation
- Be part of ensuring internal controls are effective
- Enable effective decision making
- Aid the delivery of actions / services

Flintshire County Council is responsible for delivering both statutory and non-statutory services to residents and business within Flintshire. To enable the Council to deliver these services effectively, the Council needs to consider a wide range of risks and opportunities in the decisions that are made at all levels across the Council, and these are recorded in the form of a risk register.

A Corporate Risk Register has been developed and is owned by the Chief Officer Team with a suggestion that the report will also be owned by Cabinet.

RECOMMENDATIONS	
1	To review the Council's Corporate Risk Register report, in particular risk RPE11 – Net Zero Carbon Goal and RST07 Increase in Residual Waste.

2	To be assured of the arrangements in place to manage risks RPE11 – Net Zero Carbon Goal and RST07 Increase in Residual Waste.

REPORT DETAILS

1.00	EXPLAINING THE CORPORATE RISK REGISTER REPORT
1.01	**What is a Corporate Risk Register?** A corporate risk register is used to record significant risks that could impact the strategic objectives and operations of an organisation. The corporate risk register identifies potential developments or occurrences which, were they to occur, would jeopardize the Council's ability to achieve its priorities, provide services as planned and fulfil its statutory duties. It is those risks which are deemed necessary to be managed at a corporate level, rather than at portfolio/service level. Flintshire County Council, Corporate Risk Report is owned by the Chief Officer Team. The Chief Officer Team have identified twelve key strategic risks to form part of the Corporate Risk Register. As this is a 'live' document frequent review will be undertaken and where there are changes this will be reported upon within the quarterly reports.
1.02	Since the last review and approval of the Risk Management Framework (the Framework) at Governance and Audit Committee in January 2024 much work has been undertaken over the last twelve months to embed the Framework: • The development of the Risk Management module within the Council's Performance and Risk Management System (InPhase). • A high level report to Chief Officer Team monthly that provides details of all risks across the Council, highlighting those risks that have deteriorated, any risks that have closed or any new risks, discussions regarding external / internal factors that may require escalation. • Monthly reports to the Chief Officer regarding risks within their Portfolio Risk Register. • Performance and Risk Management Team undertake an in-depth review of Portfolios Risk Registers once within a financial year. • Development of a 'Corporate Risk Register' with the Chief Officer Team, which provides details of significant risks that could impact the Council. • Development of a Risk Management E-learning module has been finalised and now available to all Officers, with a requirement that all Risk Owners / Supporting Officers and Senior Managers complete.
1.03	To continue to further embed risk management across the Council, the next steps will include (but not exhaustive): • An annual review of the Risk Management Framework is underway and will be presented to Governance and Audit Committee on 25th January 2025 for approval. • The Risk Management E-learning module to be made available to Members.

	• Cabinet Members to jointly own the Corporate Risk Register with the Chief Officer Team, having responsibility and ownership for specific risks, with a dedicated workshop to be arranged. • Quarterly reporting of the Corporate Risk Register to Cabinet and all Overview and Scrutiny Committees, with individual Overview and Scrutiny Committees challenging the details of risks specific to their scrutiny functions. • Performance and Risk Management Team will undertake an in-depth review of Portfolios Risk Registers again once within a financial year.
1.04	Future reporting regarding the Corporate Risk Register Report and in accordance with the Risk Management Framework will be presented: • Quarterly to Cabinet and Overview and Scrutiny Committees the months of January, April, July, and October (Should an Overview and Scrutiny Committee not be scheduled for those months, the Corporate Risk Register will be presented at the next scheduled date). • Bi-annually to Governance and Audit Committee the months of January and July.
1.05	**Explaining the Corporate Risk Register Report Format** The initial page of the Corporate Risk Register Report (Appendix A) provides a: • High-level overview of the number of risks (**12**) • The RAYG (Red, Amber, Yellow or Green) status of a risk at the point they were last reviewed (December 2024) • Risk Title and Description • Risk Type • Risk Scoring • Direction of Change The high-level overview also provides details on how many risks are: • **Above Target; 11** o RCF01, RCF09, RCF18, REY01, RGV01, RHC09, RHR29, RHR30, RPE11, RSS54 and RST07 • **Within Target; 1** o RCF08 • **Deteriorating; 1** o RGV01 (this risk has deteriorated this month and is therefore, still above target) • **Improving; 1** o RCF09 (although this risk is improving it is still above target score) • **New / Escalated Risks; 3** o RHR29 Recruitment and Retention o RHR30 Employment Related Costs o RSS54 Care Provision Stability It was identified by the Chief Officer Team that the three new risks needed to be managed at a corporate level, rather than at portfolio/service level. The mitigating actions for RHR30 and RHR54 are in development.
1.06	The Corporate Risk Register Report (Appendix A) then proceeds to provide further details regarding each of the individual risks, and this includes:

	• Information regarding the key impacts should the risk occur • The risk category in accordance with PESTEL analysis • Risk type • Details of the owner • Comment at point of last review (December 2024) • Risk scoring and direction of change (up to last twelve months) • Detail of the internal controls and governance arrangements, • Key mitigating actions (where the due date column is blank, the mitigating action has been identified as an ongoing action).
1.07	The below table provides a key of the symbols and terminology meanings within the Corporate Risk Register Report. .

Risk Register Key		
↔ Risk remains the same	↑ Risk has reduced	↓ Risk has deteriorated
Inherent Risk Score Risk posed before actions taken	**Current Risk Score** Score following a review of actions in place	**Target Risk Score** Level of risk the Council aims to achieve

2.00	**RESOURCE IMPLICATIONS**
2.01	There are no specific resource implications for this report.

3.00	**CONSULTATIONS REQUIRED / CARRIED OUT**
3.01	Review of the Corporate Risk Register in accordance with the Risk Management Framework is undertaken with the Chief Officer Team, Overview and Scrutiny Committees, Governance and Audit Committee and Cabinet.

4.00	**RISK MANAGEMENT**
4.01	Review of Risk Registers and individual risks are undertaken in accordance with the Risk Management Framework, whereby consideration given to the impact of a risk and what mitigation actions / internal controls are in place to ensure the risks are being managed effectively across the Council. The Corporate Risk Report has been established to highlight the key risks impacting the Council at point of review in December 2024.

5.00	**APPENDICES**
5.01	Appendix A: Flintshire County Council Corporate Risk Register (December 2024) Appendix B – Risk Management Framework (January 2024)

6.00	LIST OF ACCESSIBLE BACKGROUND DOCUMENTS
6.01	Risk Management Framework

7.00	CONTACT OFFICER DETAILS
7.01	**Contact Officer:** Emma Heath (Strategic Performance Advisor) **Telephone:** 01352 702 744 **E-mail:** emma.heath@flintshire.gov.uk

8.00	GLOSSARY OF TERMS
8.01	**Risk Management -** The process of identifying risks, evaluating tier potential consequences and managing them. The aim is to reduce the frequency of risk events occurring (wherever this is possible) and minimise the severity of their consequences if they occur. Threats are managed by a process of controlling, transferring or retaining the risk. Opportunities are managed by identifying strategies to maximise the opportunity or reward for the organisation. **Risk Register** - A risk register forms part of the risk management tool and is used to analyse current and potential risks. A risk register is completed for each Portfolio. **PESTEL** - A method to identify a risk is using a PESTEL analysis. PESTEL analysis identifies and evaluates how Political, Economic, Social, Technological, Environmental and Legal factors could impact business operations.

Mae'r dudalen hon yn wag yn bwrpasol

Corporate Risk Register Report

Number of Risks	Red	Amber	Yellow	Green
12	10	2	0	0

Risks Above Target	Risks Within Target	Risks Deteriorating	Risks Improving	New/Escalated Risks
11	1	1	1	3

Risk	Description	Risk Type	Inherent Risk Score	Target Risk Score	Current Risk Score	Direction of Change
RCF01 - Reserves	Insufficient Reserves will impact on the financial resiliance of the Council	Strategic	9	4	16	↔
RCF08 - Fraud and Prevention	The Council may be subject to fraud from both internal and external factors	Strategic	12	6	6	↔
RCF09 - Housing Revenue Account Capital Investment	Sufficient funding capacity to meet Welsh Housing Quality Standards 2.0 targets	Strategic	20	10	15	↑
RCF18 - Medium-Term Financial Strategy (MTFS)	Impact on the stability of the Medium-Term Financial Plan of increases in service demand, high inflation and reduced future Welsh Government, Local Government Settlements	Strategic	20	9	20	↔
REY01 - Financial Viability of Schools	Schools are not financially viable due to insufficient base funding	Strategic	15	15	20	↔
RGV01 - Loss of IT/Cyber Security	Significant loss of corporate data and systems due to security / environmental / technical incident	Strategic	20	12	20	↓
RHC09 - Resource to meet Homeless Obligations	The Council is unable to meet it's homelessness statutory obligations due to shortages in staff, budgetary pressures and lack of available accommodation	Strategic	15	12	20	↔
RHR29 - Recruitment and Retention	Inability to attract and retain valued employees	Strategic	9	2	9	↔
RHR30 - Employment Related Costs	Increased costs associated with temporary / additional resources to the workforce (agency costs, sickness absence, additional hours and overtime)	Strategic	16	6	12	↔
RPE11 - Net Zero Carbon Goal	Affordability of the Council being able to achieve its net zero carbon goal. Inability to commit or attract sufficient resource to coordinate the programme and deliver on projects, leading to opportunities not being maximised, actions not delivered and benefits not realised	Strategic	9	2	12	↔
RSS54 - Care Provision Sustainability	Market stability / placement sufficiency leading to insufficient and unaffordable care provision	Strategic	12	4	12	↔
RST07 - Increase in Residual Waste	Inability to achieve national recycling targets due to increased residual waste tonnages collected	Strategic	12	2	12	↔

RCF01 - Reserves

Inherent Risk Score	Current Risk Score	Target Risk Score
9	16	4

Description	Insufficient Reserves will impact on the financial resiliance of the Council
Key Impacts	1. Inability to invest or provide services for our residents 2. Inability to use reserves to balance the budget thus requirement to issue a section 114 notice under the Local Government Finance Act 1988 3. Organisation would be vulnerable to emerging financial pressures
Risk Category	▪ Economic ▪ Legal
Risk Type	Strategic
Owner	Gary Ferguson
Comments	The in-year reported overspend at Month Seven has further reduced the Contingency Reserve available even after £1 million of earmarked reserved being released in year, placing a high risk on the financial resilience of the Council.

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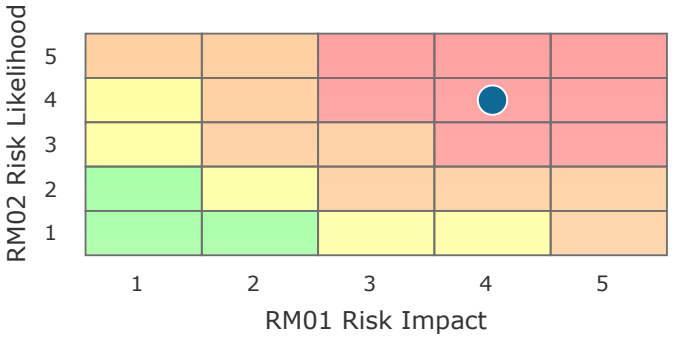
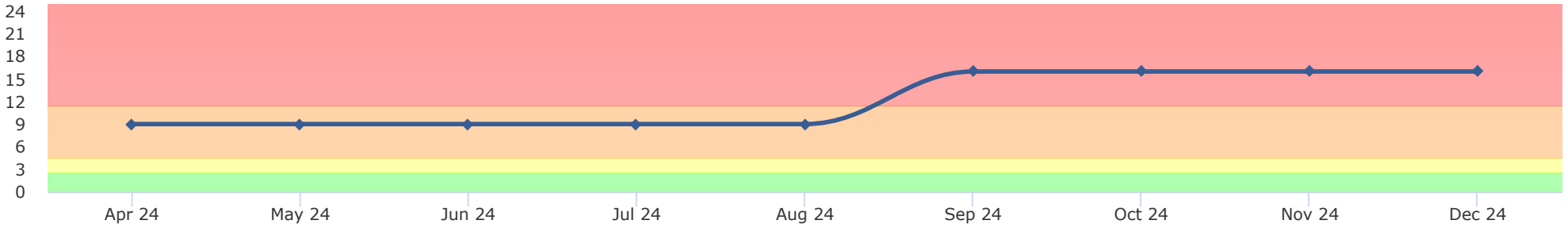
Current Score on the Risk Matrix



Direction of Change



How are we managing risk?

Governance	Frequent reporting to Chief Officer Team, Cabinet Members, Programme Board, Corporate Resources Overview and Scrutiny Committee (CROSC) and Council
Internal Controls/Process	Usable reserves are reported to CROSC and Cabinet as part of the monthly revenue budget monitoring. Earmarked reserves are reported quarterly and in Months 5 and 6 £1 million was released of earmarked reserves to the contingency reserves and further reviews and challenge will be ongoing.

Risk Mitigation Actions

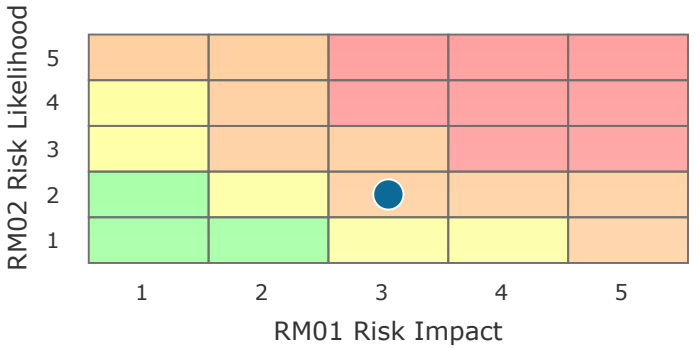
	Action	Stage	RAG	Latest Update	Due Date
RCF006T	In-year action plan to be completed by Portfolios	Completed		In-year action plan have been provided by over spending Portfolios to mitigate the in-year over spend position and this was presented to CROSC in November.	30/11/2024
RCF007T	Ongoing review of ear marked reserves	In Progress		Principal Accountants are liaising with Portfolios frequently to challenge the Portfolios current level of ear-marked reserves, particularly those balances that have not been used for a period of time.	

RCF08 - Fraud and Prevention

Inherent Risk Score	Current Risk Score	Target Risk Score
12	6	6

Description	The Council may be subject to fraud from both internal and external factors
Key Impacts	1. Financial loss 2. Impact on reputation 3. Systematic failure
Risk Category	Economic
Risk Type	Strategic
Owner	Gary Ferguson
Comments	Following a detailed review of the internal controls and processes in place, it was determined that at this point, they are sufficient enough to reduce the risk of likelihood of potential fraud taking place

Current Score on the Risk Matrix



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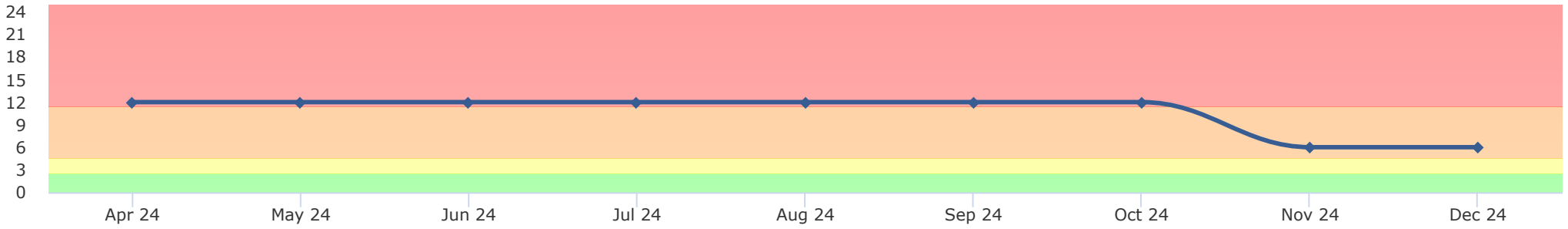


How are we managing risk?

Governance	Systems in place to identify duplicate payments or block payments (where necessary) through intelligence protocols. Regular reconciliations and annual audits of the systems are undertaken. Reports regarding the review of system intelligence provided to Senior Manager. Liaise with external Treasury Management Advisors regarding borrowing and investments.
Internal Controls/Process	Policies / Strategies and Segregation of duties in place. Treasury Management performance is reported quarterly and the Treasury Management Strategy is reviewed annually and approved by Council (February). Regular reconciliation and monitoring of income and expenditure, checks on new suppliers and verification of bank details. Financial Procedure Rules and Internal Audit reviews. Liaise with the Council's banking regarding relevant training and information sharing. Dual authorisation in place for expenditure that exceeds a certain threshold.

Risk Mitigation Actions

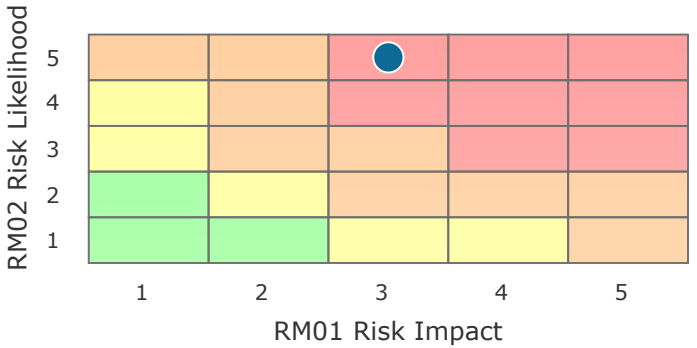
	Action	Stage	RAG	Latest Update	Due Date
RCF010T	Annual review of Treasury Management Strategy	In Progress	●	The annual review of the Treasury Management Strategy will be undertaken in February 2025.	31 Mar 2025
RCF011T	Quarterly reporting regarding Treasury Management breaches	In Progress	★	Quarterly reporting regarding Treasure Management breaches continues to take place and information is provided to Senior Management.	31 Mar 2025

RCF09 - Housing Revenue Account Capital Investment

Inherent Risk Score	Current Risk Score	Target Risk Score
20	15	10

Description	There is insufficient funding capacity to meet Welsh Housing Quality Standards (WHQS) 2.0 targets
Key Impacts	1. Non-compliance with the WHQS 2.0 targets
Risk Category	▪ Economic ▪ Legal ▪ Social
Risk Type	Strategic
Owner	Gary Ferguson
Comments	The impact for the risk has been reduced to 3, as Welsh Government are working with local authorities to reduce the impact where possible.

Current Score on the Risk Matrix



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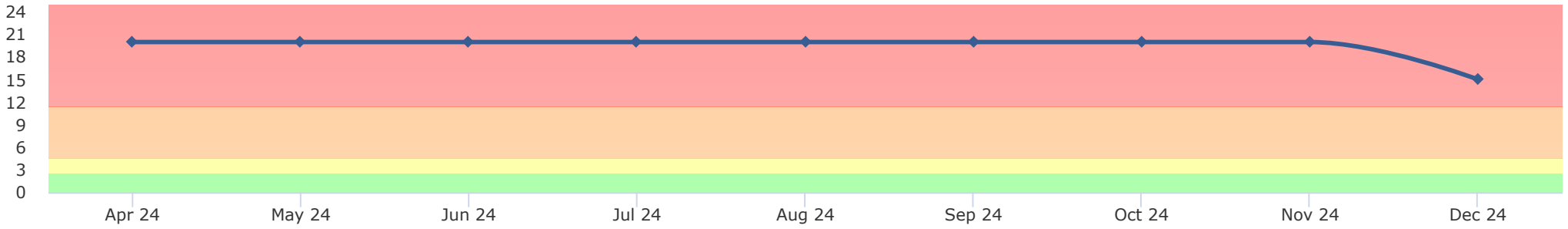


How are we managing risk?

Governance	Reporting to Capital Assets Programme Board, Chief Officer Team (COT), Cabinet, Housing and Communities Overview and Scrutiny Committee and Council
Internal Controls/Process	Finance and service area working to assess financial impact and mitigation options, findings reported through to Service Management Team meeting, Programme Board and COT.

Risk Mitigation Actions

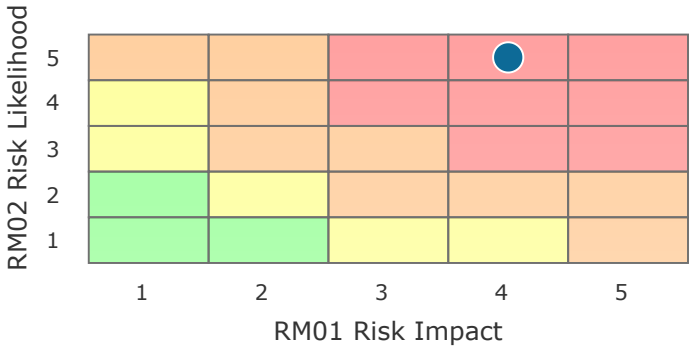
	Action	Stage	RAG	Latest Update	Due Date
RCF012T	Stock Condition Surveys to be completed	In Progress		Welsh Government have requested that Stock Condition Surveys are completed by March 25 and work is underway regarding this piece of work.	31 Mar 2025
RCF013T	Target Energy Pathways for all stock to be completed	In Progress		Welsh Government have requested that Target Energy Pathways for all stock is undertaken, to establish what works are required to achieve an EPC 'A' rating and these are required to be completed by 2027.	31 Mar 2025
RCF014T	The Council to form part of Welsh Government's working group regarding funding options.	In Progress		The Welsh Government have recently set up a working group to work through possible funding options and the Council have ensured that they have joined that working group.	31 Mar 2025

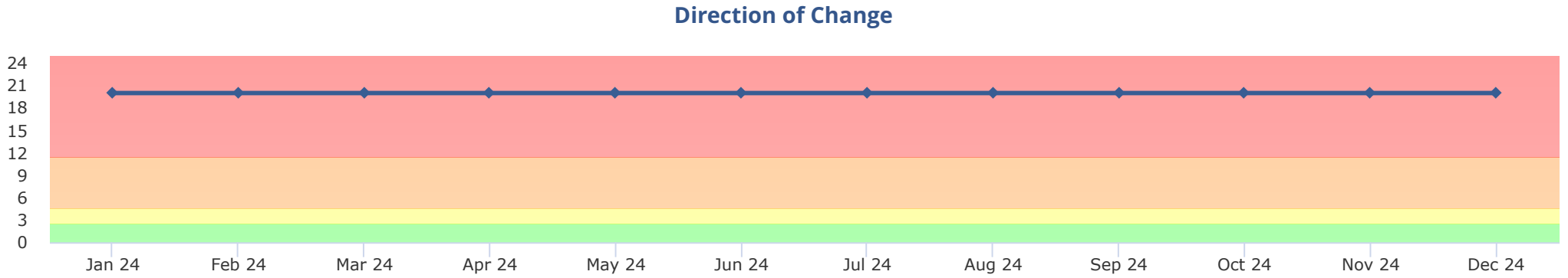
RCF18 - Medium-Term Financial Strategy (MTFS)

Inherent Risk Score	Current Risk Score	Target Risk Score
20	20	9

Description	Increased service demand, high inflation and reduced future Welsh Government, Local Government Settlements could impact the stability of the Medium-Term Financial Plan
Key Impacts	1. Stability of the Medium-Term Financial Plan 2. Reduced or ceased service delivery 3. Inability to set a legal and balanced budget with result in a Section 114 notice being issued under the Local Government Finance Act 1988
Risk Category	▪ Economic ▪ Legal ▪ Political ▪ Social
Risk Type	Strategic
Owner	Gary Ferguson
Comments	The Provisional Settlement from Welsh Government in December has indicated a 3.3% increase in our Funding allocation (compared to the Welsh average of 4.3%). The Council's additional budget requirement has now risen to £47.493m and it is estimated that the Council will need to identify further cost reductions / additional income from local taxation of around £20m/£21m. The Council will be seeking additional funding through a national floor funding mechanism. Options to balance the budget for 2025/26 are now being prepared for Member consideration in January / February 2025.

Current Score on the Risk Matrix




Direction of Change
24
21
18
15
12
9
6
3
0
Jan 24
Feb 24
Mar 24
Apr 24
May 24
Jun 24
Jul 24
Aug 24
Sep 24
Oct 24
Nov 24
Dec 24

How are we managing risk?

Governance	Reports are provided regarding the MTFS (including information regarding Welsh Government Funding) to Chief Office Team, Cabinet, Corporate Resources Overview and Scrutiny Committee (CROSC), Council, Programme Board and Members Workshops (where applicable).
Internal Controls/Process	Usable reserves are reported to CROSC and Cabinet as part of the monthly revenue budget monitoring. Earmarked reserves are reported quarterly and in Months 5 and 6 £1 million was released of earmarked reserves to the contingency reserves and further reviews and challenge will be ongoing. Regular Programme Co-ordinating Group meetings. Reporting monthly to COT and quarterly to Cabinet and CROSC in the first half of the year, monthly thereafter. Latest MTFS update is provided within the monthly budget monitoring reports.

Risk Mitigation Actions

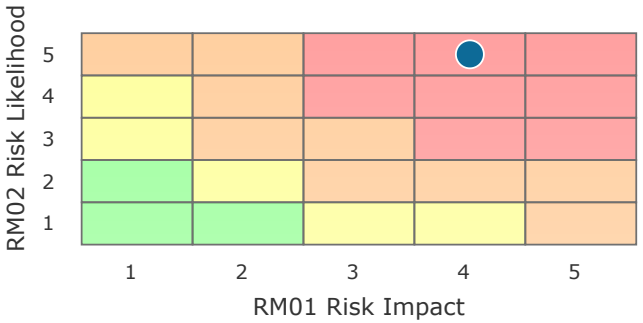
	Action	Stage	RAG	Latest Update	Due Date
RCF001T	Regular monitoring and reporting of the financial position of the organisation	In Progress	–	Revenue Budget Monitoring is reported to Cabinet and CROSC on a monthly basis.	
RCF002T	Ensuring robust and timely financial planning arrangements over the medium term	In Progress	–	Regular updates on the MTFS and Budget for 2025/26 are reported to Cabinet and to CROSC. Together with a monthly update on the MTFS within the budget monitoring report.	
RCF003T	Ongoing contribution to national debate on a fairer funding formula	In Progress	–	This is undertaken with WLGA on behalf of Local Authorities and provide projection and data analysis to support financial pressures. In addition, the Leader and Chief Executive also directly liaise with Welsh Government on specific funding issues.	
RCF004T	Ongoing engagement with Society of Welsh Treasurers (SWT) and WLGA and the escalation of key issues	In Progress	–	The Council is represented at the monthly meetings with SWT and has regular liaison with WLGA on key issues.	
RCF005T	Ensuring adequate levels of reserves are maintained across the Council	In Progress	–	Work on the challenge of earmarked reserves is ongoing. A moratorium on spend has been put in place to minimise the projected in year overspends with the aim of strengthening the position for Council Reserves. In-year action plan have been provided by over spending Portfolios to mitigate the in-year over spend position and this was presented to CROSC in November. Principal Accountants are liaising with Portfolios frequently to challenge the Portfolios current level of ear-marked reserves, particularly those balances that have not been used for a period of time.	
RCF006T	In-year action plan to be completed by Portfolios	Completed	✔	In-year action plan have been provided by over spending Portfolios to mitigate the in-year over spend position and this was presented to CROSC in November.	30/11/2024
RCF007T	Ongoing review of ear marked reserves	In Progress	★	Principal Accountants are liaising with Portfolios frequently to challenge the Portfolios current level of ear-marked reserves, particularly those balances that have not been used for a period of time.	

REY01 - Financial Viability of Schools

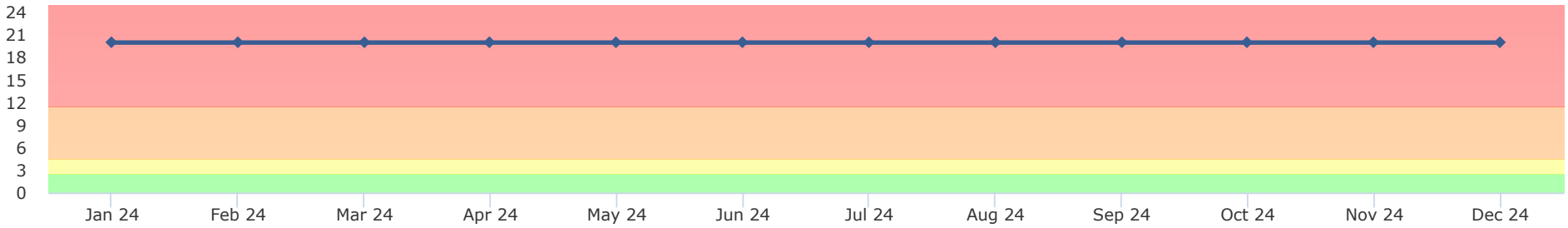
Inherent Risk Score	Current Risk Score	Target Risk Score
15	20	15

Description	Schools are not financially viable due to insufficient base funding
Key Impacts	1. A increasing number of schools are expected to enter a deficit budget position by the end of 2024/25 2. Impact of increased monitoring action on School Improvement Team, HR and Finance 3. Impact on Leadership Teams within schools 4. Potential impact on learners, for example a reduced curriculum offer
Risk Category	▪ Economic ▪ Political ▪ Social
Risk Type	Strategic
Owner	Claire Homard
Comments	Ongoing monitoring of forecasted closing balances will continue throughout the remainder of the 2024/25 financial year.

Current Score on the Risk Matrix



Direction of Change



How are we managing risk?

Governance	School Governing Bodies are expected to submit a balanced budget plan each year and where this is not possible, they are required to apply for a Licenced Deficit in line with the Protocol for Schools in Financial Difficulty.
Internal Controls/Process	Monitored through Education and Youth Programme Board, schools budget forum; schools performance monitoring group

Risk Mitigation Actions

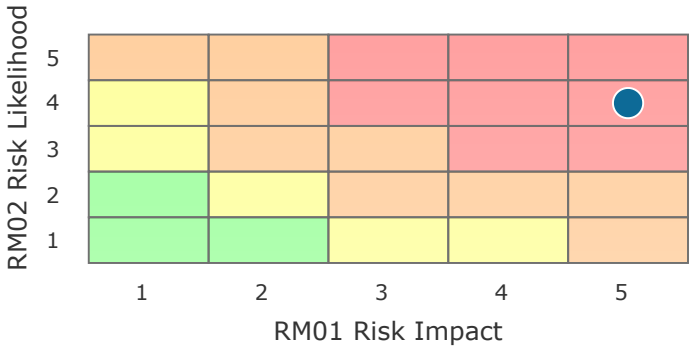
	Action	Stage	RAG	Latest Update	Due Date
REY001T	Challenge and support meetings with Headteacher/School Business Manager and regular budget monitoring sessions with schools to confirm adherence to licensed deficit protocol, with non compliance triggering formal procedures under Schools Licensed Deficit protocol	In Progress	–	Throughout October and November we held Support and Challenge meetings with Headteachers and, where necessary, we have asked for the Licenced Deficit (LD) applications to be updated to reflect these discussions. It is anticipated all current LD applications will be signed off in December, however we continue to monitor the forecasted position of all schools and we may need to schedule further meetings in the new year.	
REY002T	Financial Performance Monitoring Group meetings to review performance and agree action plan with specific actions and timescales to address issues identified	In Progress	–	We continue to monitor compliance with the Protocol for Schools in Financial Difficulty	
REY003T	Schools pupil funding Formula review to be scheduled/approved through Schools Budget Forum to ensure base budgets are best allocated	In Progress	–	Small changes to the School Funding Formula to be shared with School Budget Forum in January 25. Wider review of the Formula to be considered in 2025/26.	
REY004T	Local Authority approval mechanisms for recruitment in schools with budget deficits	In Progress	–	All Schools in a deficit position have been reminded of the requirement to consult with the Council prior to recruitment.	

RGV01 - Loss of IT/Cyber Security

Inherent Risk Score	Current Risk Score	Target Risk Score
20	20	12

Description	Significant loss of corporate data and systems due to security / environmental / technical incident
Key Impacts	1. Data breaches 2. Financial loss 3. Reputational damage 4. Business disruption
Risk Category	▪ Economic ▪ Legal ▪ Political ▪ Technological
Risk Type	Strategic
Owner	Gareth Owens
Comments	Risk is increasing due to recent local and international events, therefore the risk likelihood has increased to reflect this. However, work continues on the mitigating actions with a recent review undertaken to further enhance the mitigating actions with support from a Welsh Government initiative.

Current Score on the Risk Matrix



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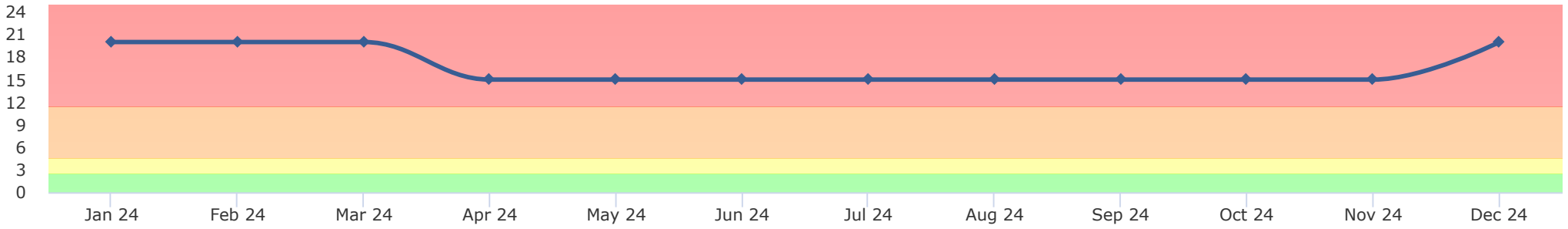


How are we managing risk?

Governance	Risk is reviewed monthly at Senior Management Meeting. Frequent reporting to Corporate Services Senior Management Meeting.
Internal Controls/Process	Internal groups that have oversight of Cyber Security procedures, threat analysis, policies and review of any incidents. Participation in National Security Groups, such as Warp, and constant review of National Cyber Security Centre guidance. Use of Citrix technologies provides a secure environment which delivers the majority of our business systems. Maintain a second active datacentre allows for the continual provision of critical systems. Utilise strong security controls, vulnerability management and delivery mechanism to reduce this risk.

Risk Mitigation Actions

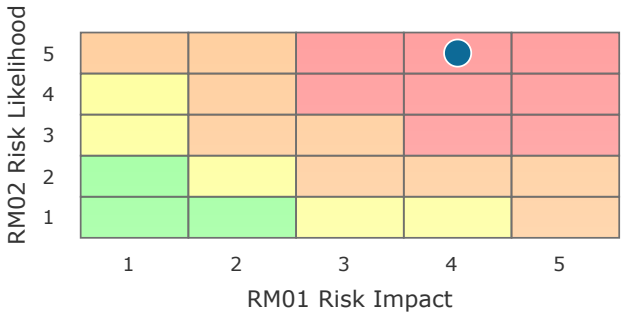
	Action	Stage	RAG	Latest Update	Due Date
RGV001T	Maintain a valid PSN and prepare for Cyber Essentials Accreditation.	Completed		PSN certification achieved for 2024/25. Cyber Essentials Plus not currently being explored but will be revisited in future	31/03/2025
RGV006T	Development of Cyber incident reponse and recovery plan.	In Progress		Draft plan has been produced and feedback has been received from IT Managers and Business Continuity Representatives. The plan has been reviewed with the Chief Officer Governance, minor changes are being made, plan will need to be shared with Chief Officer Team.	31 Mar 2025
RGV007T	Regular review and testing of IT Disaster Recovery Plan.	In Progress		The IT Disaster Recover plan continues to be reviewed on a regular basis.	31 Mar 2025
RGV008T	Identify list of critical business applications.	In Progress		We are now working to the list produced but need to have formal agreement	31 Mar 2025
RGV009T	Complete full review on IT Security Policies	In Progress		This is an ongoing task to review all IT policies and update	31 Mar 2025
RGV082T	Enrolment in CymruSOC	In Progress		Preparation onboarding is due to commence early January.	30 Jun 2025

RHC09 - Resource to meet Homeless Obligations

Inherent Risk Score	Current Risk Score	Target Risk Score
15	20	12

Description	The Council is unable to meet it's homelessness statutory obligations due to shortages in staff, budgetary pressures and lack of available accommodation
Key Impacts	1. Reputational damage 2. Failure to meet statutory duties 3. Failure to manage or project the financial pressures associated with homelessness 4. Workforce resilience and recruitment 5. Lack of access to homeless accommodation in the county
Risk Category	▪ Economic ▪ Legal ▪ Political ▪ Social
Risk Type	Strategic
Owner	Vicky Clark
Comments	Whilst lots of plans in place to deliver efficiencies through diversification of homeless accommodation portfolio, it is clear it will take some time for these interventions to achieve significant cost benefit. Numbers of homeless household stabilizing and use of hotels has reduced in recent months. Contract with D2 PropCo to progress along with increase in house shares and new builds all positive and will provide desirable outcomes in time. The restructure of the Housing & Prevention Service is now progressing and appointment to Managers roles complete and three Team Leaders now appointed, with a further two posts to progress later in the month, additional frontline staff to be recruited in January 2025.

Current Score on the Risk Matrix



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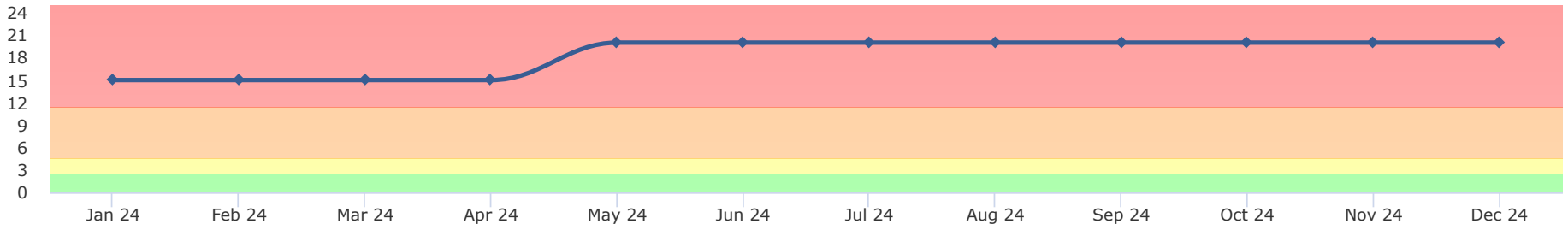


How are we managing risk?

Governance	Monthly DMT within Housing and Prevention Services to review risks and this would then be discussed further at Housing and Communities SMT. Programme Board quarterly. Ending Homelessness Board quarterly. Rapid Rehousing Transition Plan and Housing Support Programme Strategy.
Internal Controls/Process	Monitor demand for homelessness services. Monitor the levels of emergency accommodation. Monitor demand for homeless services with a view to informing workforce, prevention activities and homeless accommodation planning. Monitor levels of emergency accommodation with a view to informing workforce, move-on activities and homeless accommodation planning. Monthly financial review of budgets to monitor current expenditure and project in-year an future pressures. Monthly monitor levels of emergency accommodation with a view to informing workforce, move-on activities and homeless accommodation planning. Deliver on homeless pressures options paper outcomes (increasing supply of housing, reducing use of emergency accommodation, i.e., B & B's) and is an ongoing programme; overseen by the Ending Homelessness Board.

Risk Mitigation Actions

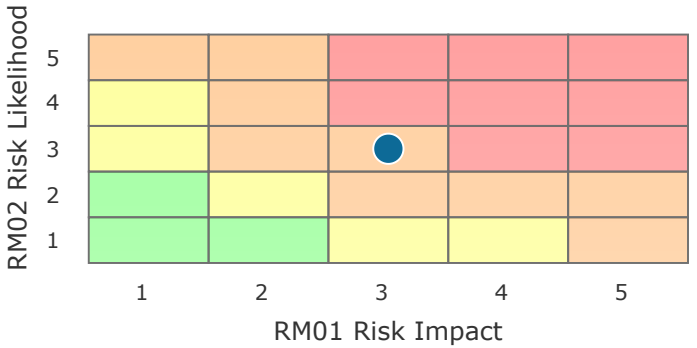
	Action	Stage	RAG	Latest Update	Due Date
PHC017T	Successfully deliver the restructure of the Housing & Prevention Service (as supported by Cabinet in October 2024) to increase capacity within the service	In Progress	●	All funding sources identified for ambitious restructure, taking the service from approximately 42 FTE to 72 FTE. Managers and Senior Staff appointed in December, recruiting to all front line staff and specific project posts, such as Rapid Rehousing Co-Ordinator and Data Analyst to be completed Quarter 4 2024/25.	30 Nov 2025
PHC018T	Implement the range of alternatives for hotel and B&B for homeless accommodation (as supported by Cabinet in October 2024).	In Progress	●	Homeless accommodation diversification plan supported by Cabinet in November 2024 and will achieve significant savings for the Council. Contract D2 PropCo progressing and Member briefing session on 11th December. Numerous properties identified across the County. Flintshire based hotel plan progressing. Pipeline of new properties funded through Transitional Accommodation Capital Programme (TACP) ongoing.	30 Nov 2025
RHC023T	Monthly financial review of budgets to monitor current expenditure and project in-year an future pressures	In Progress	★	Monthly meetings continue, positive movement against projected overspend, which is encouraging.	31 Mar 2028
RHC024T	Monthly monitor levels of emergency accommodation with a view to informing workforce, move-on activities and homeless accommodation planning	In Progress	★	Number of households within homeless accommodation have stabilized and not as high as initially projected for the Quarter 3 period. Encouragingly we have also seen a reduction in seen in the numbers of households placed in hotels and holiday accommodation, as we are now delivering more appropriate and more cost effective homeless accommodation solutions and anticipate this positive trend to continue.	31 Mar 2028

RHR29 - Recruitment and Retention

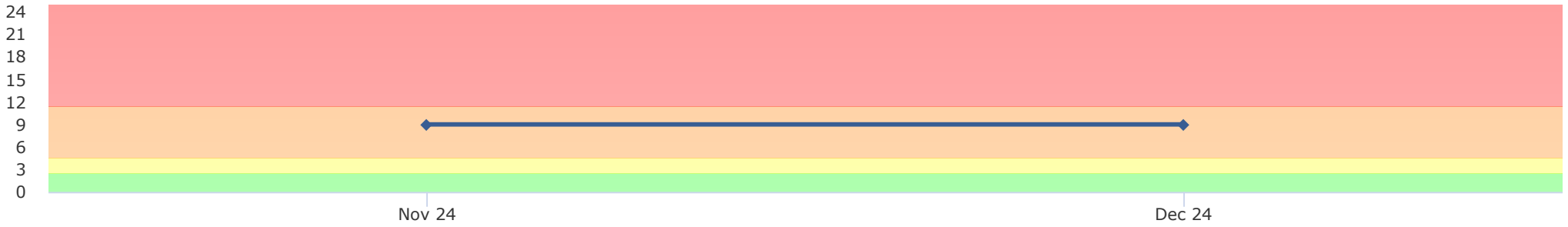
Inherent Risk Score	Current Risk Score	Target Risk Score
9	9	2

Description	Inability to attract and retain valued employees
Key Impacts	1. Loss of key skills, knowledge and experience 2. Recruitment into key posts 3. Disruption and the inability to deliver key services 4. Increased financial costs
Risk Category	▪ Economic ▪ Political ▪ Social
Risk Type	Strategic
Owner	Sharon Carney
Comments	Linked to RHR30. Some portfolios have challenges in filling vacancies due in part to national shortages and in part to our pay model being uncompetitive.

Current Score on the Risk Matrix



Direction of Change



How are we managing risk?

Governance	Reports will be provided to Programme Board, Cabinet and Corporate Resources Overview and Scrutiny Committee (CROSC) periodically.
Internal Controls/Process	Periodic benchmarking of posts. Market supplements. Reporting to Portfolios regarding employment statistics and future workforce planning. Workforce exit interviews. Monitoring and frequent reviewing of People Strategy and key measures detailed within the strategy.

Risk Mitigation Actions

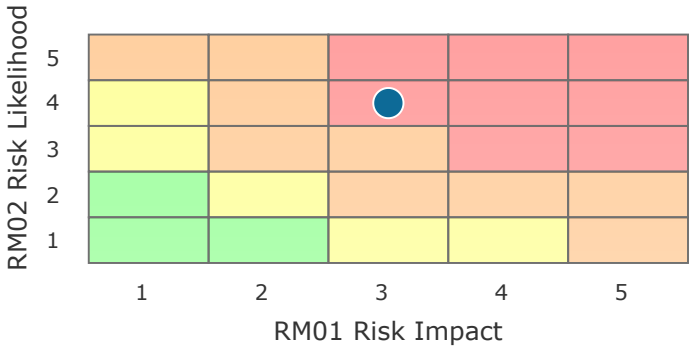
	Action	Stage	RAG	Latest Update	Due Date
RHR025T	Complete annual Equal Pay Audit report	In Progress	–	The annual Equal Pay Audit report will be finalised in Quarter 4 of 2024/25.	01 Apr 2025
RHR026T	Complete the annual Pay Policy Statement	In Progress	–	The annual Pay Policy Statement will be completed in Quarter 4 of 2024/25.	01 Apr 2025

RHR30 - Employment Related Costs

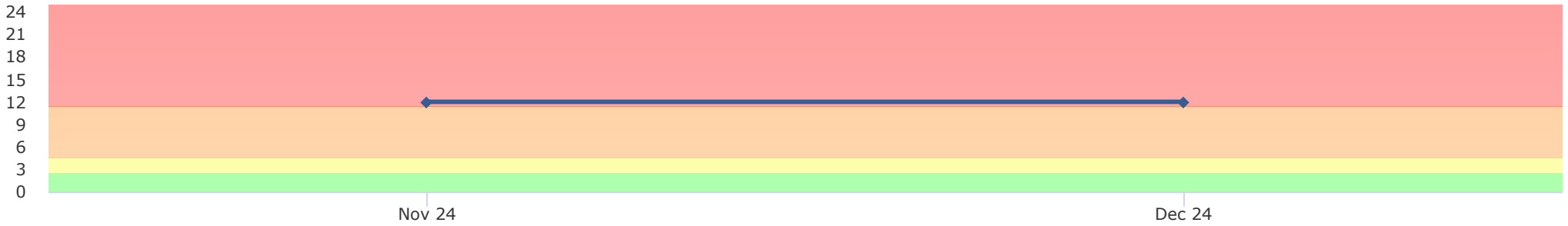
Inherent Risk Score	Current Risk Score	Target Risk Score
16	12	6

Description	Increased costs associated with temporary / additional resources to the workforce as a result of vacancies, sickness absence etc. (for example, overtime, additional hours, agency costs)
Key Impacts	1. Financial costs 2. Budgetary pressures
Risk Category	▪ Economic ▪ Legal ▪ Social
Risk Type	Strategic
Owner	Sharon Carney
Comments	Some portfolios have challenges in filling vacancies due in part to national shortages and in part to our pay being uncompetitive. Some portfolios are also dealing with high levels of sickness absence (short and long-term) resulting in work being covered by overtime, additional hours and/or using agency workers.

Current Score on the Risk Matrix



Direction of Change



How are we managing risk?

Governance	Reports will be provided to Corporate Programme Board, Cabinet and Corporate Resources Overview and Scrutiny Committee periodically
Internal Controls/Process	Business case are signed by Chief Officer for off matrix agency spend. Monthly additional hours reports (including overtime, additional hours, standby and call-out) are provided to Portfolios Senior Management Team (SMT) to review and take action as necessary. Establishment reports which confirm by post (established and non established) sent monthly to SMT and HRBP to review and take action as necessary. Budget monitoring meetings.

Risk Mitigation Actions

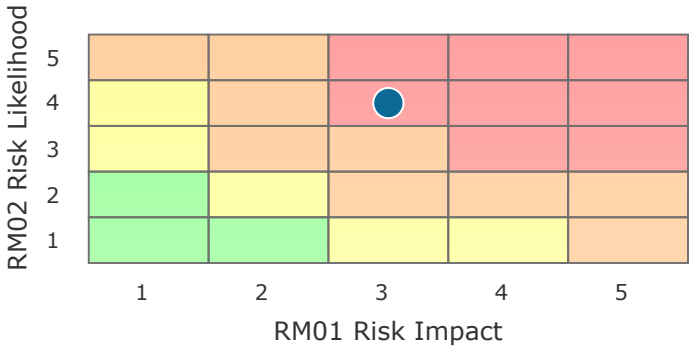
This report does not contain any data

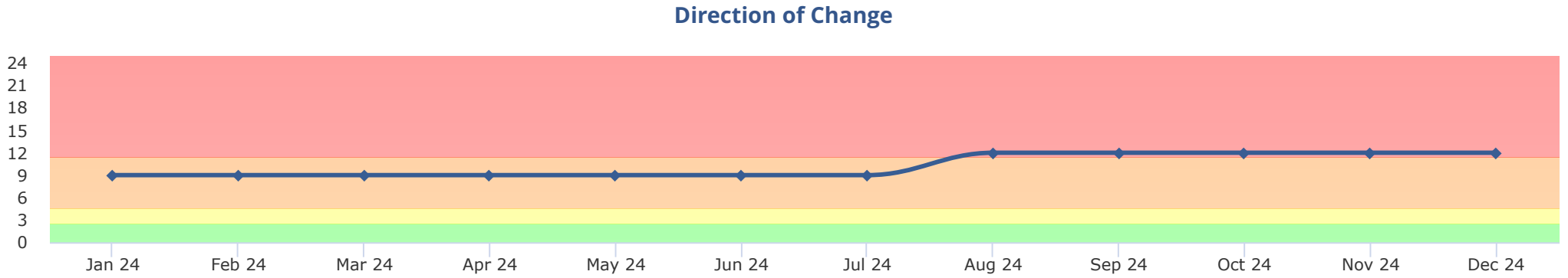
RPE11 - Net Zero Carbon Goal

Inherent Risk Score	Current Risk Score	Target Risk Score
9	12	2

Description	Affordability of the Council being able to achieve its net zero carbon goal. Inability to commit or attract sufficient resource to coordinate the programme and deliver on projects, leading to opportunities not being maximised, actions not delivered and benefits not realised
Key Impacts	1) Financial cost to the Council – inability to realise efficiency savings/income generation opportunities 2) Inability to reach net zero carbon target, both locally and as part of the team public sector 3) Reputational damage from inability to reach net zero carbon target
Risk Category	▪ Economic ▪ Environmental ▪ Legal ▪ Political ▪ Social ▪ Technological
Risk Type	Strategic
Owner	Andrew Farrow
Comments	This risk continues to be high profile due to the current economic climate and reduced access to external funding. The team continues to work closely with neighbouring authorities and networks to identify early opportunities for accessing resources and capitalising on invest to save opportunities.

Current Score on the Risk Matrix




Direction of Change
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How are we managing risk?

Governance	Officer working groups for each strategy theme area Consultation with Cabinet Member Planning Environment Economy Senior Management Team Portfolio Programme Board Climate Change Committee Environment & Economy Overview and Scrutiny Committee Cabinet Measures included within Council Plan priorities Risks included within both corporate and programme risk registers Work in collaboration with external parties, Welsh Government Energy Service (WGES) and Welsh Local Government Association (WLGA)
Internal Controls/Process	Review of climate change strategy incorporating updated methodologies, innovative solutions, learnings from previous year's data, financial projections where possible, and updated carbon reduction trajectories Reporting of carbon footprint data to Welsh Government annually Utilisation of tools to encourage better decision making around carbon impacts, including provision of carbon training, updated capital business case template, updated procurement processes, and Integrated Impact Assessment Networking locally and nationally across sectors to remain informed of opportunities for collaboration and external funding sources. Lobbying Welsh Government for both financial and political support to achieve our net zero carbon aims

Risk Mitigation Actions

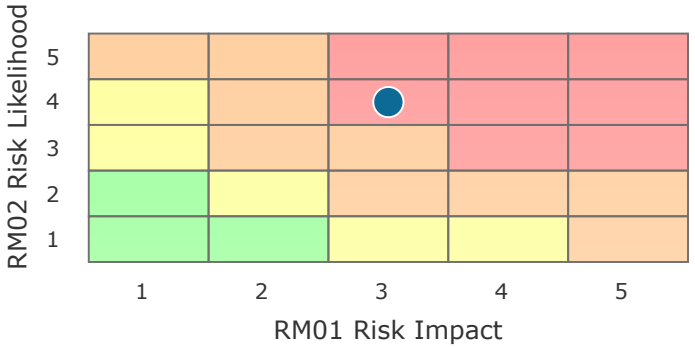
	Action	Stage	RAG	Latest Update	Due Date
CRPE011T	Proactively seek external finance using the climate change strategy and action plan as the narrative. Submit strong and coordinated external funding bids, working collaboratively across the region as well as interdepartmentally within the Council. Aim to submit early input into the Budgets for revenue and capital for the following financial year and maintain an ongoing dialogue in terms of medium to long term financial plans to ensure commitment is made towards financing carbon aims. In terms of Council-wide decision making and prioritisation, carbon literacy training roll out to key decision makers across the Council will enable officers to factor in carbon impacts at early stages of project developments to allow for sufficient provision in internal and external funding bids. Implementation of whole life cost into business cases will capture the long term costs and benefits of schemes.	In Progress	–	External funding continues to be sought for energy efficiency works on Council assets as well as funded support programmes to assist in delivery objectives and leadership across the Council, eg. funded support from WRAP auditing sustainable procurement, funded support with University of Manchester developing the Integrated Impact Assessment. Carbon actions are included in the MTFS and capital works programme,.The RE:fit contract which will see £1.5 million Council investment over 2 years in retrofit of energy efficiency and renewable energy works across the building assets, was awarded and works underway. This year's capital business cases have all used the new template which includes consideration of a low carbon/environmentally friendly option with, where applicable, one off and ongoing carbon emission projections. Carbon literacy training has been rolled out to Senior managers across the Council and Elected Members. Further training sessions have been scheduled throughout the year for the wider employee base, and the Climate essentials elearn has also been launched. Carbon training is now a mandatory unit for Elected Members to complete, and this should see an increase in participation over the coming year.	31 Mar 2030

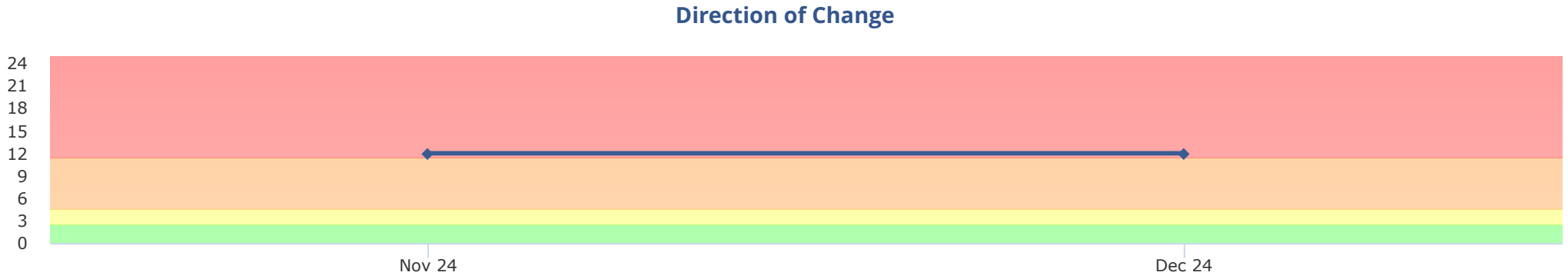
RSS54 - Care Provision Sustainability

Inherent Risk Score	Current Risk Score	Target Risk Score
12	12	4

Description	Market stability / placement sufficiency leading to insufficient and unaffordable care provision
Key Impacts	1. Local authority providing care that operates without registration 2. Unintended consequences of Welsh Government's eliminating profit policy leading to insufficient placement availability and /or unaffordable care fees 3. Unaffordable cost of residential care for children looked after
Risk Category	▪ Economic ▪ Political ▪ Social
Risk Type	Strategic
Owner	Craig Macleod
Comments	This is a newly created strategic risk around sustainability of the care placement market for both adults and children, the risk being that escalating costs, scarcity of placements and forthcoming changes in national policy will make it impossible for the Council to continue to source placements that are affordable and meet the needs of the individual. Mitigating actions currently in progress include working with local providers to reshape the residential market, including continuing to look at our options for developing further residential provision in house, and developing initiatives with the aim of reducing the number of children coming into care, supporting existing placements to prevent breakdown, combating exploitation, and recruiting and developing our in house foster carer pool. These plans include solutions for accommodating an increasing number of unaccompanied asylum seekers.

Current Score on the Risk Matrix

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How are we managing risk?

Governance	Chief Officer Team (COT)
Internal Controls/Process	We are developing in house residential care services for children with complex needs who would otherwise need to be placed out of county. We are also growing our in house fostering service to support more looked after children within Flintshire. This risk is monitored through the Out of County budget. This risk is monitored through the number of children placed in settings without registration (Paris report). Unaccompanied Asylum Seeking Children (UASC) is an increasing risk for placement costs and are included in the scope of expanding our in house residential.

Risk Mitigation Actions

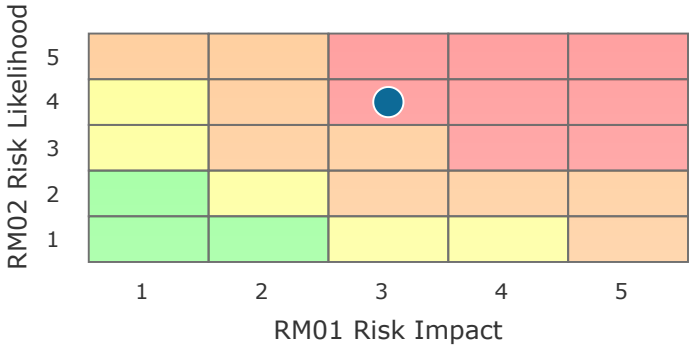
This report does not contain any data

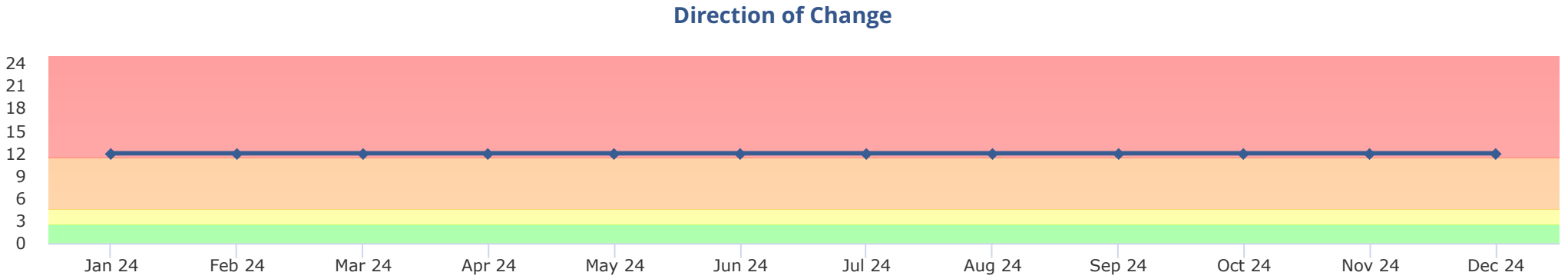
RST07 - Increase in Residual Waste

Inherent Risk Score	Current Risk Score	Target Risk Score
12	12	2

Description	Inability to achieve national recycling targets
Key Impacts	1. Financial cost to the Authority 2. Non compliance with legislative targets 3. Inability to reduce carbon emissions from waste collected 4. Reputational
Risk Category	▪ Economic ▪ Environmental ▪ Legal ▪ Political ▪ Social
Risk Type	Strategic
Owner	Katie Wilby
Comments	The review of the Council's Resource and Waste Strategy was undertaken and consulted upon earlier in 2024 and a new strategy adopted in March 2024 with an action plan to improve service delivery methods to improve the Council's recycling performance, maximise resource efficiency, minimise waste, reduce emissions and minimise the risk of infraction fines. A fundamental action from the strategy is to restrict the amount of residual waste collected from Flintshire properties by introducing a three weekly collection . In November a report was presented to Cabinet outlining and implementation date (28th April 2025), an implementation plan and a communication plan for this service change. It is expected that the recycling performance from this one change will increase by 4.5 percentage points. At this point in time, the risk has been reviewed and the risk scoring and risk comment remains the same this month.

Current Score on the Risk Matrix

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How are we managing risk?

Governance	Consultation with Cabinet Member Business SMT Portfolio Programme Board Forward Works Programme Environment and Economy Overview and Scrutiny Committee Cabinet Council Plan Risk Register Internal audit Collaboration with WRAP Cymru / Local Partnerships / Welsh Government (WG)
Internal Controls/Process	Introduction of a Resource and Waste Strategy - 2024-2030 Update the recycling and waste collections and household recycling centre operational policy Weekly waste management project meetings Waste data reporting to Natural Resources Wales and Welsh Government Restrict the amount of residual waste collected through reducing the frequency of collection Undertake excess waste presentation enforcement Introduce a clear bag policy at Household Recycling Centres (HRCs) Identify other waste streams that could be collected for recycling at the kerbside or HRCs Identify and implement reuse initiatives (via Welsh Government funding) Enhance recycling collections at flats, communal points and Houses of Multiple Occupancy (HMO) Implement a robust communications plan

Risk Mitigation Actions

	Action	Stage	RAG	Latest Update	Due Date
RST007T	Undertake a review of the Council Waste Strategy to identify improve service delivery methods to minimise residual waste disposal and increase recycling.	Completed		A new Resource and Waste Strategy was adopted in March 2024, which sets out the Councils objectives and priorities to reach the statutory recycling targets over the next 6 years.	31/12/2024

Mae'r dudalen hon yn wag yn bwrpasol

Risk Management Framework

December 2023

Mae'r ddogfen hon hefyd ar gael yn Gymraeg. Gweler y dudalen Gymraeg ar ein gwefan.
This document is also available in Welsh. See Welsh page on our website.

Tudalen 141

CYNGOR Sir y Fflint Flintshire COUNTY COUNCIL

Document Control

OVERVIEW

Title	Risk Management Framework
Owner	Internal Audit, Performance and Risk Manager
Nominated Contact	Lisa Brownbill (lisa.brownbill@flintshire.gov.uk)
Reviewed By	Internal Audit, Performance and Risk Manager
Date of Last Review	December 2023
Date of Next Review	December 2024
Related Documents	Risk Management – InPhase User Guide

REVISION HISTORY

Version	Issue Date	Author	Summary of Changes
1	March 2020	Strategic Performance Advisor	New guidance document
2	February 2021	Strategic Performance Advisor	Inclusion of escalation procedure
3	September 2022	Strategic Performance Advisor	Fit for purpose review and update.
3.2	December 2023	Strategic Performance Advisor	Annual review following role out of InPhase

CONSULTATION

Version	Who	Date
1	Performance Leads	17th January 2020
1	Chief Officers Team	26th February 2020
2	Chief Officers Team	20th January 2021
3	Chief Officers Team	16th August 2022
3	Performance Leads	21st September 2022
3.2	Performance Leads and Chief Officer Team	December 2023

APPROVAL

Version	Who / Where	Date
1	Chief Officers Team	26th February 2020
2	Chief Officers Team	20th January 2021
3	Chief Officers Team	16th August 2022
3	Governance and Audit Committee	14th November 2022
3.1	Governance and Audit Committee – Additional information	14th November 2022
3.2	Governance and Audit Committee	24th January 2024

CONTENTS

SECTION	NARRATIVE	PAGE
	Document Control	1
	Contents	2
1.	Introduction	3
2.	What is Risk Management?	3
3.	What is Risk?	3
3.1	Types of Risk	3
3.2	Risk Appetite	4
4.	Roles and Responsibilities	4
5.	Risk Management Process	7
6.	Risk Scoring	10
6.1	Risk Matrix	10
6.2	Approach to Management / Appetite of Risk	10
6.3	Examples of Risk Scoring	11
7.	Communication and Reporting	11
7.1	Non-compliance Monitoring	11
7.2	Escalation of Risk	12
7.3	When Does a Risk Need to be Escalate?	12
7.4	What is the Operating Procedure for Escalation?	13
Appendix A	Contact Details	14
Appendix B	Risk Reporting Overview (Simplified)	15

1. Introduction

Flintshire County Council (the Council) is responsible for delivering both statutory and non-statutory services to residents and business within Flintshire. To enable the Council to deliver these services effectively, the Council needs to consider a wide range of risks and opportunities in the decisions that are made at all levels across the Council.

2. What is Risk Management?

Risk management is the process of identifying risks, evaluating the potential impact, and mitigating them. The aim is to minimise the severity of their impact and likelihood of occurring where possible. Risk management is invaluable to the Council and should form part of the day-to-day management of a service. Some of the benefits to managing risks include;

- prevents reputational damage,
- informs decision making,
- leads to successful future planning.

3. What is Risk?

Risk is defined as the possibility that events will occur and affect the achievement of strategy and business objectives. A ‘risk’ is made up of an event, which if left untreated and with no controls in place, will have an impact on the Council and service delivery.

3.1 TYPES OF RISK

There are three main risk types at Flintshire County Council, they are:

- **Strategic** - risks which have an impact to the operation of the organisation, for example, Health and Safety, Systematic IT Failure and GDPR. A strategic risk requires corporate ownership.
- **Operational** - risks that affect the successful delivery of individual service objectives/delivery plans, and which are controlled by a single Portfolio.
- **Project/Programme** - risks that prevent the successful delivery of a project or programme to be completed on time, on budget and achieving the desired outcomes e.g., a capital investment project for a new school.

3.2 RISK APPETITE

Risk appetite is defined as the amount of risk an organisation is willing to accept or tolerate to achieve its intended objectives. In an organisation as large and diverse as the Council, it is difficult to define a singular risk appetite. Appetite for risk will vary due to the objectives being undertaken in the Council spanning a wide range of different service areas. The Chief Officer Team has the final collective decision if risk appetite has been reached or breached through monthly monitoring reports.

As an organisation the Council recognises that we must accept some risk to achieve our objectives. These are considered as opportunities. The Council's approach to risk is to ensure a culture of being informed and risk aware. The Council may have to accept major or catastrophic risks, which cannot be reduced or eliminated (and therefore these risks would have to be managed within the Council's risk appetite). However, by ensuring the **Risk Management Framework** and **InPhase User Guides** (the Council's performance and risk management system) are followed and risks are reviewed monthly, the Council will have good corporate oversight of such risks.

4. Roles and Responsibilities

Everyone at the Council is responsible for ensuring risks and opportunities are identified and managed at all governance levels.

The table below explains the key roles and responsibilities to ensure risk management is effective within the Council, which includes:

Governance Arrangements, Members & Officer Roles	Description of Roles and Responsibilities
Cabinet Members	• Ensuring that the Council's risks and opportunities are managed effectively, and procedures are in place to monitor the management of significant strategic risks • Setting the appropriate level of risk appetite for the Council • To review the Council's full strategic risk register on a quarterly basis • To ensure that all strategic decisions have been fully considered and consulted upon (risks and opportunities) • To have political oversight and responsibility of the Council's risk and opportunities
Overview and Scrutiny Committees	• Challenging the detail of individual risks related to the Council Plan priorities for example, or a service/function • Reviewing all high-level (this can include strategic, operational and / or project) risks (red and increasing) for assurance and monitoring as well as those escalated for review • Promote the use of risk management to inform effective strategic decision making
Governance and Audit Committee	• Reviewing the effectiveness of the Council's Risk Management Framework, processes, and systems • Effective forward work planning for risk management • To receive a bi-annual risk profile report on all Strategic risks • High level overview of escalated and deteriorating risks • Consider and approve annual reviews of the Risk Management Framework • To call in Risk Owners / Senior Managers when concerns are raised regarding a strategic risk
Chief Officer Team	• The Chief Officer Team owns and lead the risk management process. • Implementation of the risk management process and related policies • Ensuring that risks are managed, monitored and reviewed within their relevant statutory roles • Set strategic risk management controls for any initiatives, projects, action plans • Discussing the appropriate level of risk for the Council (risk appetite) • Identification and assessment of risk levels • Challenging the outcomes of risk management • Monitoring and reviewing risks in accordance with the Risk Management Operational Procedures • Assurance of Business Continuity Planning • Reviewing information within monthly reports to ensure continuous risk identification, assessment, monitoring, and escalation takes place • Ensuring that all risks are reviewed and updated in line with the Council's Risk Management Framework

Governance Arrangements, Members & Officer Roles	Description of Roles and Responsibilities
Service / Departmental Management Team	• Risk management and ownership of risk is a key element of any management role within the Council • The identification, assessment, control, and monitoring / reporting of Portfolio risk registers, (this includes Council Plan, Business as Usual, Partnerships or emerging risks) in accordance with the Risk Management Framework • Reviewing and managing the risks identified for which they are responsible for monthly. • Sharing relevant information regarding risks with colleagues in other service areas • Risk management should be discussed at all Senior Management Team meetings
Performance and Risk Management Team (PRM Team) & Internal Audit, Performance and Risk Manager	• Ensuring the Risk Management Framework is adhered to • Providing advice and support where appropriate • Quality control and challenge (if applicable) of any new risks identified • Providing a monthly risk dashboard for each Portfolio detailing their risk profile • Providing risk profile and trend analysis for relevant Committees • Informing Chief Officers of new or escalating risks • Providing a monthly risk report to the Chief Officer Team (COT) • Responsible for oversight and development of Performance and Risk Management System
Risk Owners	• Responsible for managing and monitoring a specific risk (each risk in the Portfolio risk register is assigned a risk owner) • Ensure that appropriate resources and importance are allocated to the risks they own • Confirm the existence and effectiveness of existing actions and ensure that any further actions are implemented • Review risks during Supervision with their manager • Provide assurance that the risks for which they are the risk owner are being effectively managed • Any risks which are escalating are reported to relevant Senior / Departmental Management Team
Performance Leads	• Effective implementation of the risk management process and related policies within their Portfolio • Ensuring continuous risk identification, assessment, control, monitoring, reporting and escalation takes place within their Portfolio • Ensuring that all risks are updated in line with the Council's Risk Management Framework • Responsible for having oversight of Portfolio risks and use of the Performance and Risk Management System • Where an operational risk may need to become a strategic risk this will be highlighted to Chief Officer Team (COT) and corporately owned as a strategic risk, if applicable
Internal Audit Team	• Periodic reviews of the Council's risks (strategic, operational and project) • Liaise frequently with the Performance and Risk Management Team
All Employees	• Maintain an awareness and understanding of risk in their workplace • Comply with Council policies and procedures for risk management • Notify their line manager of any identified risk and proposed actions to mitigate the risk • Report any incident to their line manager of a risk tolerance breach

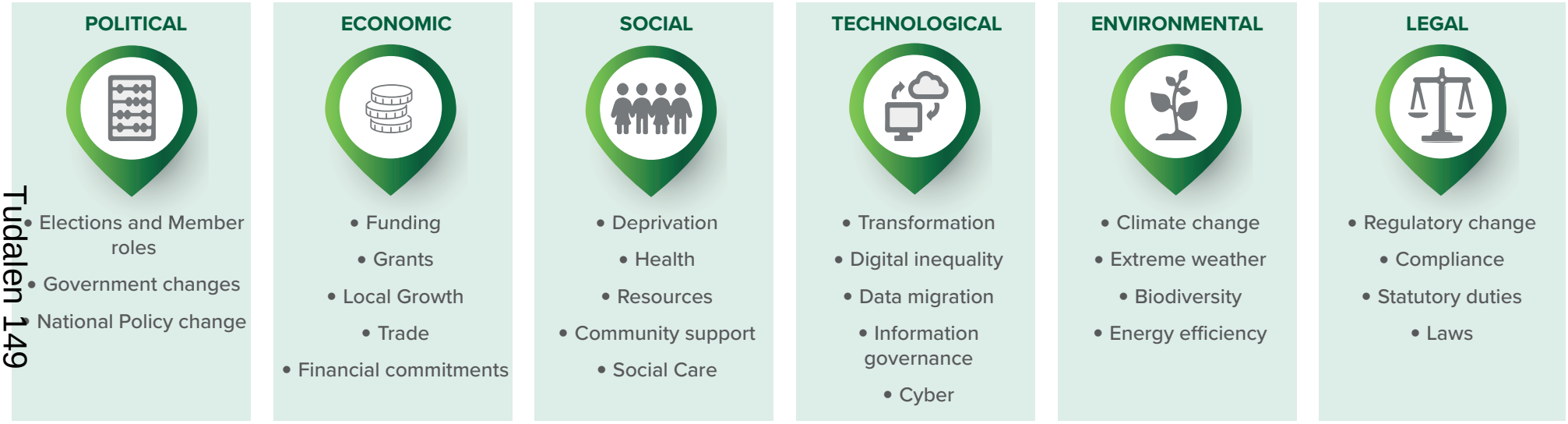
5. Risk Management Process

Risk management is a continuous process and is often done in a sequence of four key stages:

1. Identify
2. Assess
3. Control / Management Actions
4. Monitor and Review

STAGE 1: IDENTIFY

Risk identification is a continuous process which is embedded in Council Planning, Portfolios (and Service Areas within Portfolios), Business Planning, Project Management, partnerships and as part of business as usual or when something changes. Risks can be identified through planning processes, emerging risks and when expected performance is not achieved. When identifying a risk, it should be very clear what the risk is, to the Council, project(s), service delivery or priorities. A method to identify a risk is using a PESTEL analysis:



Once a risk has been identified it should be given a clear and concise risk title. Risk should be identified by using qualitative (milestones and actions) and quantitative (performance indicators, financial data). This is called Risk Evidence and will be used to calculate the risk scoring and be used to measure against risk tolerance.

For every identified risk there **MUST** be a risk owner.

When thinking about identifying a risk consider using the following statement:
This (event) could happen due to (cause) which may result in the following (impact) to our objectives.

STAGE 2: ASSESS

Assessing risk is about prioritising key threats and opportunities and understanding their scale.

Typically, risk is measured in:
- **Likelihood** – how likely will the risk happen
- **Impact** – how severe would the outcomes be if the risk occurred

Once a score for each of the measures has been established, they are multiplied together to generate a final risk score. The higher the score, the higher the priority and urgency of the risk (please see Section 6, Risk Matrix, for further information).

STAGE 3: CONTROL / MANAGEMENT ACTIONS

Once a risk has been identified and assessed the next step is to decide on the best method of managing the risk.

It is important to identify what additional internal controls / actions and measures are required to reduce the risk or to prevent the risk from escalating further. The Council may not always be able to reduce the likelihood with internal controls, however the aim is to always reduce the impact.

A key question to ask is: 'What are you going to do about it?'

STAGE 4: MONITOR AND REVIEW

Monitoring and reviewing of risks is a 'live' process and must be continuously monitored at the appropriate levels (Cabinet, Chief Officer Team, Senior Management). Risks are constantly changing as the external environment alters and / or internal factors change, therefore it is important to monitor that:
- The risk has not changed
- The approach to controlling the risk is still appropriate
- Controls are still working effectively to manage or reduce the risk
- Through regular review a new risk has been identified
- A risk can now be closed (has been successfully mitigated or the risk no longer exists)
- The risk is not deteriorating (if a risk is deteriorating the escalation process should be followed, please see Section 7, Compliance and Monitoring, for further information)

6. Risk Scoring

When assessing the likelihood and impact of a risk, consideration must be giving to 'How likely the risk could happen' and 'How severe would the outcome be is the risk occurred?'

6.1 RISK MATRIX

The Risk Matrix (below) must be used when calculating impact and likelihood score to have an overall score. Risks are then categorised via the overall score and a colour rating to determine the tolerance of risk.

IMPACT
How severe would the outcomes be if the risk occurred

LIKELIHOOD
How likely will the risk be happening

	1 Negligible	2 Moderate	3 Significant	4 Major	5 Catastrophic
5 Almost Certain	Amber 5	Amber 10	Red 15	Red 20	Red 25
4 Likely	Yellow 4	Amber 8	Red 12	Red 16	Red 20
3 Possible	Yellow 3	Amber 6	Amber 9	Red 12	Red 15
2 Unlikely	Green 2	Yellow 4	Amber 6	Amber 8	Amber 10
1 Rare	Green 1	Green 2	Yellow 3	Yellow 4	Amber 5

6.2 APPROACH TO MANAGEMENT / APPETITE OF RISK

The table (below) provides guidance on the Council's risk's appetite depending on the final overall score of a risk.

Colour	Score	Approach	Action
Green	1-2	Accept	Risks within the Council's risk appetite.
Yellow	3-4	Adequate	Risks within the Council's risk appetite which need to be monitored by Senior Management, if risk deteriorates
Amber	5-10	Tolerable	Risks within the Council's risk appetite but not at a level which is acceptable.
Red	12-25	Unacceptable	Risks outside of the Council's risk appetite

6.3 EXAMPLES OF RISK SCORING

The table below provides examples and can be used as a guide to score a risk.

IMPACT SEVERITY (EXAMPLES)

	Service Delivery	Financial	Reputation	Legal
1 Negligible	No noticeable impact	Expenditure or loss of income up to £50k	Internal review	Legal action very unlikely and defendable
2 Moderate	Some temporary disruption to a single service areas / delay in delivery or one of the Council's key strategic outcomes or priorities	Expenditure or loss of income greater than £50k but less than £500k	Internal scrutiny required to prevent escalation	Legal action possible but unlikely and defendable
3 Significant	Disruption to one or more services / a number of key strategic outcomes or priorities would be delayed or not delivered	Expenditure or loss of income greater than £500k but less than £2.5m	Local media interest. Scrutiny by external committee or body	Legal action expected
4 Major	Severe service disruption on a service level with many key strategic outcomes or proprieties delayed or not delivered	Expenditure or loss of income greater than £2.5m but less than £6m	Intense public and media scrutiny	Legal action almost certain and difficult to defend
5 Catastrophic	Unable to deliver most key strategic outcomes or priorities / statutory duties not delivered	Expenditure or loss of income greater than £6m	Public Inquiry or adverse national media attention	Legal action almost certain, unable to defend

LIKELIHOOD

Likelihood of Risk Occurring		
1 Rare	Less than 5% chance	May only occur in exceptional circumstances
2 Unlikely		Could occur but unlikely
3 Possible	50% chance	A change might occur
4 Likely		Will probably occur
5 Almost Certain	More than 95% chance	Very likely to occur

7. Communication and Reporting

For risk management to be effective it needs to be integral to the day-to-day operation of the work the Council undertakes. This involves not only the four key steps of identification, assessing, control / management and, monitoring and reviewing of risks but also clear forms of communicating and reporting on risks. Where developments happen over time, it is important that this is communicated and reported to ensure the information has been captured and included within this document for consistency of approach.

- The risk is not deteriorating (if a risk is deteriorating the escalation process should be followed, please see Section 7, Compliance and Monitoring, for further information)

7.1 NON-COMPLIANCE MONITORING

It is essential that the Risk Management Framework is followed, and risks are reviewed monthly. Where this does not occur, this is considered as non-compliance with the process and a non-compliance report will be shared with the Chief Officer Team.

7.2 ESCALATION OF RISK

The diagram below provides an overview of roles and responsibilities when a escalating risk has been identified.

7.3 WHEN DOES A RISK NEED TO BE ESCALATED?

A risk needs to be escalated:

- When the risk appetite/risk target level is breached (this will be informed by risk evidence)
- When risk mitigation cannot be managed within the Portfolio and:
  - A Council Plan/Strategy priority is compromised and/or
  - Service operations or performance will be seriously compromised and/or
  - The financial, legal, or reputational position of the Council might be compromised and/or
  - An emergency situation might develop

7.4 WHAT IS THE OPERATING PROCEDURE FOR ESCALATION?

Where it has been identified that a risk needs escalating, the escalation procedure will be followed, and COT will be notified of:

- A risk which has a red RAYG (red, amber, yellow, green) status, including all three types of risks
- Any risk which has deteriorated, regardless of RAYG status
- Any new risk to ensure corporate oversight
- The identification of an operational risk needing to become a strategic risk

APPENDIX A

FURTHER INFORMATION

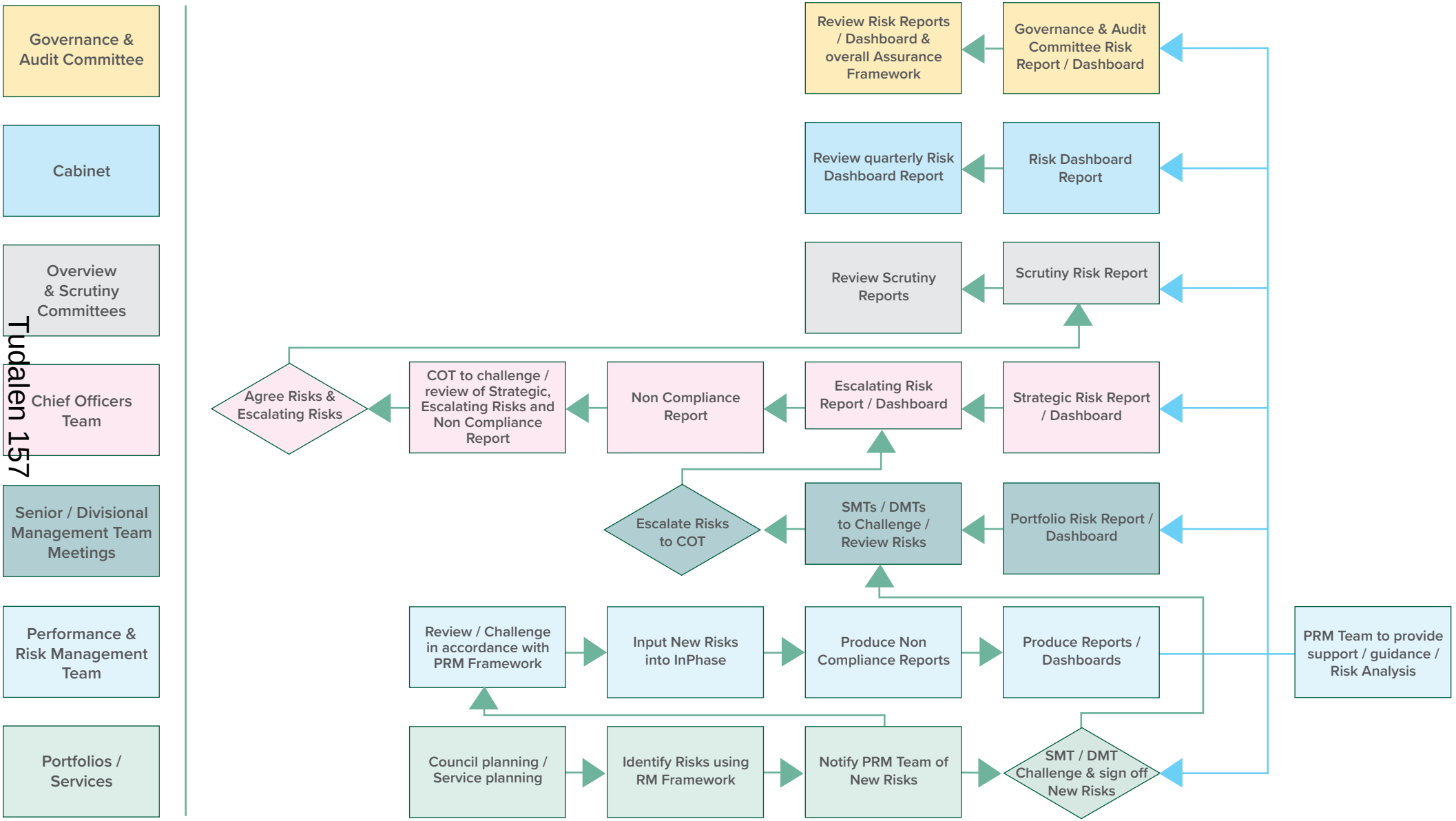
If you wish to receive any further information regarding the Risk Management Framework, please contact the Performance and Risk Management Team.

CONTACT DETAILS:

PRM@flintshire.gov.uk

APPENDIX B

RISK REPORTING OVERVIEW (SIMPLIFIED)



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ENVIRONMENT AND ECONOMY OVERVIEW AND SCRUTINY COMMITTEE

Date of Meeting	Tuesday, 14th January 2025
Report Subject	Grass Cutting and Weed Control Performance Review
Cabinet Member	Cabinet Member for Streetscene & Transportation
Report Author	Chief Officer (Streetscene & Transportation)
Type of Report	Operational

EXECUTIVE SUMMARY

The council provides a grass cutting service at a range of locations and key facilities across the county. The grass cutting policy has been regularly reviewed since 2012 with the last review undertaken in January 2023 with the revised policy approved by Cabinet in March 2023.

This report has been requested by members of the Environment and Economy Overview and Scrutiny Committee following concerns raised about weed control and grass cutting over the summer period in 2024.

It is good practice to review the performance of our grass cutting services at regular intervals and this report provides an overview of performance of our grass cutting operations for the 2024 season following the introduction of the revised policy.

The report also provides further details on the preparations for the 2025 season following the review of performance for this year.

RECOMMENDATIONS	
1	Scrutiny notes the work of the portfolio in its delivery of grass cutting services across the county.
2	Scrutiny acknowledges the preparations being made for the 2025 grass cutting season.

REPORT DETAILS

1.00	BACKGROUND OF THE GRASS CUTTING POLICY
1.01	The grass cutting policy was last reviewed in January 2023 and approved by Cabinet in March 2023. A copy of the revised policy is attached in **Appendix 1**. The revision of the policy followed an all-member workshop in January 2023, which was delivered jointly by the Streetscene & Transportation and Planning, Environment & Economy portfolios, which sought to bring more focus on biodiversity in our grassland management regimes. The approved change of policy also sought to reduce the use of glyphosate on land managed by the council in a controlled and targeted way, due to the carcinogenic properties of such chemicals and harmful effects on human health, wildlife, and animals.
1.02	The main changes to the approved policy included reduced mowing on all suitable verges (avoiding visibility splays and banks), allowing the grass / wildflowers to grow in certain areas and increasing the number of areas to be included in reduced mow or wildflower management to improve the biodiversity. Approval was also given for the targeted reduction of pesticides and the use of alternatives, such as mechanical removal of weeds or organic sprays or opt-out schemes. This involved stopping the use of chemical herbicides within town centres, school grounds and green spaces, for example in parks or recreational areas, along with excluding the use of chemical herbicides in contracted services, such as the schools' grounds maintenance contract, and using alternative weed control methods instead (e.g. heat-based methods, organic sprays, manual/mechanical removal methods).
1.03	Under the Environment (Wales) Act 2016, public authorities must maintain and enhance biodiversity. Sympathetic mowing of road verges and amenity grasslands can help meet this duty. The Act states that all public authorities are required, when undertaking their functions in Wales, to seek to maintain and enhance biodiversity wherever possible within the proper exercise of their functions. In doing so, public authorities must also seek to promote the resilience of ecosystems.
1.04	The council also has a legal responsibility under the Highways Act 1980 for managing the highway network in terms of keeping the routes available and safe for the passage of the highway user. It undertakes this duty in its role as the Highway Authority. Grass cutting takes place on highway verges in areas that are key to maintaining visibility, such as at junctions, laybys, and the inside of bends. The aim of grass cutting is to keep the highway safe and to maintain visibility for all road users, and effectively manage any hazards that may cause a member of the public to trip or fall. We also have a legal obligation to manage certain species of weeds under the Weeds Act 1959 as well as a legal requirement under the Wildlife and Countryside Act 1981 for managing invasive species.
1.05	As can be seen from the different pieces of legislation, there is a balance to be struck in terms of meeting our statutory duties for enhancing biodiversity and reducing the use of harmful chemical weed killers, whilst ensuring safe access and passage to the public highway.

1.06	In addition, regular grounds maintenance of areas that are accessed by the public is recognised to improve the aesthetic appearance of those areas and maintains accessibility for the communities that look to enjoy these green spaces. However, safety remains the priority for grass cutting, such as rural road verges and visibility splays at junctions, for instance.
1.07	Following complaints received about grass cutting and weed control during the 2024 summer season, a report has been requested by the Environment and Economy Overview and Scrutiny Committee. The purpose of this report is to provide an overview to the Committee of the grass cutting performance during the 2024 season, highlighting key achievements, challenges, and operational adjustments. We recognise that grass cutting and weed control are critical elements of the Council's Streetscene service, ensuring safety, maintaining amenity spaces, and supporting biodiversity objectives. This report reflects on the season's performance outcomes and identifies areas for improvement to inform future planning.
1.08	The current delivery mechanisms for grass cutting operations are as follows: - • Rural Highway Verges – Contracted • Urban Verges and Visibility Splays – Contracted • Amenity Areas – Partially contracted / partially in-house • Cemeteries – In-house • Assisted Tenants Gardens – In-house (on behalf of Housing) • Hedges – In-house • School Playing Fields – Contracted • Rights of Way – Contracted (Managed by Countryside Services)
1.09	The frequency of cutting is set as core standards within the current grass cutting policy as follows: - • Rural Highway Verges – once per year • Urban Verges and Visibility Splays – 4 times per year • Amenity Areas – Maximum 13 cuts per year / every 2-3 weeks • Cemeteries – Every 2-3 weeks • Assisted Tenants Gardens – Maximum 13 cuts per year / every 2-3 weeks • Hedges – once per year • School Playing Fields – up to 16 cuts per year
1.10	The programme for grass cutting operations is scheduled as described in the policy; however, there will be periods when the grass and foliage will grow more quickly between cuts. Favourable weather conditions, including warmer temperatures, humidity, and increased UV light, usually in early summer, can cause grass to grow more rapidly. As a result, specific dates for when the grass will be cut cannot be provided, as it depends on weather conditions and how fast the grass grows. We will carry out additional cuts at junctions for visibility when needed if safety issues are identified.

1.11	The 2024 grass cutting season began later than planned during the week of 11th March 2024 and concluded earlier than planned, during the week of 4th October 2024, due to adverse weather conditions. Crew availability was affected by the winter maintenance schedule at the start of the season, as many operatives from the grounds team were being regularly deployed on road gritting operations or adverse weather response at that time.
1.12	Persistent warm, wet weather from the early spring period through to the late summer posed significant operational challenges, and we saw a surge in grass and weed growth across the county, which affected progress on scheduled rounds and increased public complaints as a result. A summary of the number cuts is included in the Grass Cutting Dashboard Summary 2024 (please see **Appendix 2**).
1.13	Due to recent budget cuts, resources are being stretched more thinly compared to previous years. Like other local authorities across the country, Flintshire has had to reduce spending this year on all its services, but the number of sites being maintained for grass cutting has not reduced. We currently maintain 1,030 sites for grass cutting, along with 16 cemeteries and 850+ gardens for the Assisted Garden Scheme. Budget setting for 2024/25 included various options for grass cutting operations, including reducing the service standards for grass cutting generally across the county and reducing the areas cut within unused parts of the cemeteries, as well as bringing some previously contracted services in-house (e.g. weed control and assisted tenants' gardens), which amounted to an overall £85k reduction in the revenue budget.
1.14	As a result, there are fewer members of the grounds maintenance team compared to previous years and grass cutting gangs operated with reduced staffing from five to four-person teams. While the adjustment was initially manageable, recruitment and retention issues, and additional responsibilities diverted to flooding response has compounded delays to the schedule. Despite these difficulties, between eight and nine cuts per area were achieved across the network. The extended grass-growing season, resulting from the warming climate, has progressively made it more challenging to maintain the standard of service historically provided to residents. During periods of rapid growth, it may not be possible to keep pace, despite the team's best efforts to manage the demand. Balancing customer expectations against the weather and resources available is becoming increasingly challenging.
1.15	In addition, the service experienced a number of operational issues with the reliability of some of the machinery and equipment used for grass cutting and weed control, such as the flail deck for the gang mower and the hot foam stream, which took longer to restore than expected due to the specialist nature of the equipment and long lead in times for replacement parts.
1.16	Cemetery maintenance and parks required additional prioritisation during peak demand periods, with teams redeployed to address urgent complaints. Warmer, wetter conditions further slowed progress against the schedule, particularly on larger sites where heavy machinery was impractical. Weed removal also presented significant challenges with accelerated growth outpacing available resources.

1.17	In terms of weed control, we have continued to look for alternatives to using chemical pesticides throughout the season and we have trialled different products and methods, including organic herbicides hot foam treatment (i.e. known as foam-stream), heat treatment, weed ripping and some degree of manual hand weeding. However, these usually require a second treatment and can be more expensive. In previous years, external contractors have typically performed one or two sprays per year, and this too has had very limited effect.
1.18	Whilst we do adopt manual hand pulling weeds in some specific settings, this approach is very time consuming and financially unviable to use across the entire county. Weeds must be removed from the root to ensure they are effectively destroyed and so, each weed must be dug out carefully before pulling. In addition to this, we employ completely chemical-free options such as two small sweepers, which can remove silt and debris, and a mechanical 'weed ripper' that attaches to the sweepers. Our street cleansing teams are also required to "side out" or "edge out" footpath edges. Some alternative means, such as not treating perimeters of parks and open spaces, adding more wildflower meadows, and additional tree planting to further encourage habitat, wildlife, and biodiversity, are also being explored. We will carry out further trials in 2025, in conjunction with the foamstream, to assess the efficacy of the latest version of their chemical free treatment method.
1.19	Collaborative work with the biodiversity team continued to strengthen, with enhanced site management, public engagement, and training opportunities for operatives. The success of the in-house management of the Assisted Gardening Scheme (AGS) on behalf of the Housing and Communities portfolio also provided a positive example of adaptability and cross-portfolio teamwork.
1.20	The Assisted Gardening Scheme (AGS) was brought in-house this season, covering 850 properties. Nine operatives across three teams managed this workload effectively, overcoming challenges such as changes in property lists mid-season. Close collaboration with housing services ensured quality work, reduced complaints, and exceeded expectations. This success has led to securing AGS hedge reduction work for the winter season. This season showcased the adaptability and commitment of teams despite numerous challenges, laying a foundation for continued improvement in efficiency and service delivery.
1.21	Below is a summary of the key challenges this season: - • Weather Conditions: One of the wettest summers on record made many areas unsuitable for cutting, particularly larger spaces requiring heavy machinery. Teams also responded to flooding incidents in late May 2024 and poor weather in October 2024, delaying scheduled work and shortening the grass cutting season.

	• Staffing: Operating with reduced team sizes due to budget constraints, coupled with recruitment and retention issues, affected productivity and schedule adherence. • Machinery Reliability: Delays in repairing the gang mower and limitations in capacity impacted open space maintenance, particularly during peak growth periods. • Public Complaints: High public expectations, exacerbated by visible delays in cemetery and play area maintenance, led to increased enquiries and complaints.
1.22	Despite significant challenges, the teams demonstrated resilience and adaptability. Notable achievements included: - • Completion of eight to nine cuts across most rounds throughout the county, maintaining safety and amenity standards. • Successful in-house management of the Assisted Gardening Scheme, improving quality and reducing costs. • Enhanced collaboration with the biodiversity team, including training for operatives and improved site management practices. • Successful award of biodiversity funding from Welsh Government to purchase a new tractor, new cut and collect machinery, a new gang mower and a quad bike for organic weed spraying.
1.23	**Future Improvements and Action Plan** Based on the 2024 season review, the following steps are proposed to improve performance in readiness for the 2025 season: • Machinery Upgrades: Deployment of the newly purchased tractor and gang mower to improve reliability and efficiency for large open spaces and wildflower site management. • Enhanced Weed Management: We continue to review and trial any new alternative weed control products as they come to market and become licensed for use. The introduction of a weed spraying quad bike and non-glyphosate-based treatments for more comprehensive and timely weed control. We will continue to deliver 'weed killer free' alternative methodologies, such as wider use of weed ripper machine and other mechanical sweepers. • Improved Staff Resourcing: Reduce reliance on agency staff and review operational team sizes to address staffing gaps during peak periods. We will also be instructing our grass cutting gangs to manually pull weeds out when deployed for grass cutting to further reduce the need for weed spraying. We will refresh training with our cleansing teams, who are required to edge out footways in their respective areas. • Revised Schedules: Adapt grass cutting schedules to reflect operational lessons learned, prioritising high-demand areas such as parks and cemeteries during critical periods.

	• Community Engagement: Expand public awareness of biodiversity initiatives and maintenance schedules to manage expectations and highlight ongoing efforts to balance safety, aesthetics, and ecological goals.
1.24	**Highway Verges** The highway verge grass cutting contract has just completed its first season of a two-year contract. The season starts on 1st April each year with the first round of visibility cuts (four in total throughout the season). The contract is delivered by a single contractor split into three areas: North, Central and South. The single swathe cut starts on 1st July each year and is expected to be completed within four weeks. Monthly contract management meetings are held throughout the season, involving discussions regarding KPIs, Health & Safety and contractor payments. The new contractor has performed well this season with minimal complaints regarding highway verges. Please note that hedges, cycleways, and daytime cyclic maintenance operations were removed from this contract to be delivered by our in-house teams this season.
1.17	**Schools Grounds Maintenance Contract** The schools' grounds maintenance contract is supervised and managed by Streetscene on behalf of the Education and Youth portfolio. Winter works will continue as planned, mainly focusing on football pitches and hedges, whilst the contractor will offer support and assistance during times of inclement weather. The contract runs well, and we received minimal complaints from the schools this season. The contractor has completed the last summer season of the contract and discussions will now take place to review whether we will enter into the first of the possible two-year contract extension (as per contract).

2.00	**RESOURCE IMPLICATIONS**
2.01	It is the intention of the service to maintain budgets and deliver the service with cost neutral implications.

3.00	**IMPACT ASSESSMENT AND RISK MANAGEMENT**
3.01	This is an operational report and, as such, does not require a full integrated impact assessment.
3.02	The Streetscene & Transportation portfolio has undertaken risk assessments on the provision of the standard and frequency of all grass cutting services, which are outlined within the policy.

4.00	CONSULTATIONS REQUIRED/CARRIED OUT
4.01	Consultation has taken place with: • Operational teams and stakeholders • With the Cabinet Member for Streetscene & Transportation
4.02	The Environment Overview and Scrutiny Committee supported the existing policy and the proposals for targeted reduction of chemical pesticides and introducing wildflower areas at their meeting in March 2023, which were subsequently approved by Cabinet in March 2023.

5.00	APPENDICES
5.01	Appendix 1 – Approved Grass Cutting Policy (March 2023)
5.02	Appendix 2 - Grass Cutting Performance Dashboard 2024

6.00	LIST OF ACCESSIBLE BACKGROUND DOCUMENTS
6.01	Highways Act 1980.
6.02	Code of Practice for Well-managed Highway Infrastructure (2016)

7.00	CONTACT OFFICER DETAILS
7.01	**Contact Officer:** Barry Wilkinson, Highway Network Manager **Telephone:** 01352 704656 **E-mail:** barry.wilkinson@flintshire.gov.uk
7.02	**Contact Officer**: Christopher Goddard, Streetscene Service Manager **Telephone**: 01352 704550 **E-mail**: christopher.goddard@flintshire.gov.uk

8.00	GLOSSARY OF TERMS
8.01	**AGS (Assisted Gardening Scheme):** A programme managed by the Council to provide gardening services, such as grass cutting and hedge maintenance, for eligible residents requiring assistance. **Biodiversity**: The variety of plant and animal life in a particular habitat, often supported by specific management practices like wildflower site creation or reduced mowing schedules. **Cemeteries (Cems)**: Areas managed by the Council for burial and memorial services. Grass cutting and maintenance in these areas are prioritised to maintain dignity and accessibility for visitors.

	Dashboard: A reporting tool used to monitor performance, record progress, and track key data such as operational hours, complaints, or completed tasks. **Gang Mower**: A large mower designed for cutting extensive open spaces quickly and efficiently. Typically used for parks, sports fields, and large grassed areas. **Glyphosate**: A chemical herbicide historically used for weed control. Glyphosate is the active ingredient in many weed killers used in agriculture, horticulture and gardening. The Council has reduced its use in favour of organic / non-chemical alternatives to support environmental goals. There are legal rules on the use of herbicides and the manufacturers' instructions and the Control of Pesticides Regulations 1986 must be complied with. **Foamstream Applicator:** A non-chemical weed control system that uses hot water and biodegradable foam to treat weeds effectively. **P1 (Priority 1)**: High-priority operational tasks or maintenance areas requiring immediate attention, such as town centres or critical visibility zones. **Rounds**: Pre-defined routes or areas allocated to grass cutting teams to ensure systematic coverage of the network within the season. **Strimming**: The use of handheld or small motorised equipment to trim grass and vegetation in areas inaccessible to larger machinery, such as around obstacles or kerbs. **Visibility Splays/Areas**: Grass areas adjacent to roads or junctions maintained to ensure drivers have clear sightlines for safe navigation and traffic flow. **Wildflower Sites**: Specific areas managed to encourage the growth of native wildflowers, supporting biodiversity and reducing maintenance frequency.

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Appendix 1 – Grass Cutting Policy Review & Options for Biodiversity

Grass Cutting Policy (January 2018) (current)

Biodiversity opportunities highlighted in red text (Jan 2023)

1. Roadside verges

a) Rural Verges (outside 40mph) – 1 cut per year in July (subject to weather conditions); 1 swathe width on all principal roads; 1 swathe width on all non-principal and unclassified roads

Visibility splays at junctions 4 cuts per year in –

- April
- June
- August
- September/October

Full width verge cutting for weed and self-sown sapling control on all classifications of rural roads once every 4 years in September/October.

Additional cuts may be carried out on Health and Safety grounds in specific locations as identified by the Area Coordinators.

Rural Verges:

- Safety remains the priority
- Limited opportunity
- Opportunity to collect cuttings when we cut on flat verges – looking into bank mowers

Option A – Visibility splays:

- Opportunity to collect cuttings – longer term impact less cuts needed, improvements in biodiversity

b) Urban verges (within 40 mph zones) – 4 cuts per year

- April
- June
- August
- September/October

Option A – Reduced mow on all suitable verges (avoiding banks and visibility cuts)

Letting the grass/wildflowers grow, with a cut and collect once a year between August and October
(Targeted initial communities a possibility but adds complexities)

Option B – retain cuts - collect all cuttings – on flat verges
(longer term impact reduce vigour of grasses- less cuts needed, improvements in biodiversity (Dorset approach)

c) Cyclic
Cyclic routes on county dual carriageways

Appendix 2 – Grass Cutting Policy Review & Options for Biodiversity

Cyclic routes receive 2 cuts a year (1m swathe cut in April-July and a full cut in September)

Option A - Retain first cut as existing.

Collect all cuttings on the second full cut where possible.
Trial cyclic cut and collect 2023 on the most appropriate cyclic route (A548 Gronant or DIP suggested).

2. Amenity Areas

Maximum of 13 cuts per year as required.

Flexible start required for the start of the cutting season, in February/March, subject to weather conditions.

Frequency of cuts based on every 2 weeks in April to June, extended to every 3 weeks July to Oct, subject to weather conditions.

(Removal of grass cuttings will only take place in exceptional circumstances i.e. First-Cut of the season)

Option A - Increase area under reduced mow or wildflower management gradually through existing process.

Option B - Opportunity to introduce collection of cuttings on flat areas – longer term impact less cuts needed, improvements in biodiversity

3. Public footpaths / Cycle Routes

A maximum of 4 cuts per year as required, to prevent rural footways being lost to grass ingress and verge creep due to lack of usage.

No change proposed

4. Hedges

The majority of highway hedges are the responsibility of the adjacent landowner. Where the hedge has grown to an extent that it is causing an obstruction to the highway user, notice will be served on the landowner to cut the hedge accordingly. Highway hedges owned by the Council will be cut once a year after the nesting season has passed.

Highway hedges managed by the Council will be cut a maximum of once a year, outside of the nesting season.

Option A - Management timed between Jan - Feb maintains the availability of berries and nuts as a food source for birds and other wildlife.
Allow 2 – 4 years between cuts where possible

5. Bus-stops
A maximum of 4 cuts per year as required across the grassed areas either side of rural Bus-stops, up to 20 metres across the length of the stop.

Option A - Retain cuts but introduce collection of cuttings– longer term impact less cuts needed, improvements in biodiversity

6. Village / Town Gateways

A maximum of 4 cuts per year as required across the grassed areas either side of Village/Town

Gateways signs, up to 10 metres either side of the gateway.

Option A - Retain cuts but introduce collection of cuttings – longer term impact less cuts needed, improvements in biodiversity

7. Recreation Sports Grounds

Up to 16 cuts per year March to October. Subject to separate procurement arrangements and direct liaison with the Schools.

No change proposed

Appendix 2 – Grass Cutting Policy Review & Options for Biodiversity

8. Cemeteries
Flexible start required for the start of the cutting season, in February/March, subject to weather conditions. Frequency of cuts based on every 2 weeks in April to June, extended to every 3 weeks July to Oct, subject to weather conditions.
(Removal of grass cuttings will only take place in exceptional circumstances. i.e. First-Cut of the season)
Additional key dates outside of the cutting season to include Christmas and Mothering Sunday.

No change proposed continued implementation of wildflower areas in cemeteries

9. Tenants Gardens
Where tenants have requested and qualify for the assisted gardening service. The service is provided by contractors who will provide the following:
Maximum of 13 cuts per year as required.
Flexible start required for the start of the cutting season, in February/March, subject to weather conditions.
Frequency of cuts based on every 2 weeks in April to June, extended to every 3 weeks July to Oct, subject to weather conditions.
Option A - Collection of cuttings when cutting tenants lawns if not already done
Option B - Allow tenants to opt into a 'wildlife friendly' service for reduced mow to allow grass to grow (cut and collect once a year Aug - Oct).
Additional offer for wildflower enhancement could be coordinated by biodiversity officer.
Resident engagement could also be supported by the biodiversity team.

Additions to the current policy –

10. Reduced mow/Wildflower Areas
Allow to grow then 1 cut and collect per year between August – November

11. Natural regeneration Areas
Areas to be identified for natural regeneration for carbon capture and biodiversity only requiring essential management for safety.

Grass cutting - Dashboard progress monitoring 2024

	11.03.24	18.03.24	25.03.24	01.04.24	08.04.24	15.04.24	22.04.24	29.04.24	06.05.24	13.05.24	20.05.24	27.05.24	03.06.24	10.06.24	17.06.24	24.06.24	01.07.24	08.07.24	15.07.24	22.07.24	29.07.24	05.08.24	12.08.24	19.08.24	26.08.24	02.09.24	09.09.24	16.09.24	23.09.24	30.09.24	07.10.24
Week	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
ROUND 1 / Area 1	1	1	1	1	1	1	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8	8	Grass cutting stopped in all areas due to bad weather
ROUND 2 / Area 2	1	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	7	7	7	8	8	8	
ROUND 3 / Area 3	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	5	6	6	6	
ROUND 4 / Area 4 & 5	1	1	1	1	2	2	2	2	2	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8	8	
ROUND 5 / Area 6	1	1	1	1	2	2	2	2	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	7	8	8	
ROUND 6 / Area 7	1	1	1	1	1	2	2	2	2	2	2	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	8	8	
ROUND 7 / Area 8	1	1	1	1	1	2	2	2	2	2	2	3	3	3	4	4	4	5	5	5	5	6	6	6	6	7	7	7	8	8	
CEMS	2	2	2	3	3	3	4	4	4	4	4	4	5	5	6	6	6	6	7	7	7	7	8	8	8	9	9	9	9	10	
TRACTOR	**Not out due to weather**							1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4	4	4	

← Grass round chargehands out of service due to WM →

← Winter maintenance operatives / chargehands returned to service

< > Cyclic works

< > All trees responded to flooding

< > All trees responded to flooding

< > Cems grass cutting & Cyclic works

< > Cyclic works

< > Cyclic works

< > Cyclic works

Mae'r dudalen hon yn wag yn bwrpasol

Environment & Economy Overview & Scrutiny Committee

Date of Meeting	14th January 2025
Report Subject	Flintshire's Local Area Energy Plan
Cabinet Member	Collective Responsibility
Report Author	Chief Officer (Planning, Environment & Economy)
Type of Report	Operational

EXECUTIVE SUMMARY

Local Area Energy Planning (LAEP) is a data driven and whole energy system, evidence-based approach that sets out to identify the most effective route for the local area to contribute towards meeting the national net zero target, as well as meeting its local net zero target.

LAEPs feed into regional energy strategies, which relate to national policies: Future Wales: the national plan 2040, Climate change targets, and National Energy Plan 2024.

A Members' Briefing was held on 16th December 2024, and provided an opportunity to increase understanding of and consider the details in the LAEP.

Since the endorsement of the North Wales Energy Strategy and Action Plan and commencement of the Local Area Energy Planning (LAEP) in early 2023, the LAEP for Flintshire has now been finalised.

RECOMMENDATIONS	
1	Cabinet endorses the attached Flintshire Local Area Energy Plan Main Report and Technical Report (Appendix 1 and 2), understanding that the LAEP actions assigned to Flintshire County Council are subject to securing and maintaining necessary funding.

2	Cabinet considers the content of The Coal Authority report 'Flintshire County Council: Mine Water Heat Opportunities' (Appendix 3) in conjunction with the Local Area Energy Plan.

REPORT DETAILS

1.00	EXPLAINING THE REPORT
1.01	**Local Area Energy Planning** Local Area Energy Planning (LAEP) is a data driven and whole energy system, evidence-based approach that sets out to identify the most effective route for the local area to contribute towards meeting the national net zero target, as well as meeting its local net zero target.
1.02	LAEP aims to: account for local and national conditions to achieve net zero; consider how cooperation with adjacent areas can bring success; and increase local stakeholder awareness to increase consent and facilitate credible commitments to achieve the plan.
1.03	LAEPs feed into regional energy strategies, which relate to national policies: Future Wales: the national plan 2040, Climate change targets, and National Energy Plan 2024.
1.04	The local energy system includes: whole building retrofit, local onshore renewables, decarbonisation of transport, deployment of heat pumps where appropriate, reinforced electricity distribution network, decarbonisation of industry and hydrogen networks.
1.05	On behalf of the Welsh Government, Ambition North Wales are managing a contract with consultants developing the LAEP for Flintshire, and the other north Wales counties. The LAEP was authored by The Carbon Trust and Arup, following an internationally recognised method, and was based on modelling, insights from data, and stakeholder plans and ideas, including through workshops. These workshops were attended by Council officers across portfolios, Members, Town & Community Councils, and external stakeholders. External stakeholders have included large local employers, large local energy providers, large local energy users, Deeside decarbonisation forum, transport providers, Distribution Network Operators, housing providers, and any community groups who are focussing on energy.
1.06	The plans will fall under the ownership of each local authority in Wales. They are aimed at being a guidance tool in how best to work towards a fully decarbonised energy system by 2050. All LAEPs will be aggregated to inform the development of the National Energy Plan by the end of the year. Local authorities are requested to endorse the Local Area Energy Plan through due process. The LAEP will be reviewed by Environment &

	Economy Overview & Scrutiny Committee, Corporate Resources Overview & Scrutiny Committee and Cabinet.
1.07	A Members' Briefing was held on 16th December 2024, and provided an opportunity to increase understanding of and consider the details in the LAEP. With Ambition North Wales and other counties in Wales, a delivery/ monitoring mechanism to progress LAEP actions will be developed, including: • Agreeing on a governance structure • Aligning north Wales Regional Energy Strategy (+Action Plan) with the LAEPs • Identifying KPI's • Regional Steering Group The LAEP is provisionally due to be reviewed in five years' time, as we approach 2030 and the public sector net zero carbon target deadline.

2.00	**RESOURCE IMPLICATIONS**
2.01	The Flintshire LAEP includes high-level indicative costs. Actions identified in the plan are assigned to many organisations in the county and funding for actions is not expected to come only from the Council and the public sector. Where possible, the LAEP actions assigned to the Council align with the Climate Change Strategy and are subject to securing and maintaining necessary funding. Delivering the LAEP actions will be for a wide range of stakeholders and will be subject to sufficient political and financial support.
2.02	There will be the requirement for both capital and revenue resource in order to deliver on the LAEP. Specific projects will require full feasibility assessments and this would require additional staffing resource. Delivery of all projects and actions identified is subject to securing the necessary funding.

3.00	**IMPACT ASSESSMENT AND RISK MANAGEMENT**
3.01	There is a risk in terms of lack of capacity (people and/or funding) to deliver the actions allocated to the Council as lead. This could result in actions not being delivered, or delayed in delivery, and therefore outcomes in terms of decarbonising and futureproofing the energy system, not being realised. This risk can be mitigated by collaborating across the region to secure funding to support these actions. Ambition North Wales are working to increase resource capacity in order to support Councils with LAEP action delivery. Many of the actions within the LAEP are aligned with the Council's Climate Change Strategy which will assist in likelihood of delivery, and robust, clear and transparent

	messaging must be used to manage expectations in terms of resource availability matching the Council's ability to deliver.
3.02	**Ways of Working (Sustainable Development) Principles Impact**

Long-term	Positive: Decarbonisation of the Council's activities and services will require long term planning and a long term vision to ensure systems and services are fit for purpose as the climate changes as well as reducing the impact of harmful climate change through mitigation. Decarbonisation activities such as developing renewable energy will have long lasting impacts over tens to hundreds of years. These activities also contribute to the climate change targets set by Welsh Government particularly Wales generating 70% of its electricity demand from renewable energy by 2030 and becoming a net zero carbon nation by 2050.
Prevention	Positive: In order to avoid the harmful effects of climate change it is necessary for the Council to reduce its carbon emissions and increase the amount of carbon sequestered in its land assets. Carbon emissions caused by human activities are the main cause of climate change. Mitigating climate change will help to reduce impacts such as extreme weather causing flooding / extreme heat, loss of wildlife and habitats, increased pests and diseases, etc. Adapting to the impacts of climate change now will improve sustainability of our communities as the climate changes.
Integration	Positive: Becoming net zero carbon integrates with the following priorities under the Council Plan; Green Council, Ambitious Council and Supportive Council. It integrates with the public service board objectives in the Environment priority of the Wellbeing Plan as well as the Smart Access to Energy project in the North Wales Growth Deal. It also integrates with the Environment (Wales) Act 2016 and Welsh Government's decarbonisation of the public sector agenda.
Collaboration	Positive: The climate change programme offers multiple opportunities to work collaboratively both internally and

	externally – and this collaboration will determine the success of the programme. Collaboration with the following groups is needed to ensure decarbonisation is integrated into everything that the Council and the wider region does and plans for: - Welsh Government - Other public sector organisations such as local authorities, NRW, health boards, universities. - Private sector - Regional groups such as Ambition North Wales - Local Town and County Councillors - the local communities
Involvement	Positive: If decarbonisation is to succeed and harmful climate change is to be avoided then everyone at a professional and personal level will need to be involved

Well-being Goals Impact

Prosperous Wales	Positive: Reducing the Council's carbon emissions should enable strategic investment in projects and ways of working that could deliver savings or generate new income streams, therefore supporting delivery of local services. It should also facilitate the development of the low carbon economy through infrastructure projects, land management etc which can support local businesses and communities.
Resilient Wales	Positive: Decarbonisation of the local energy sytem will promote resilience through actions such as: investment in renewable energy infrastructure which helps to reduce reliance on imports from across Europe and the World and the associated price fluctuations.
Healthier Wales	Positive: Decarbonisation of the energy system will provide clean, green energy that is not releasing emissions into the atmosphere via burning of fossil fuels.
More equal Wales	Neutral; No impact identified
Cohesive Wales	Neutral; No impact identified
Vibrant Wales	Neutral; No impact identified
Globally responsible Wales	Positive: Reducing the Council's carbon emissions to net zero helps to mitigate climate change and therefore contributes to the achievement of Welsh Government,

		UK Government and international climate goals.
3.03	Not anticipated to be any negative anti-poverty, equalities or environmental impacts of the scheme.	
3.04	**The Council's Well-being Objectives** Decarbonisation of the Council's activities will support the Green Council objective with a key impact of reducing carbon emissions mitigating climate change, for example, through the development of alternative and renewable energy production, promoting active travel, shifting to electric fleet vehicles, engaging with the supply chain and promoting a low carbon economy through the goods and services purchased. It can also contribute towards the success of other Council Wellbeing objectives such as 'An Ambitious Council' and 'A Caring Council' through providing local job creation and apprenticeships and therefore potentially reducing poverty through maximising residents' income and employability.	

4.00	**CONSULTATIONS REQUIRED/CARRIED OUT**
4.01	The LAEP was created with stakeholders operating in Flintshire (geographical area). Identification and engagement of stakeholders eg in workshops, was a key part of the process of creating the LAEP. Details are included in the Technical Report (Appendix 2). Progress reports and draft versions have also been to Climate Change Committee, Environment & Economy Overview & Scrutiny Committee and Cabinet.

5.00	**APPENDICES**
5.01	1. LAEP Flintshire Main Report 2. LAEP Flintshire Technical Report 3. The Coal Authority report 'Flintshire County Council: Mine water heat opportunities'

6.00	**LIST OF ACCESSIBLE BACKGROUND DOCUMENTS**
6.01	**1.** North Wales Energy Strategy (https://www.gov.wales/regional-energy-strategy-north-wales)

7.00	**CONTACT OFFICER DETAILS**
7.01	**Contact Officer: Alex Ellis – Programme Manager** **Telephone:** 01352 703110 **E-mail:** alex.ellis@flintshire.gov.uk

8.00	GLOSSARY OF TERMS
	Anaerobic digestion – Processes biomass (plant material) into biogas (methane) that can be used for heating and/or generating electricity. **ANW** – Ambition North Wales (formerly North Wales Economic Ambition Board). **Biomass boiler** – Generates heat by burning wood-based fuel (eg. Logs, chippings) in a boiler. **Energy Component -** This is a technology or component of the energy system – such as onshore wind, solar PV **Ground PV** – Converts solar radiation into electricity using photo-voltaic cells mounted on the ground. **Heat pump –** Uses a heat exchange system to take heat from air/ground and increases the temperature to heat buildings. **Hydro** – Uses water falling between two reservoirs to turn turbines to generate electricity. **LAEP** – Local Area Energy Plan **Onshore wind** – Harnesses wind to turn a turbine to generate electricity on land. **Pathway** - A pathway is how we get from the current energy system, to the most likely net zero end point. The pathway will consider what is needed from across the scenarios, the supply chain, number of installers etc. The propositions will make up the more certain part of the pathway, whereas the longer-term energy components will need further definition in the future. **Retrofit** – Upgrading the performance of an existing building, such as installing more insulation or double glazing. **Scenario** - A scenario is a set of assumptions for a particular end point (usually 2050) which are modelled in our optimisation model. We will model 5 different scenarios to see what is common across the scenarios and therefore “no regrets”, and what changes between the modelled scenarios. **WG** – Welsh Government.

Flintshire

Local Area Energy Plan

Flintshire

2024

Mae'r ddogfen hon ar gael yn Gymraeg /
This document is also available in Welsh

Abbreviations

Acronym	Definition or meaning
ANW	Ambition North Wales.
CAPEX	Capital Expenditure.
CCGT	Combined Cycle Gas Turbine.
COP	Coefficient of Performance.
DESNZ	Department for Energy Security and Net Zero.
DFES	Distribution Future Energy Scenarios.
DNO	Distribution Network Operator.
EfW	Energy from Waste.
EPC	Energy performance certificate.
ESC	Energy Systems Catapult.
EV	Electric Vehicle.
FES	Future Energy Scenarios.
GDN	Gas Distribution Network.
GHG	Greenhouse Gas.

Acronym	Definition or meaning
GIS	Geographic Information System.
HGV	Heavy Goods Vehicles.
LAEP	Local area energy planning or Local area energy plan.
LDP	Local Development Plan.
LGV	Light Goods Vehicles.
LSOA	Lower super output area, a small area classification in the UK designed to have a comparable population.
LULUCF	Land Use, Land Use Change and Forestry.
MSOA	Middle super output area, a medium-sized area classification in the UK designed to have a comparable population.
NAEI	National Atmospheric Emissions Inventory.
NGED	National Grid Electricity Distribution.
NZ	Net Zero.

Abbreviations

Acronym	Definition or meaning
REA	Renewable Energy Assessment.
REPD	Renewable Energy Planning Database.
RFI	Request for Information.
RIIO	Revenue = Incentives + Innovation + Outputs, a regulatory framework used by the UK energy regulator, Ofgem.
RSP	Regional Skills Partnership.
RTP	Regional Transport Plan.
SDP	Strategic Development Plan.
SMR	Steam Methane Reformation.
SPEN	SP Energy Networks.
SSE	Scottish and Southern Energy plc.
TfW	Transport for Wales.
WIMD	Welsh Index of Multiple Deprivation.
WWU	Wales and West Utilities.

Note: full definitions for terms used through the report are provided in the glossary at the end of the document.

Sponsors: *Delivery partners:*

Contents

	Local Area Energy Plan outline	5
	Executive summary	6
1.	Introduction	12
2.	The current energy system	20
3.	The future energy system	38
4.	Action planning	50
5.	Next steps	69
	Appendices	74
	Glossary of terms	79

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Navigating this report

Home icon
Clicking the Flintshire County Council logo in the top right-hand corner of each page will return the reader to this contents page.

Navigation to Sections
Readers can navigate to every section of the report my clicking on the desired section from this contents page.

Navigation within the report
Throughout this document, clicking on underlined text with take the reader to the page referred to.

This Local Area Energy Plan was prepared by Arup, Carbon Trust and Afallen on behalf of Flintshire County Council and co-ordinated across the region by Ambition North Wales. Energy Systems Catapult is the Technical Advisor for the LAEP Programme in Wales.

The Plan's development was funded by the Welsh Government.

Local Area Energy Plan outline

This plan collates evidence to identify the most effective route for Flintshire to reach a net zero energy system

Overview

As part of this project, two separate documents have been produced. This will ensure the content is accessible to a variety of audiences whilst also making it easier to find information relevant for the reader. These two documents are the:

1. **Local Area Energy Plan** *(this document)* contains the overarching plan, focusing on the Flintshire's area-wide local energy plan and actions.

Technical Report contains the graphs, charts, maps and supporting data for the results published in the Local Area Energy Plan. It also provides more detail about the approach to modelling and scenario analysis that we took. This report is available upon request.

Achieving the transformation that is needed for the energy system to reach net zero will not be easy and will need a collaborative approach. In this plan, the term "we" has therefore been used to refer to the range of people and organisations in Flintshire who will support the ambition we set out and take action. The Council and Ambition North Wales have taken facilitating roles in developing this LAEP, but we will not deliver the ambition it sets out alone. We have developed this Plan with input from a range of stakeholders, and we hope that you will be inspired by the actions that stakeholders have committed to, to take action to transform our energy system too.

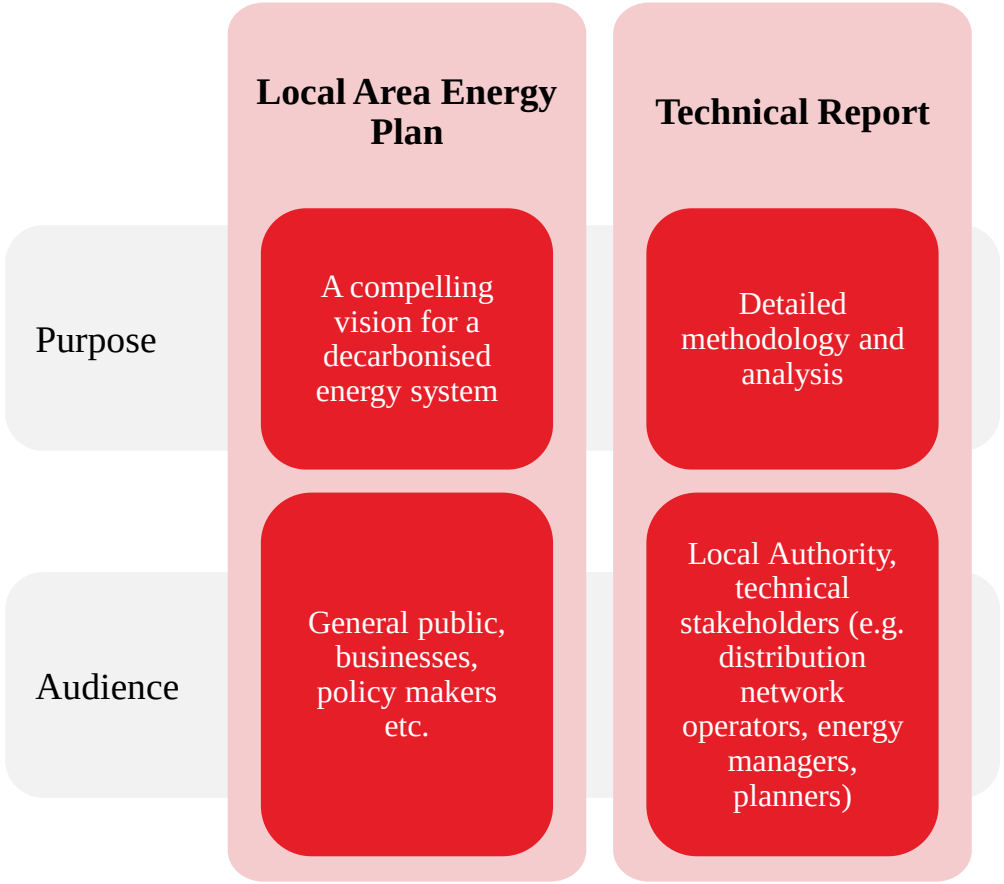


Figure 0.0.1: LAEP and support documents purpose and audience summary

Executive summary
Our vision for a net zero local energy system

The vision for Flintshire's future local energy system is:

Flintshire County Council envisions a sustainable future with a net zero energy system that is affordable and promotes community health, wellbeing, and economic growth. We commit to a clean energy transition that fosters a resilient, inclusive, and prosperous community, ensuring a harmonious balance between environmental stewardship and social progress.

Flintshire's **energy objectives** are collectively agreed and describe what needs to be done to create the enabling conditions needed to deliver this LAEP.

- Support a low-cost and affordable energy system through reducing energy demand and promoting energy efficiency.
- Optimise the use of local renewable energy sources within Flintshire, encouraging local ownership and community participation.
- Promote safe, healthy, and sustainable places to live, work and visit – helping to generate connected and resilient communities
- Create a resilient energy system capable of meeting future energy demands that reduces carbon emissions and protects and enhances Flintshire's natural assets.
- Promote a low carbon economy, providing learning and skills for all to create a prosperous, thriving, resilient Flintshire.

Our **energy propositions** describe what needs to change between now and 2050 to decarbonise Flintshire's local energy system and achieve net zero by 2050.

- Scaling Zero Carbon Buildings
- Decarbonising Transport
- Increasing Local Renewable Generation
- Supporting Green Business
- Maturing Hydrogen
- Reinforcing and Transitioning Energy Networks

Figure 0.0.2: LAEP priority energy proposition areas for Flintshire

Executive summary

Flintshire's energy propositions in more detail

Scaling Zero Carbon Buildings

Supporting and deploying energy efficiency measures across the county to reduce energy demand and costs.

Ensuring buildings are safe, healthy and low carbon in operation and design.

Low regret system components:

- Retrofit
- Heat pumps

Decarbonising Transport

Enabling the rollout of ultra low/zero carbon vehicles across the county and transitioning to a zero carbon council fleet.

Promoting active and sustainable travel within the region.

Low regret system components:

- EV chargers
- Active travel

Increasing Local Renewable Generation

Investigating opportunities for local and community ownership of renewables, providing low cost, clean energy to residents.

Low regret system components:

- Rooftop solar
- Ground-mounted solar

Supporting Green Business

Encouraging and supporting businesses to adopt low carbon measures and reduce energy costs.

Create an attractive environment for sustainable businesses to make base in Flintshire.

Low regret system components:

- Waste heat

Maturing Hydrogen in Industry

Exploring the potential for hydrogen within particular sectors and understand the infrastructure requirements for implementation.

Low regret system components:

- Innovation trials

Reinforcing and transitioning energy networks

Grid reinforcement will be required to accommodate the shift towards electric vehicles and heating.

Even in a low hydrogen scenario the gas grid will require repurposing for hydrogen within some applications.

Low regret system components:

- Flexibility and storage technologies

Figure 0.0.3: Summary of energy propositions

Sponsors:

Delivery partners:

Executive summary

Flintshire's local energy system will need to change significantly to achieve net zero by 2050

Flintshire's local energy system today

- **220** public EV charge points
- **700** heat pumps installed
- **13,000 (35%)** of all domestic properties EPC A-C
- **80MW** ground-mounted solar PV installed capacity
- **2,900** buildings with rooftop solar PV installed (12MW)
- **0 GWh/yr** of industrial hydrogen consumption

What Flintshire's net zero local energy system could look like in 2050

- **Up to 63,800** public EV charge points
- **Up to 95,300** heat pumps installed
- **Up to 37,200** of all domestic properties EPC A-C
- **645MW** ground-mounted solar PV installed capacity
- **99,700** buildings with rooftop solar PV capacity (400MW)
- **Up to 220 GWh/yr** of industrial hydrogen consumption

1 Between 2023 and 2030, we assume a slow but steady uptake of low carbon technologies due to factors such as limited awareness, higher capital costs, and the need for network reinforcement.

2 From 2030 onwards, we assume that deployment accelerates as technologies become more commercially attractive, awareness increases, supply chains develop, and they become more affordable.

3 From 2040 onwards, we assume that low carbon technologies are widely used and tend towards their maximum feasible adoption, which causes the deployment rate to stabilise.

Sponsors:

Delivery partners:

Executive summary

Achieving a net zero local energy system in 2050 aligns with the Well-being of Future Generations (Wales) Act 2015 and could lead to the following

Direct Impacts

Emissions reductions
22 times less GHG emissions than in 2023

Energy savings
1.4 times less heat used in buildings than in 2023

1.6 times less energy used for transport than in 2023

Wider Impacts

Energy security and reliability
Diversified local energy supply improves energy security

Air quality improvements
Reduced fossil fuel combustion from transport, heat and power improves air quality - up to £1,200m of cumulative savings by 2050

Net job creation
Emerging net zero industries attract investment and create high quality local jobs – up to 8,800 net jobs created by 2050

Affordability
Highly insulated homes reduce heat demand, improve affordability and reduce fuel poverty

National Well-being Goals

Wales' Well-being of Future Generations (Wales) Act 2015, well-being goals

Executive Summary
Flintshire's Plan on a page

To support transformation of the energy system, pilot projects may be useful. The map below highlights areas that could provide a useful focus for these pilots.

Figure 0.4 identifies zones with particularly favourable conditions for specific energy components, making them ideal locations for pilot studies. The summary boxes detail the location, opportunity type, potential capacity, required investment for each component, and total investment necessary for both energy component installation and electricity network infrastructure in each zone by 2030. Ranges have been calculated by taking the minimum and maximum results from each future energy scenarios modelled.

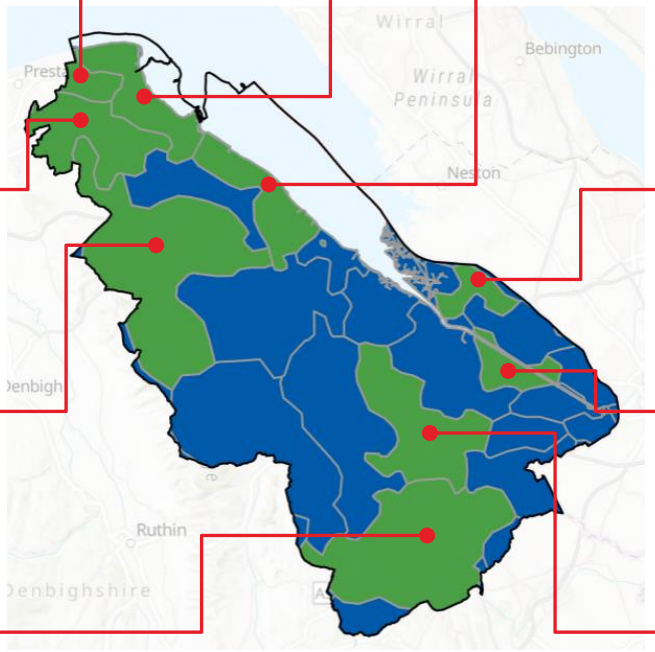
Point of Ayr
Opportunities: Heat pumps Rooftop PV
Potential: 0.6-1.0MW 1.0MW
Cost: £0.4m-0.7m £1.1m
Total opportunities cost: £3m-24m

Gronant
Opportunity: Insulation measures
Potential: 138-298 homes
Cost: £1.3m-23.1m
Total opportunities cost: £3m-24m

Trelawnyd
Opportunity: Heat pumps
Potential: 0.3-0.5MW
Cost: £0.2m-0.4m
Total opportunities cost: £3m-28m

Caerwys
Opportunity: Rooftop PV
Potential: 1.1MW
Cost: £1.3m
Total opportunities cost: £9m-69m

Leeswood
Opportunity: Ground PV
Potential: 35.2MW
Cost: £15.1m
Total opportunities cost: £31m-141m



Greenfield
Opportunity: Insulation measures
Potential: 372-1,197 homes
Cost: £3.4m-63.4m
Total opportunities cost: £21m-79m

Shotwick
Opportunity: EV chargers
Potential: 1.0MW
Cost: £0.9m
Total opportunities cost: £18m-22m

Queensferry
Opportunity: EV chargers
Potential: 1.9MW
Cost: £1.6m
Total opportunities cost: £23m-66m

Buckley
Opportunity: Ground PV
Potential: 75.2MW
Cost: £32.5m
Total opportunities cost: £68m-269m

Figure 0.0.4: Flintshire's spatial representation of opportunities, including 2030 ambition and investment (million £) – in High and Low Demand scenarios. Zone boundaries are defined by primary substation service areas.

Executive summary

To deliver the LAEP, we have developed a series of actions and next steps that we'll need to take

Action routemap

Although the exact form of the decarbonised energy system in 2050 is uncertain, there are actions we can take now with relative certainty that will help us maintain the ability to meet our 2050 Net Zero ambition and capitalise on the opportunities that this transition will bring.

Our action routemap takes each energy proposition and outlines critical, enabling actions that we will take collectively alongside our stakeholders in the coming decade, with a particular focus on what we can achieve in the next 5-7 years.

The sequencing of activities in the routemap is highly dependent on the political, regulatory and strategic context it has been created in. Therefore, we expect it to evolve over time and be regularly updated to make sure it stays relevant. Flintshire's routemap can be found in Chapter 4: Action planning.

Next steps

Progressing energy propositions: For each prioritised proposition, we will undertake a series of development activities to progress towards delivery (such as feasibility studies, detailed technical and commercial development, business case, commercialisation and procurement).

Governance: Where possible, we will integrate oversight of LAEP delivery with existing governance structures. We will explore options to appoint a lead officer to guide the delivery of the actions in this plan.

Monitoring: We will work with regional and national partners to develop a monitoring framework which builds on existing processes and helps us understand the progress Flintshire is making towards its committed actions and ambitions set out in this plan.

Engagement & collaboration:
Many stakeholders with an interest and influence over the local energy system have come together to help shape this LAEP, and it is important that this collaboration continues as we deliver this plan. The development of this LAEP has brought those with interest and influence together.

ARUP

Chapter 1: Introduction

1. Introduction
What is Local Area Energy Planning (LAEP)?

Overview

Definition of a LAEP

A LAEP sets out the changes required to transition an area's energy system to net zero carbon emissions against a specified time. By exploring a range of technologies and scenarios through whole energy system modelling and analysis, the most cost-effective preferred pathway to net zero can be identified. The process follows standardised guidance defined by ESC.

Being data-driven and evidence-based, a LAEP uses a whole energy system approach that is led by local government and developed collaboratively with defined stakeholders. It sets out to identify the most effective route for the local area to meet its local net zero target, as well as contributing towards meeting the national net zero target.

A LAEP results in an indicative costed spatial plan that identifies the change needed to the local energy system and built environment, detailing what changes are required, where, when and by whom. The level of detail in a LAEP is equivalent to an outline design or masterplan and is intended to identify core areas that require focus over the next 25 years. It proposes future sector-specific action plans that set out how each part of the area will be designed and built. Additional detailed design work will be required for identified specific actions, projects and programmes to progress to delivery.*

Vision of a LAEP

A LAEP defines a long-term vision for an area but should be updated approximately every 5 years (or when significant technological, policy or local changes occur) to ensure the long-term vision remains relevant. This LAEP sets out the start of Flintshire's net zero energy transition journey.

**For example, a LAEP may identify a zone that is best suited to a district heat network by assessing the types of buildings in the zone, their characteristics, and density; however, to deliver the district heat network it would require a full feasibility assessment by an appropriately qualified installation or design company, along with assessment of commercial viability and delivery mechanisms.*

A note on the use of "we" throughout this report:

Achieving the transformation that is needed for the energy system to reach net zero will not be easy and will need a collaborative approach. In this plan, the term "we" has therefore been used to refer to the range of people and organisations across the Isle of Anglesey who will support the ambition set out and agreed in this plan. The Council and Ambition North Wales have taken facilitating roles in developing this LAEP but cannot deliver the ambition it sets out alone. This Plan has been developed with input from a range of stakeholders, and we all hope that you will be inspired by the actions that stakeholders have committed to, to take action to transform the island's energy system too.

1. Introduction
What is Local Area Energy Planning (LAEP)?

Overview

Scope of a LAEP

The UK government's 2021 Net Zero Strategy[M02] estimates that **82% of the UK's emissions are "within the scope of influence of local authorities."**

The scope of a LAEP covers the current and projected future energy consumption and associated greenhouse gas (GHG) emissions, primarily focusing on an area's built environment (all categories of domestic, non-domestic, and industrial buildings), energy used for road transport (excl. energy used in rail, aviation, and shipping), local renewable generation and the energy networks needed to support this consumption.

Elements included in a LAEP are:

- Electricity, heat and gas networks
- The future potential for hydrogen
- The built environment (industrial, residential, and commercial), its fabric and systems,
- Flexibility (in terms of shifting when demand is placed on the grid), and the storage and generation of energy,
- Providing energy to decarbonised transport (i.e., the electricity required for electric vehicle charging infrastructure).

Some GHG emissions sources are excluded from scope, because they are either not directly associated with the energy system (e.g. emissions from land, land use and forestry) or are produced from assets that are national (e.g. rail, aviation and shipping). More information on the boundary and scope can be found in Chapter 1: Introduction and the Technical Report (*Chapter 1*).

It identifies near-term actions and projects, providing stakeholders with a basis for taking forward activity and prioritising investments and action. Site-specific data is used where available, with remaining areas covered by the national dataset.

Benefits of a LAEP

A LAEP provides a long-term plan to deliver net zero. A benefit of LAEP is the 'whole systems approach', aligned to the Wellbeing of Future Generations Act[M06] "way of working" on integration. This provides consideration to the most cost-effective solutions to future energy system at the right time. For example, deploying different heat decarbonisation technologies to avoid a high-cost upgrade of the electricity network. By working closely with local stakeholders, incorporating their data, knowledge and plans, a LAEP is built on a common evidence base. The outputs can then be used reliably by stakeholders from Flintshire's public service providers to network operators to community groups, knowing they are working towards a common goal built on strong foundations.

1. Introduction
The energy transition across Wales

Overview

The Welsh Government's "Net Zero Wales" plan[M03] establishes an increased level of ambition on decarbonisation, with a legally binding target to reach net zero emissions by 2050. It is the first national government to fund the roll out of LAEP to all its local authorities. The programme is being co-ordinated through a regional approach, where LAEPs are being developed for local authorities in mid Wales, South West Wales and in the North Wales and the Cardiff Capital Region. The rationale for taking this approach was because there are efficiencies on data collection and management, as well as reinforcing the links between the regional and local plans to maximise opportunities across LA areas and between regions. Several suppliers have been selected to produce the LAEPs for each region, as detailed in the map.

To contribute to the Welsh Government's commitment of producing a "National Energy Plan" in 2024, upon completion of the LAEP programme Energy Systems Catapult[M04] will aggregate the LAEPs into a national view. To support this task, they are working with the Welsh Government to create and import standardised LAEP outputs for aggregation into the DataMapWales platform[M05]. Energy Systems Catapult is also providing technical advisory support to the Welsh Government throughout the programme.

The LAEPs will also form the basis of the 'National Energy Plan' Welsh Government has committed to produce in 2024.

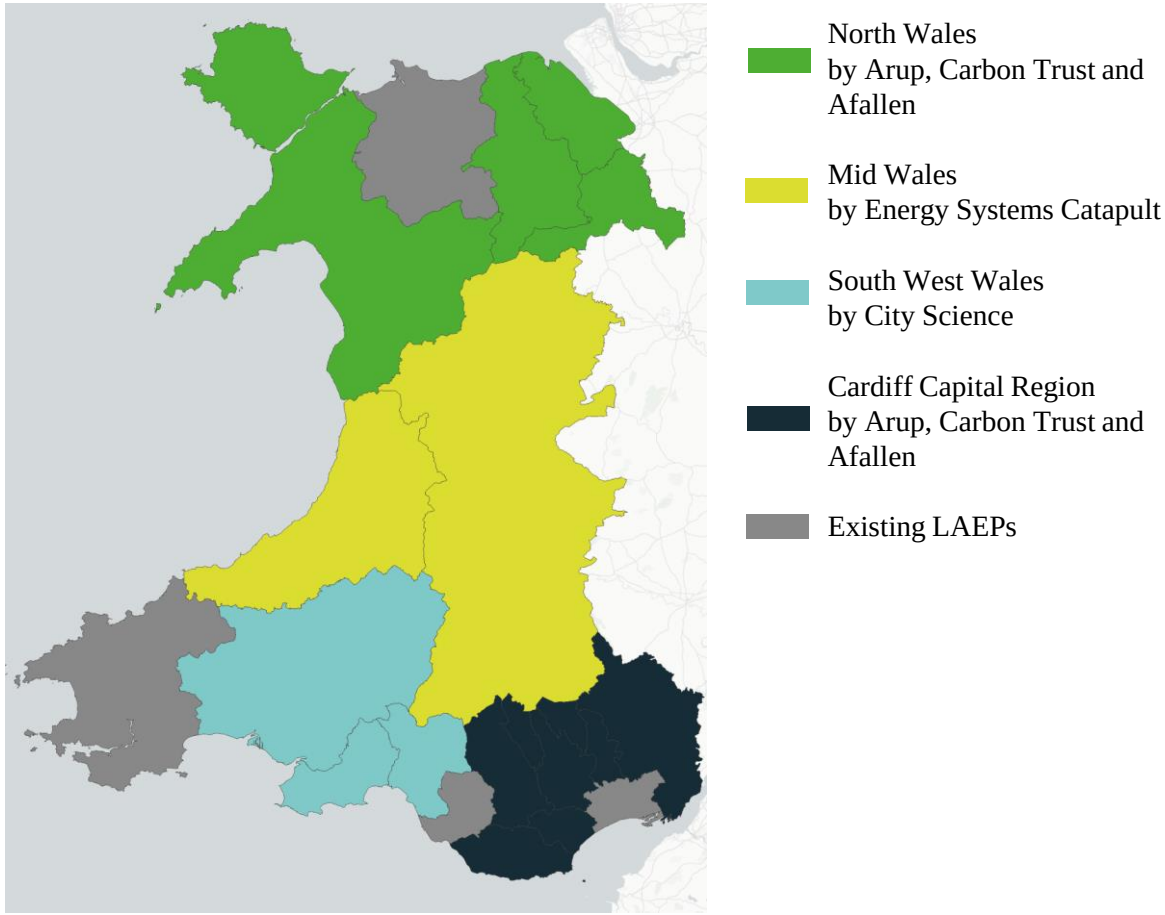


Figure 1.0.1: LAEP landscape across Wales

1. Introduction
Boundary and scope

A LAEP considers energy use, supply and generation within the Flintshire boundary.

There are three core parts to the local energy system:

- **Infrastructure** – The physical assets associated with the energy system such as electricity substations.
- **Supply** – Generation (renewable and non-renewable), storage and distribution of energy to local consumers for use in homes, businesses, industry and transport.
- **Demand** – The use of energy driven by human activity e.g. petrol/diesel used in vehicles, gas burned for heat in homes. required for the energy system to operate.

The whole energy system across all sectors is considered in the planning process to ensure that the interactions and dependencies between generation and use of different energy sources are fully considered. This identifies where different systems can work together to improve the overall resilience and flexibility of the energy system.

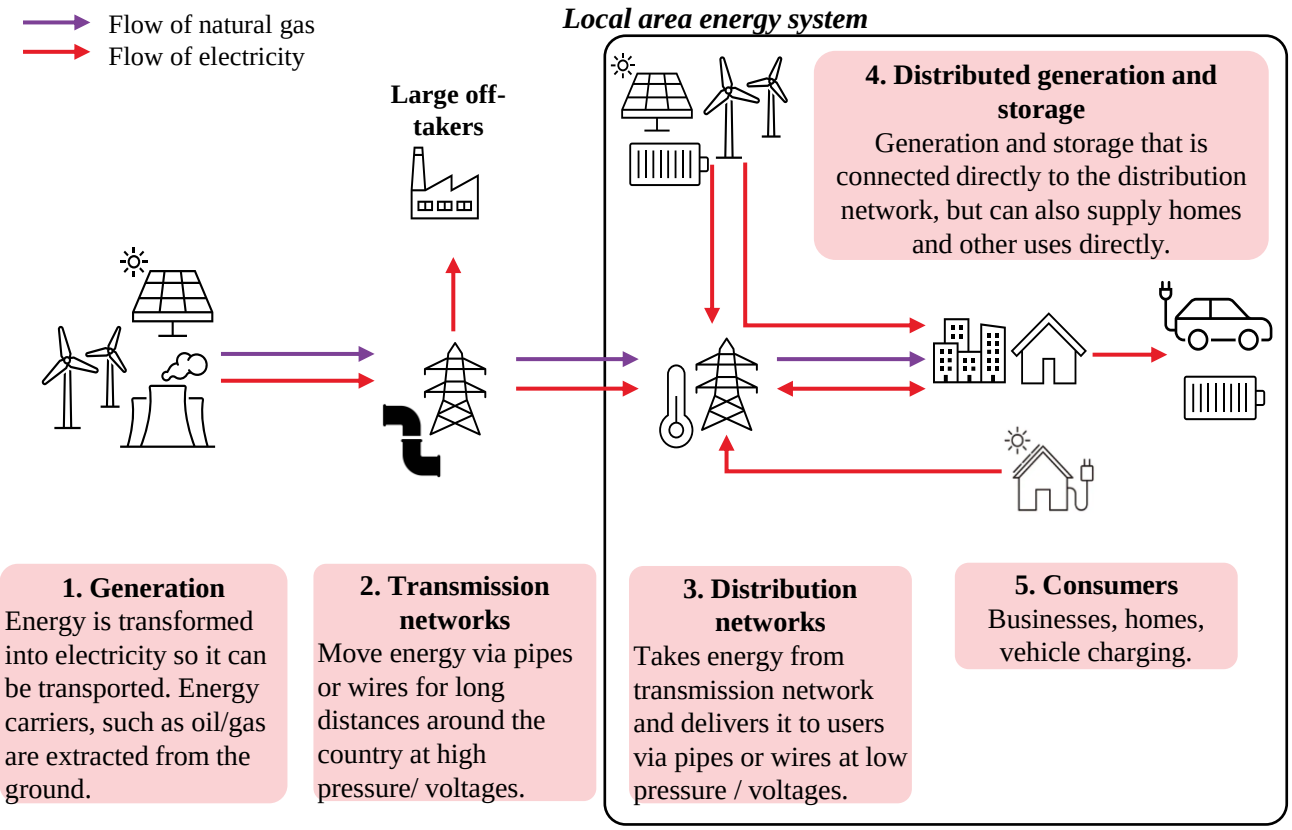


Figure 1.0.2: Schematic of electricity and gas transmission and distribution network and the system boundary for LAEP

1. Introduction
Boundary and scope

Scope for the Welsh LAEPs

The diagram to the right indicate the parts of the local energy system which are in-scope for the LAEPs across Wales. This scope is defined by ESC's LAEP Guidance[M01].

Geographic boundary

We used the geographic boundary for Flintshire to set the boundary for the LAEP, which meant that any energy generating assets, energy use and infrastructure in that boundary were considered for inclusion in the LAEP.

Exclusions from the LAEP

The following parts of the energy system within the Isle of Anglesey are excluded from the LAEP:

- Aspects of the energy system which are expected to be overseen by central government, or any non-energy sources of greenhouse gas (GHG) emissions occurring within the Local Authority's governing boundary (for example, GHG emissions from industrial processes, agricultural land use and livestock are excluded).
- Energy used for shipping, aviation and rail are excluded on the basis that they are not local uses of energy.
- Large electricity generators connected to the transmission network (such as offshore wind, grid scale batteries, hydrogen SMR) are considered national assets and excluded from the modelling, however these are likely to play an important role in Flintshire's decarbonisation journey.

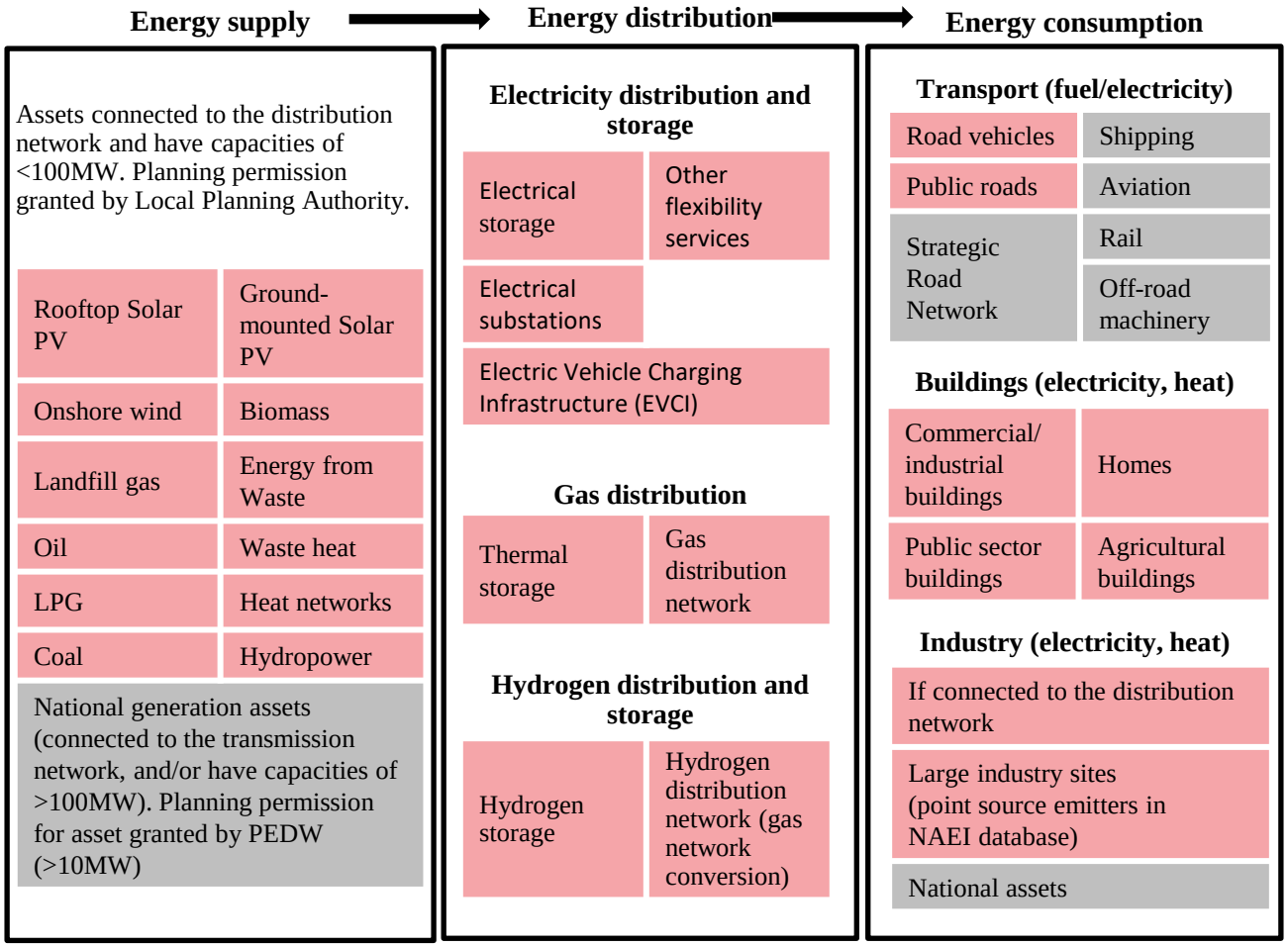


Figure 1.0.3: Schematic of the local system scope for LAEP

1. Introduction
Our vision for Flintshire's future local energy system

Future energy system vision and energy objectives

We have produced the following vision statement that underpins our ambition for the future net zero energy system in Flintshire:

Flintshire's vision

Flintshire County Council envisions a sustainable future with a net zero energy system that is affordable and promotes community health, wellbeing, and economic growth. We commit to a clean energy transition that fosters a resilient, inclusive, and prosperous community, ensuring a harmonious balance between environmental stewardship and social progress.

Finally, in shaping the LAEP for Flintshire, we established the following objectives. These objectives served as foundation elements that were considered when formulating recommended actions:

Energy objectives

1. Support a low-cost and affordable energy system through reducing energy demand and promoting energy efficiency.
2. Optimise the use of local renewable energy sources within Flintshire, encouraging local ownership and community participation.
3. Promote safe, healthy, and sustainable places to live, work and visit – helping to generate connected and resilient communities.
4. Create a resilient energy system capable of meeting future energy demands that reduces carbon emissions and protects and enhances Flintshire's natural assets.
5. Promote a low carbon economy, providing learning and skills for all to create a prosperous, thriving, resilient Flintshire.

1. Introduction
Navigating this report

LAEP contents

This LAEP presents a vision for a net zero local energy system in Flintshire, with a routemap to get there, including a set of recommended actions for Flintshire, whilst recognising the role of other key actors in government, the energy sector and across the community.

Plan structure

This plan is structured into three main topic areas:

Chapter 1 - Introduction – overview of what a LAEP is, and an introduction to Flintshire's vision and objectives for its LAEP.

Chapter 2 - The current energy system - description of Flintshire's existing energy system and relevant policies and objectives.

Chapter 3 - The future energy system - presentation of future scenarios for a net zero local energy system, including risks and "low regrets" measures, which are very likely to be part of the future energy system regardless of uncertainty around certain aspects of the future.

Chapter 4 - Action planning - a routemap and action plan for us to use to drive the local energy system transition in Flintshire, including what needs to happen and what we will do.

Chapter 5 - Next steps - outlines immediate next steps and what is needed to create an enabling environment for the delivery of this plan, and a net zero local energy system.

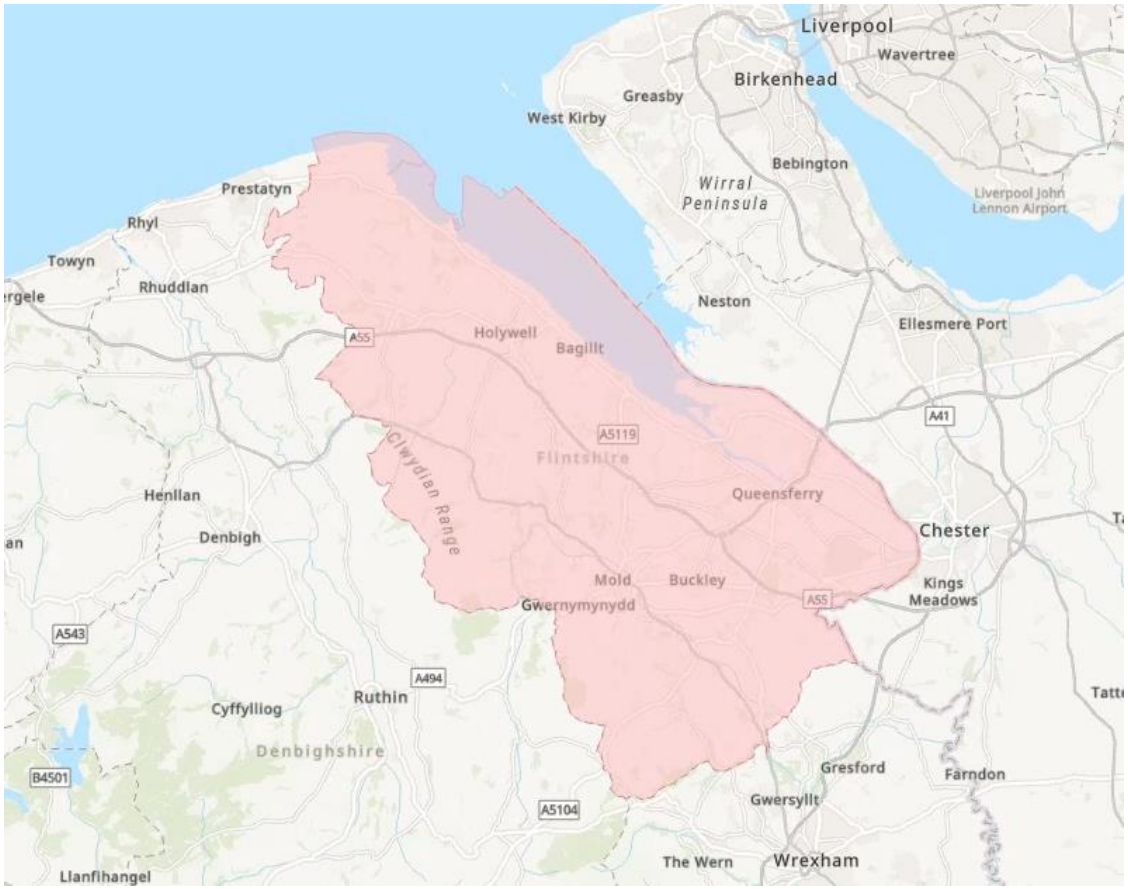


Figure 1.0.4: Geographic boundary for LAEP

Chapter 2: The current energy system

2. The current energy system
Policy and funding context

Net Zero Wales[M03] is the Welsh Government's emissions reduction plan for the current carbon budget period between 2021-2025. This is a statutory document required by the Environment (Wales) Act[M07], which sets out policies and proposals to help Wales meet its carbon budget and be on track to meet its legally binding net zero target for 2050. The Well-Being of Future Generations (Wales) Act[M06] is in place to ensure that this transition fosters greater equality and positive outcomes for all.

There are a range of strategies and policies at Welsh and UK level that will influence how Wales transitions to a net zero energy system in the next 25-30 years. Devolved powers vary across the different parts of the energy system.

Using our own statutory powers, we, as a Local Authority, have also established plans and policies relating to decarbonising energy use across our own operations, and have started to look further to how we influence changes in our local communities through our place-making role.

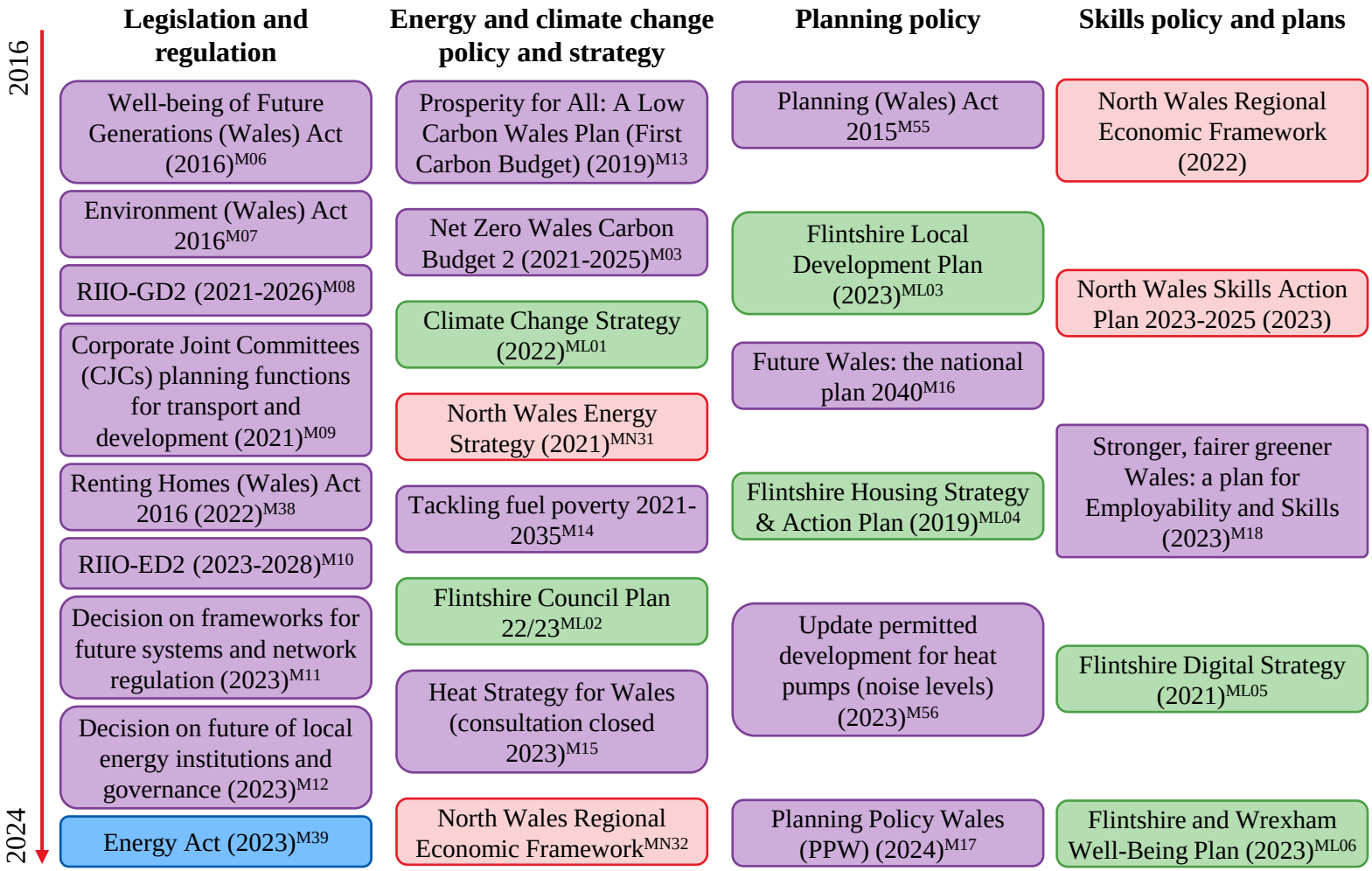


Figure 2.0.1: Summary of cross-cutting regulation / policies at local, regional and national level

2. The current energy system
Policy and funding context

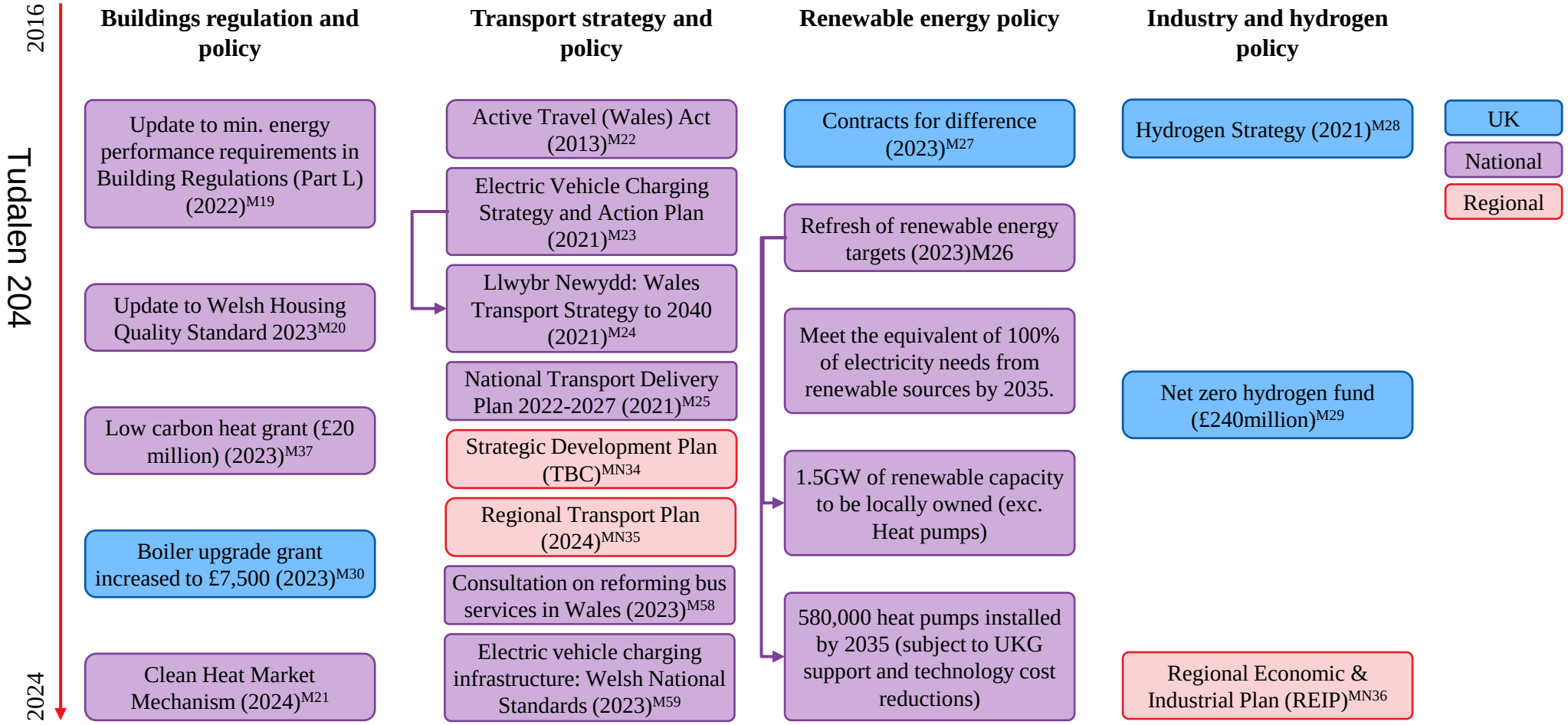


Figure 2.0.2: Summary of sector-specific regulation / policy at local, national and regional level

2. The current energy system

Our collaborative approach to developing and delivering our LAEP

Stakeholder engagement approach

Delivering our LAEP calls for a collective effort from all types of organisations in and beyond the local authority boundary. The local energy system extends beyond Flintshire's influence which is why stakeholder engagement is the foundation for the development of our LAEP.

With the support of our delivery partners, we prioritised stakeholders based on their level of local knowledge of and / or influence over specific elements of the local energy system and their role in the development of the LAEP. The importance of recognising the involvement of regional stakeholders emerged early in the LAEP. They have a unique role, ensuring cohesion of action for specific element(s) of the energy system across neighbouring LAEPs in the same region and offering regional efficiencies where local objectives are aligned.

We engaged stakeholders at different stages of the development process to make sure stakeholders could help shape the plan and key development milestones. Regional steering groups were held for North Wales, attended by the regional and local authority leads, as well as bi-weekly meetings with the local authority leads. Two workshops were held regionally and involved primary stakeholders from across each local authority in North Wales. These workshops were used at stages where it was important to agree a way forwards that was appropriate for the region, as well as each local authority.

As part of the overarching programme, a national forum brought together all suppliers, local authority leads, the regional leads, Welsh Government and the Technical Advisor to share learnings and maintain a consistent approach across Wales. The suppliers and regional leads also had regular catch ups to share assumptions and challenges.

Please refer to the Technical Report (Chapter 2) for more detailed information on the methodology, analysis and engagement of stakeholders throughout the plan's development.

40+ Organisations engaged

90+ Hours of engagement

Sector	Examples of stakeholders engaged
Buildings	Housing developers
Transport	Transport providers
Renewable energy generation	Energy project developers Community energy groups, landowners
Industry and private sector	Local businesses, larger industrial players
Community engagement	Charities, social enterprise,
Networks	Distribution Network Operators, gas distribution networks
Public sector	Public services board, public service providers, Welsh Government, educational institutions

Figure 2.0.3: Summary of stakeholders engaged

2. The current energy system

Flintshire’s energy baseline

2. The current energy system

Overview

This section provides a detailed overview of the local energy system baseline, and describes the methodology and assumptions used to understand current energy infrastructure, what types of energy are used, what technologies are used to convert it from one form to another (e.g. heat) and how much is consumed.

Results presented reflect the energy baseline in Flintshire in 2023, apart from the transport (2019) and industry data (2019). Transport and industry datasets are the least likely to have changed in terms of electrification over the years 2019 to 2023, and transport is the most likely dataset to have changed due to COVID-19 with 2019 being the most representative year.

Some of the data collected that has locational characteristics is reported by “modelling zone”. Figure 2.0.4 shows the geographic boundary of Flintshire (black line) which is also the boundary used for Flintshire’s LAEP. The primary substation service areas that supply energy within the geographic boundary are shown with coloured blocks. Where primary substation service areas intersected one or more Local Authority boundaries, they were divided into smaller modelling zones. Most of the analysis, results, and maps in this report are presented in terms of these smaller modelling zones, which may also be called “substation zones” or simply “zones.”

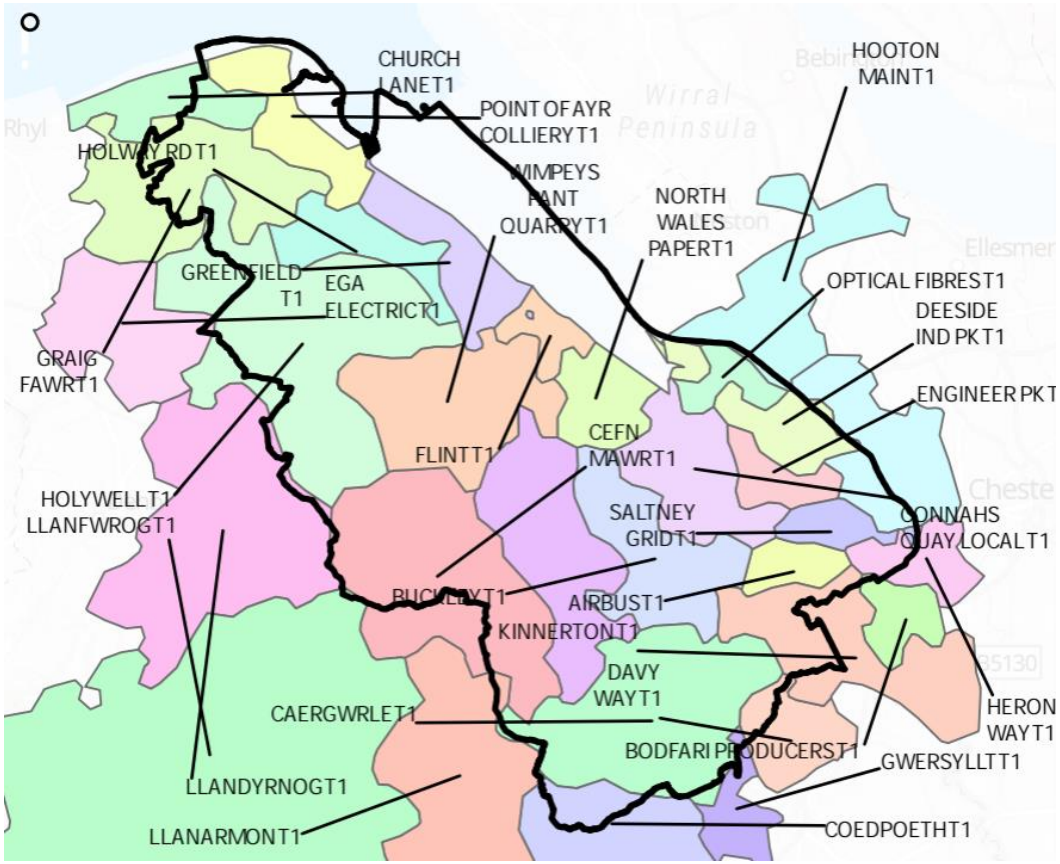


Figure 2.0.4: Geographic boundary of Flintshire used to define the boundary for this LAEP and the associated modelling zones within the LAEP boundary

2. The current energy system

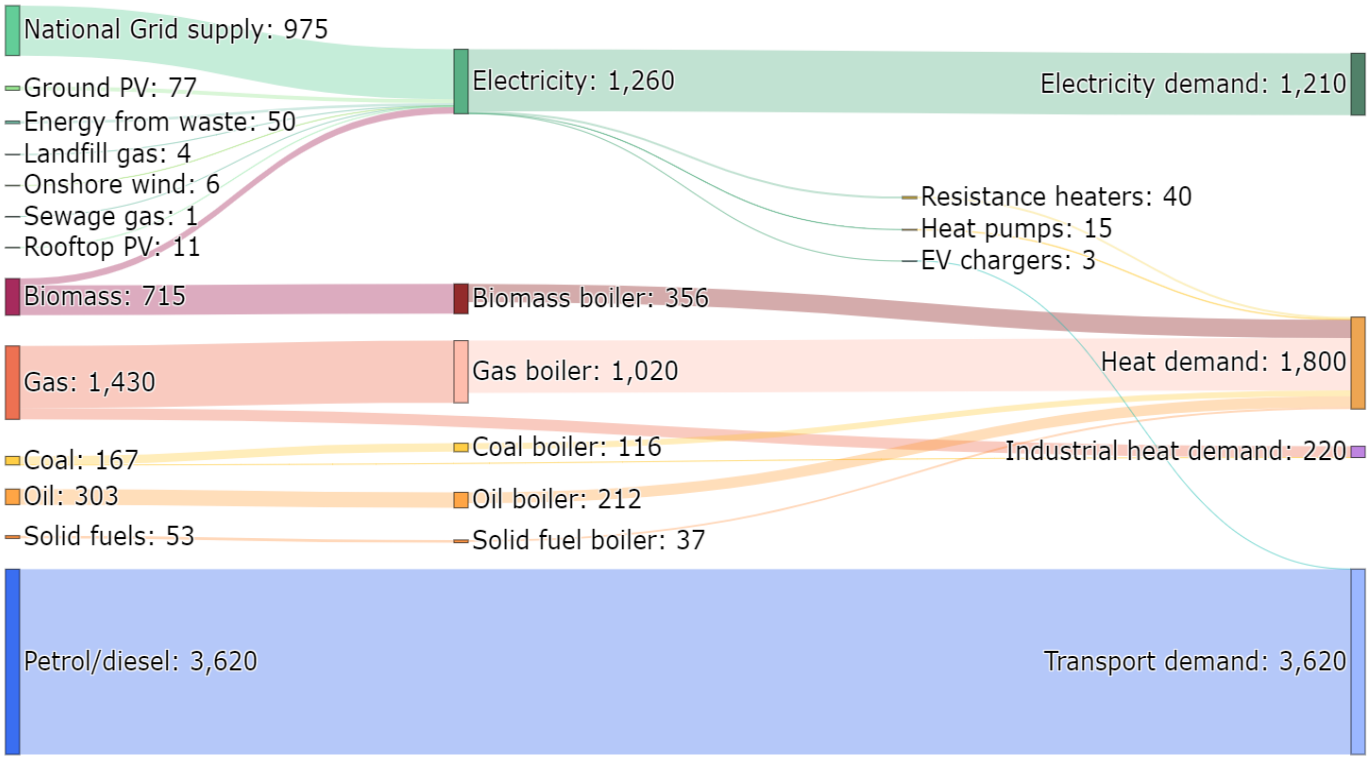
Overview

Sankey diagrams are a way of visualising energy transfer from energy sources to energy demands via energy vectors or conversion technologies.

They are read from left to right and show a snapshot of a scenario in time e.g., 2050

Energy transfers are drawn to scale and so are helpful to identify the size of each transfer and compare different scenarios.

The average Welsh home uses 3,300kWh/year of electricity, which is 0.003GWh for comparison with the scale on the Sankey. In terms of gas, a typical home uses 12,000kWh/year, which is 0.012GWh for comparison with scale on the Sankey[M40].



1. Where the energy comes from
This side represents the different **energy sources**, including generation technologies and imports from the national grid

2. How the energy is being converted

3. Where the energy is being used
This side represents the **final demands** for each energy vector: heat demand, electricity, demand, transport demand.

Figure 2.0.5: How to read a Sankey diagram (units are GWh/year)

2. Current energy system
Flintshire's energy baseline

Energy demand

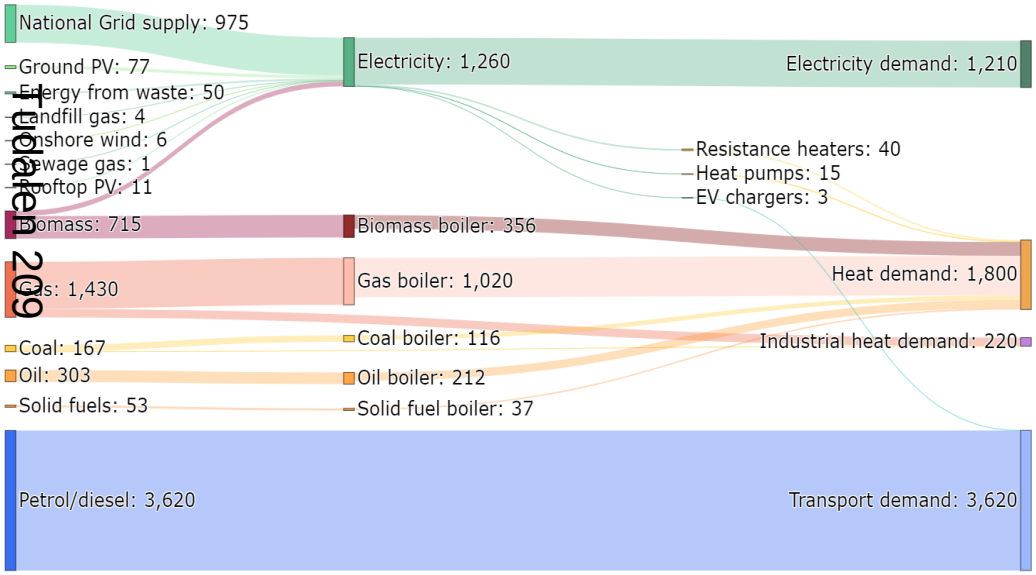


Figure 2.0.6: Sankey diagram showing energy input, conversion and output in Flintshire (GWh/year)

Industry

Around **61%** of total energy consumption in Flintshire is from the industrial and commercial sectors

The industry landscape is varied and expansive but key industries include paper manufacturing, food and drink, and vehicle manufacturing. Many of the largest consumers sit outside of the scope of this plan.

Electricity

18% of total energy demand is electricity

23% generated from renewable sources

The largest renewable source of electricity is ground-mounted **solar PV**, with Shotwick solar park the largest in the country at **72MW**

At the local level **no** electricity is generated through **fossil fuel** means

Transport

53% of total energy demand is from transport

The main source of transport emissions are HGVs, although car travel has the highest mileage

83% of households own a car[M65]

67% of fuel consumed is diesel

0.23% of vehicles are electric or plug in hybrid

Heat

26% of total energy demand is from commercial and domestic heating

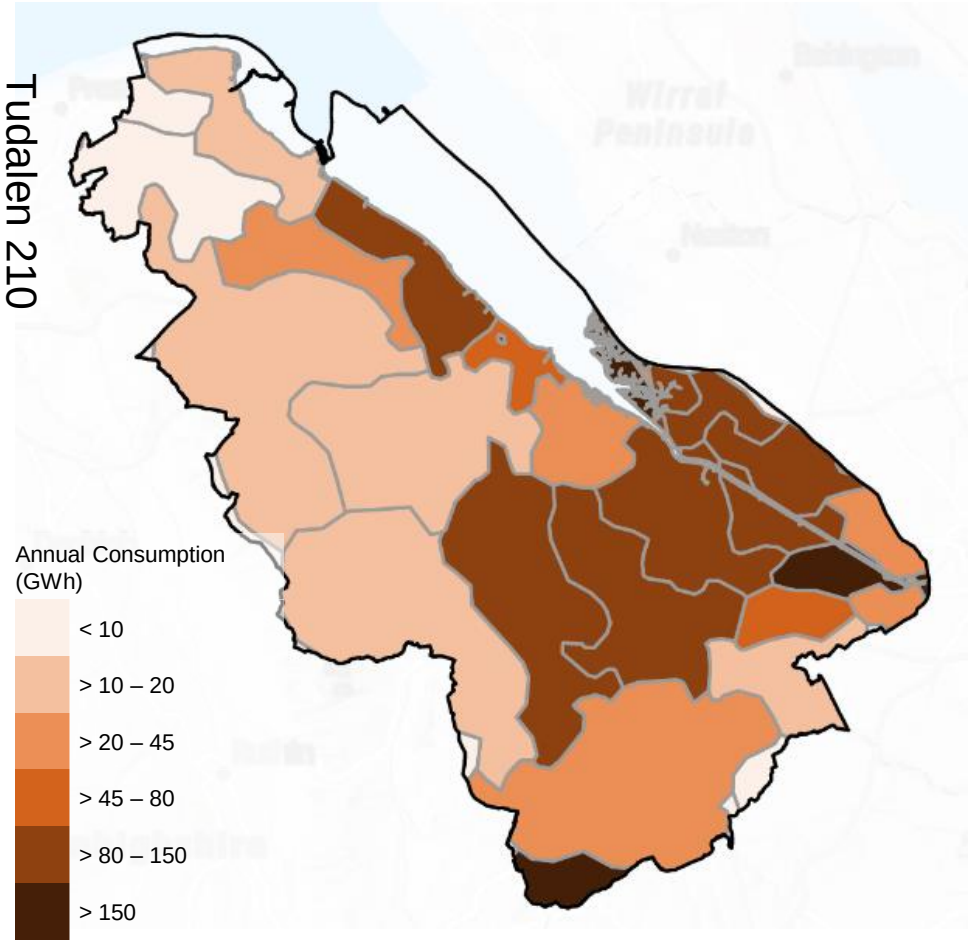
A significant proportion of biomass is used at the Shotton paper mill

The majority of heat demand is met through gas boilers, **82%** of properties have a gas grid connection, equivalent to the national average

42% of properties achieve an A-C EPC rating

2. Current energy system
Flintshire's energy baseline

Electricity demand in buildings (MWh per year)



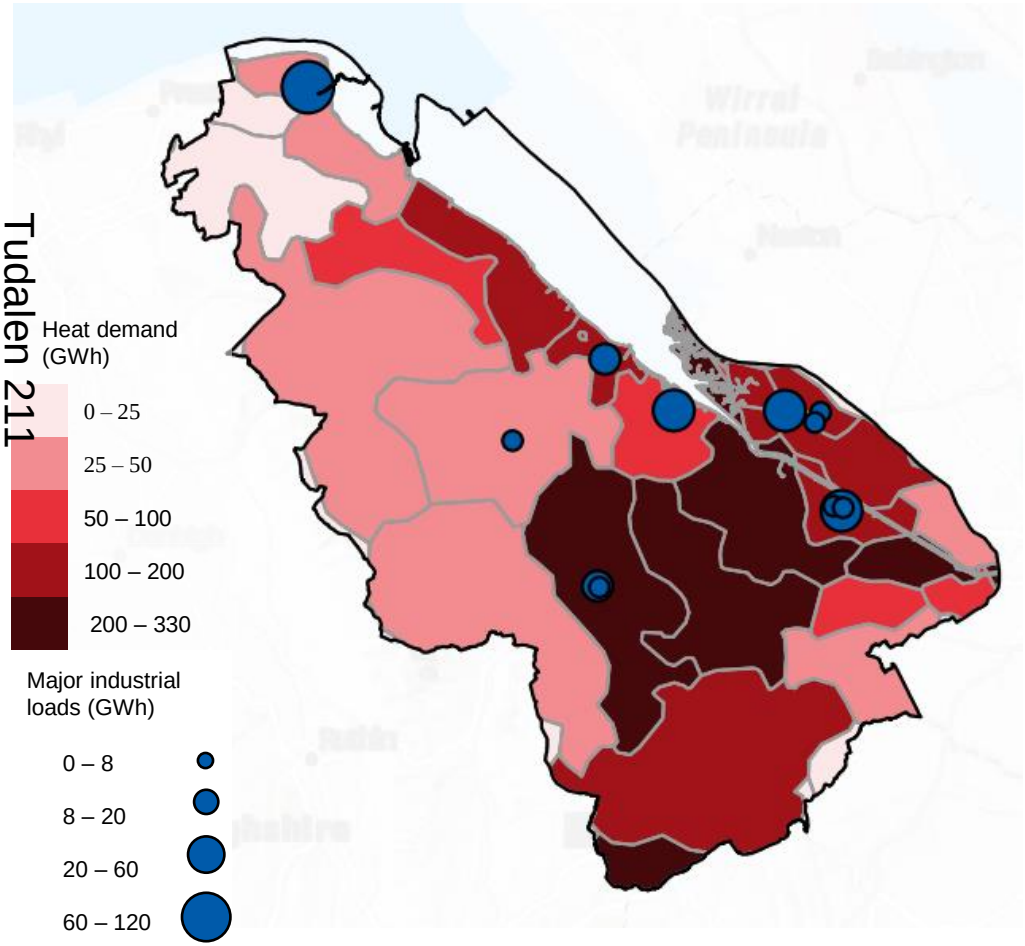
Electricity trends

Electricity consumption across Flintshire varies considerably from sub-station zone to sub-station zone, with some zones having over 100GWh/year difference in electricity consumption. The areas of higher consumption, understandably, correlate with areas of increased commercial, domestic and industrial density.

Figure 2.0.7: Electricity consumption (MWh/year) (domestic and non-domestic properties) by substation zone across Flintshire (2023). Data is based on meter level electricity consumption data

2. Current energy system
Flintshire's energy baseline

Heat demand in buildings and industry (MWh per year)



Building numbers

71,200 domestic buildings

4,000 non-domestic buildings

EPC ratings

On average, properties across Flintshire exhibit below average EPC ratings (35% of properties achieving A-C EPC rating compared with Wales-wide of 40%).

Insulation

26% with <100mm loft insulation, 12% with unfilled cavity walls.

Heating fuels

82% of homes are connected to the gas grid. Most homes that are not connected to the gas network use oil for heating (11% of all homes).

Gas consumption

Areas of high and low gas consumption vary significantly across the local authority. The areas of greatest consumption align with more heavily populated areas in the centre of the county, where off-gas grids are less common and gas boilers are the predominant heating type.

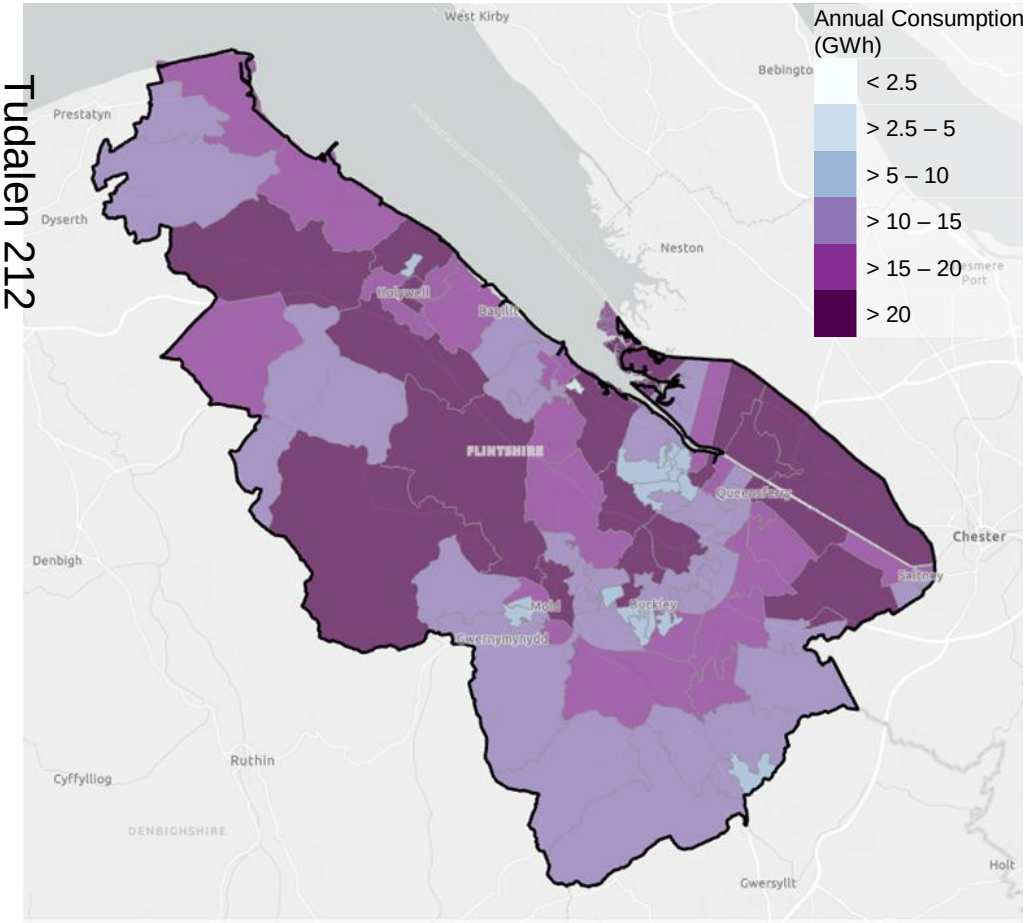
Industry

There are numerous major point demands for gas and other fossil fuels, these are situated in the main industrial areas along the coastal parts of the county in Deeside, Connah's Quay, Flint, Greenfield and Tolacre.

Figure 2.0.8: Major industrial loads (2019) and heat demand (2023) by substation zone across Flintshire. The data is based on meter level gas consumption (MWh/year)

2. Current energy system
Flintshire's energy baseline

Transport energy demand



Transport trends

Transport related energy consumption varies across the local authority. Areas of higher energy consumption tend to align with the main thoroughfares of the A55 and A494 which intersect between Buckley and Deeside, as well as the more rural parts of the county, where car usage is more prevalent. Areas of lowest energy consumption tend to be in and around towns (Mold, Buckley, Deeside, Holywell, and Connah's Quay) where public transport and active travel can be a more viable option.

Number of EV chargers

Currently 53 listed on the National Chargepoint Registry (2023 data). [M43]

Car ownership

83% of households in the area own cars, with an average of 1.3 cars per household, which is above the national average. [M65]

Figure 2.0.9: Transport energy consumption (combined total across cars, light goods vehicles (LGV) and heavy goods vehicles (HGV) by LSOA, in 2019 as a baseline year

2. Current energy system
Flintshire's energy baseline

Energy generation in 2023

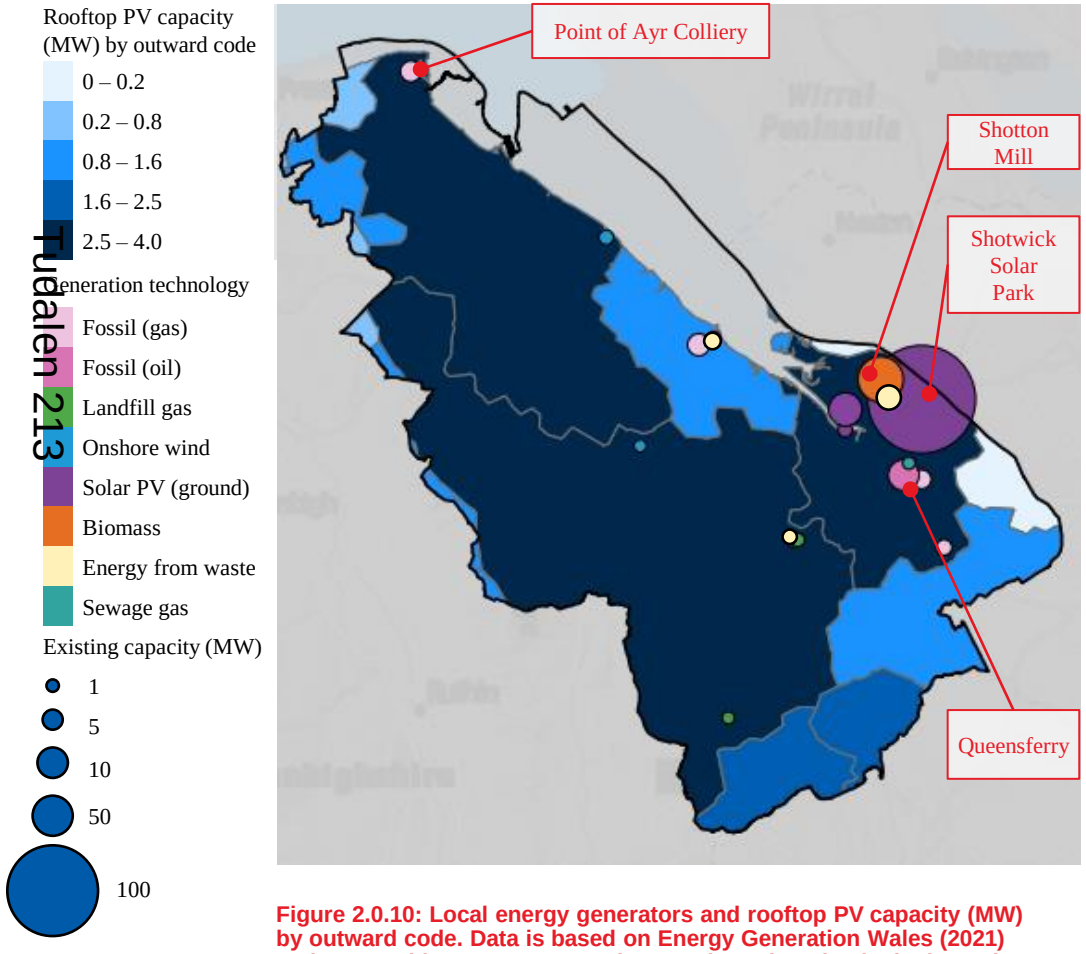


Figure 2.0.10: Local energy generators and rooftop PV capacity (MW) by outward code. Data is based on Energy Generation Wales (2021) and Renewable Energy Generation Database (2023)m (units in MW)

Tudalen 213

Electricity generation

There is **136MW** of renewable electricity generation capacity, across seven different generating technologies

Ground-mounted solar photovoltaics are the largest source of local electricity generation with a capacity of **80MW**, this includes Shotwick park the **country's largest solar farm**

7% of electricity generation comes from rooftop solar PV across both domestic and non-domestic properties

20% of the electricity generation capacity is from fossil fuel sources (gas and oil), although these may not supply electricity in any given year

Heat generation

The majority of heat is generated through natural gas boilers (62% of heat across all sectors)

Flintshire's large industrial presence provides ample waste heat that could be used for low heat processes or heating.

19% of heat supply comes from low carbon sources (electric or biomass)

2. Current energy system
Flintshire's energy baseline

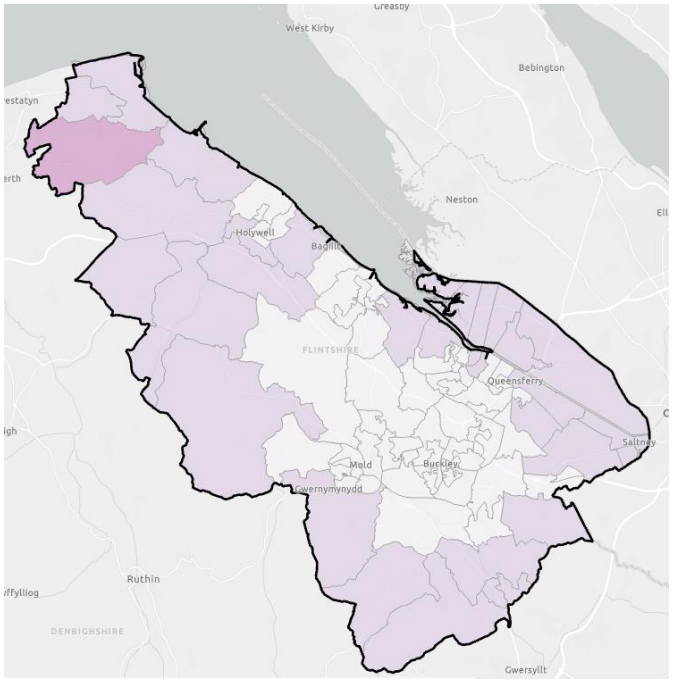
Networks and infrastructure

Figures 2.10 and 2.11 display primary substation's supply and demand headroom across Flintshire, providing an insight to the network capacity in 2019. In this context, headroom is an indicative measure of primary substation's capacity. This metric offers an overview of the electricity network's capacity, highlighting areas where constraints may be present.

Generation headroom is relatively low across the local authority, with very little spare capacity in the largest towns and surrounding areas. There is greater demand headroom in heavily industrialised areas where the grid may be reinforced, and in areas of low population density where demand is low.

Although headroom offers valuable insights into the available 11kV network capacity, it is important to recognise that constraints can occur both upstream and downstream of primary substations. Fig 2.10 and 2.11 may not show the extent of networks constraints in Flintshire.

Generation headroom

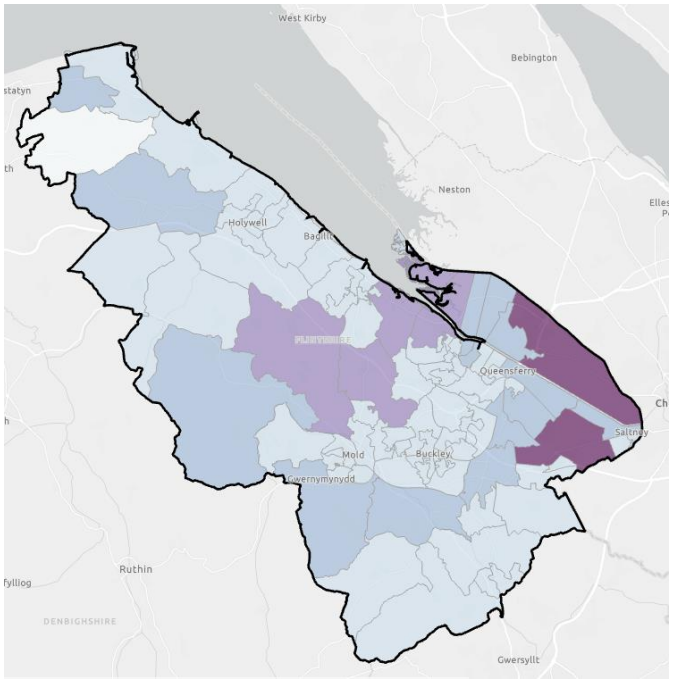


Generation headroom (MW)

0	> 4 – 6
> 0 – 2	> 6 – 8
> 2 – 4	> 8

Figure 2.0.11: Electricity generation headroom

Demand headroom



Demand headroom (MW)

0	> 4 – 6
> 0 – 2	> 6 – 8
> 2 – 4	> 8

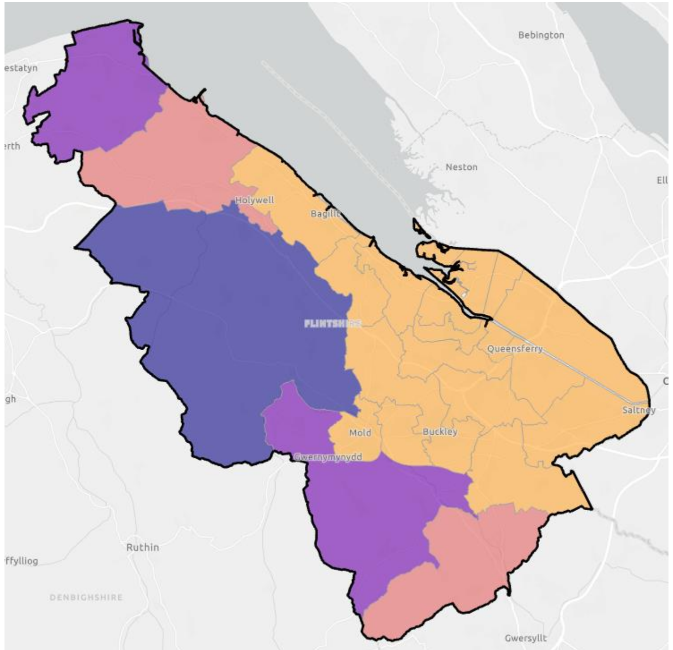
Figure 2.0.12: Electricity demand headroom

Off gas grid properties

The highest proportion of properties off the gas grid are found in the more rural areas of the local authority, towards the west. In more densely populated areas of the local authority (i.e. where many of the larger towns are located) there is a much higher proportion of properties connected to the gas grid (80%+).

Where properties are not connected to the gas grid, heating oil is used as the primary means of heating and hot water generation. This is the case across the entirety of the local authority.

Off gas grid properties

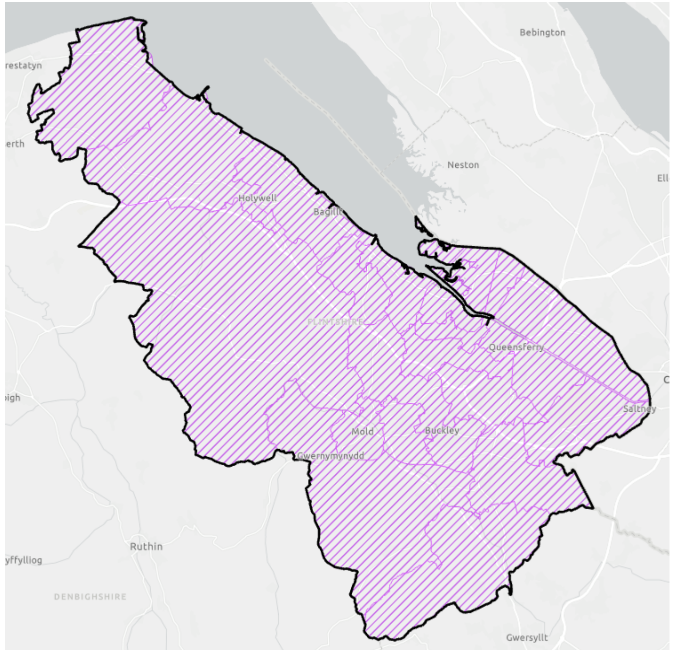


Estimated % of properties off gas grid

- 0 (100% gas grid)
- > 0 – 20
- > 20 - 40
- > 40 – 60
- > 60 – 80
- > 80 - 100

Figure 2.0.13: Percentage of properties that are not connected to the gas distribution network (2023)

Alternative heating



Off gas grid main heating type

- Electricity
- Oil
- N/A (100% gas grid)

Figure 2.0.14: Main heating type for properties that are not connected to the gas distribution network, using 2019 as a baseline year

2. Current energy system
Flintshire's energy baseline

Local environmental, social and economic factors that influence energy (2019 figures)

Tudalen 216

Area

Area: Flintshire has a total land area of 438km^2.

Enterprise: Flintshire is home to the Deeside enterprise zone, a 2,000 hectare area with the highest concentration of manufacturing jobs in the UK.

Population density: Around 80% of Flintshire's population inhabits 20% of the county's land.

Designated land: The County hosts over 23 Sites of Special Scientific Interest (SSSIs) and over 300 locally designated wildlife sites.

Demographics

Population: Flintshire has a population of 155,000 and a density of 350 pers/km^2, the eleventh most densely populated local authority (out of twenty-two) in Wales.

Population change: The population has increased by 1.6% between 2011 and 2021 in Flintshire, compared to 1.4% nationally over the same period.

Age: Flintshire has a median age of 44, the proportion of the population over 19 years of age has increased from 76.2% to 78.2% between 2011 and 2021.

Socio-economic

Fuel poverty: 9% of households are regarded as being in fuel poverty, this compares to 12% for the Welsh national average.

Commuting: In general Flintshire sees more people commute out (38,100) of the county for work than commuting in (14,400). 73% of workers (133,000) in Flintshire also live in the county.

Employment: The largest sectors by level of employment in Flintshire are: 'Production', 'Wholesale, retail, transport, hotels and food' and 'Public administration, defence, education and health'.

Industry & commerce: Industries that contribute substantially to the value of goods and services produced within Flintshire and Wrexham include transport manufacturing, health and social work, wholesale and retail trade, food and drink manufacturing.

GHG Emissions

Emissions: Flintshire's baseline year emissions for the region accounted for 7% of the national total and has an average emissions per capita of 10.6 tCO_2e/pers. This is greater than the national average of 7 tCO_2e/pers.

Sectoral emissions: The overwhelming majority of emissions arise from industry (56%), with the transport (23%) and domestic (15%) sectors contributing the next greatest proportion of emissions.

Emissions change: Emissions have decreased on average by just under 2% each year since 2005, this has been driven by decreases in almost all sectors but transport.

2. Current energy system
Flintshire's energy baseline

GHG Emissions

Figures 2.14 and 2.15 display the proportion of GHG emissions by different sectors for both Flintshire as a region (using the boundary considered within this LAEP) and for Flintshire County Council.

The Council's emissions have been taken from their 2018/19 baseline report and equal 46ktCO$_2$e for that year. Despite the Council's emissions only accounting for a small percentage (~4%) of the region's emissions, they still have a strong influence over emissions outside of their direct control and supply chain. The Council, amongst other local, regional, and national players, has the ability to influence emissions within the domestic, commercial, industrial and transport sectors of Flintshire as a region.

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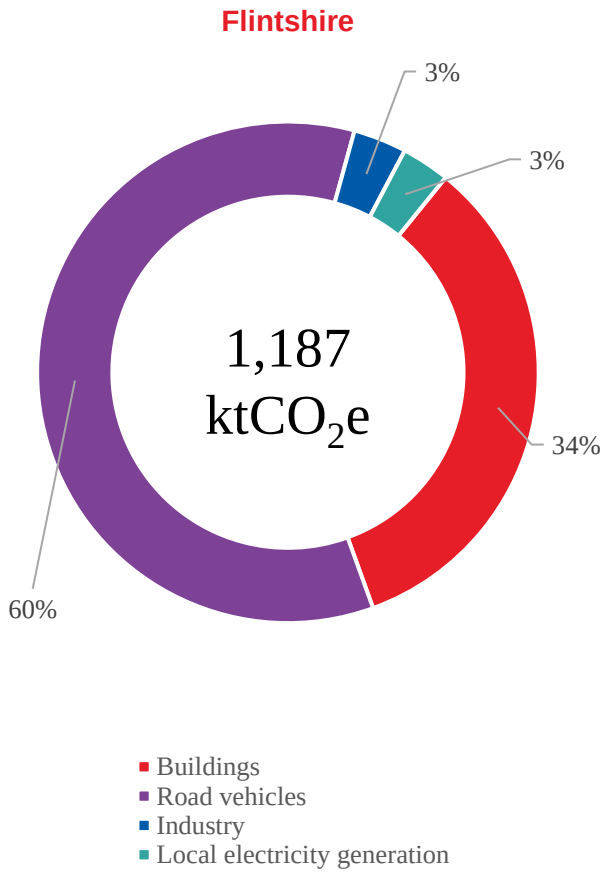


Figure 2.0.15: Doughnut of Flintshire's GHG emissions by sector for baseline years (2019 & 2023)

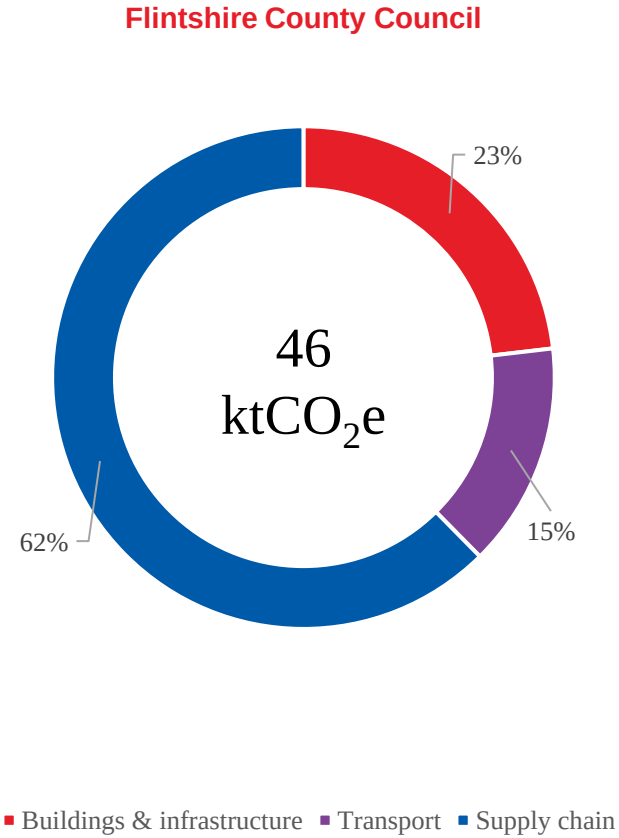


Figure 2.0.16: Doughnut of Flintshire County Council's GHG emissions for baseline financial year 2018/19

2. The current energy system

Progress to date

Since supporting Welsh Government's climate declarations in 2019 and agreeing to develop a climate change strategy, Flintshire has worked to reduce its organisational carbon emissions, and to provide the means for the wider community to do the same, as we transition to a net zero energy system.

Flintshire County Council has made a lot of progress against the four themes of the climate change strategy with a handful of success stories to date listed below:

- Building and renovating fit for future schools through the 21st Century Schools Programme, with new school buildings funded through this programme required to be Net Zero Carbon.
- Replacement of the Council's streetlighting with LED lamps which use significantly less electricity.
- Commitment made by the council for a net zero 2030 ambition, with a strategy and action plan created to deliver against the target.
- Developed and delivered active travel routes across the County.
- Through collaboration with regional partners and Welsh Government, the Council has managed the construction of an energy from waste facility, Parc Adfer, which will create electricity for 30,000 homes from waste that cannot be recycled. It will also help to prevent waste from going to landfill
- The construction of an additional two solar farms, with a combined generation capacity of 3.6MW, amounting in 4.8MW of total generation across four farms.

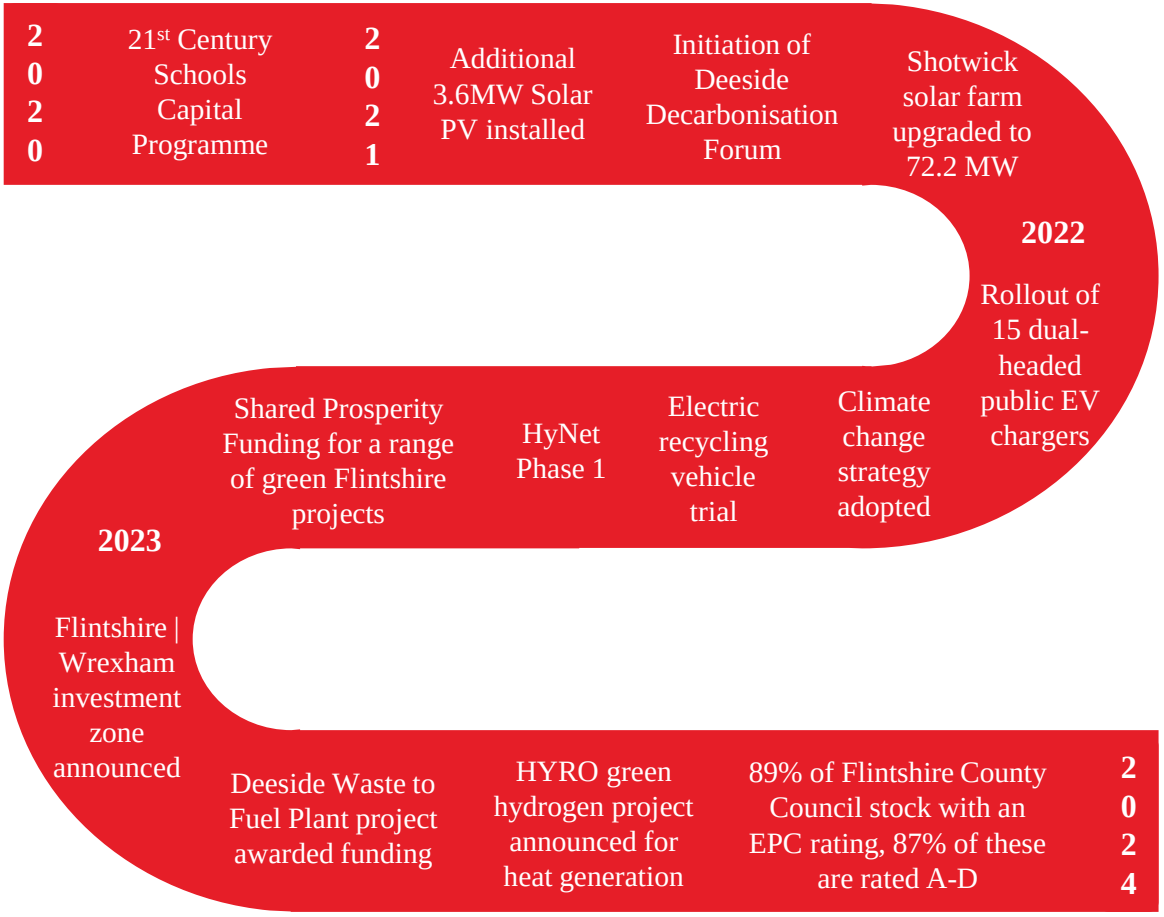


Figure 2.0.17: Summary of activities to date that have contributed to decarbonising the local energy system

2. Current energy system
Flintshire's energy baseline

Plans for the future

Renewable generation

Within the energy baseline, 23% of electricity generated within Flintshire is from renewable sources.

Building on the rollout of solar PV that has already taken place, there are further planning applications for even larger sources of generation, with a 30MW solar PV farm (Bretton Hall – YnNi Newydd) in the pipeline that would be community owned and partially sited in Flintshire.

The Coal Authority released a report in 2024 highlighting the opportunities for mine water heat within Flintshire. This has shown several potential sites that could provide low or zero carbon heat generation. The next step to fully understand the generation potential of these and potential off takers is now required. The timing of this report means it hasn't been included within the future energy system analysis.

Reducing energy demand

There are plans to reduce energy demand across the local authority through retrofit measures available through 21st Century schools and ECO4 programmes.

There are larger scale projects too, such as the combined heat and power (CHP) facility at Shotton paper mill. The CHP facility can reach efficiency ratings in excess of 90%, in comparison of gas power stations, which in the UK range between 49% and 52%. In the future there are possibilities to use Hydrogen gas as a fuel source.

Reducing carbon

Beyond energy generation and demand reduction there are plans to remove or use lower carbon technologies within the energy system. One such example is the planned Carbon Capture and Storage at Padeswood cement site which intends to capture 800,000 tonnes of CO_2 a year, the equivalent of taking 320,000 cars off the road. The scheme will be an integral part of the HyNet industrial cluster, which could save up to 10 million tonnes of CO_2 per year. HyNet is a vast infrastructure project to produce, transport and store low carbon hydrogen across the North West of England and North Wales. Flintshire is likely to have a role to play providing hydrogen off takers in Deeside and helping to support the network of H_2 and CO_2 pipelines.

Another example is the HYRO project which plans to develop hydrogen electrolysers to provide green hydrogen for boilers and plant within the Kimberly-Clark paper manufacturing complex.

Chapter 3: The future energy system

3. The future energy system
Overview

Vision and objectives

Vision

Flintshire County Council envisions a sustainable future with a net-zero energy system that is affordable and promotes community health, well-being, and economic growth. We commit to a clean energy transition that fosters a resilient, inclusive, and prosperous community, ensuring a harmonious balance between environmental stewardship and social progress.

Objectives of the plan

We have worked with stakeholders to define the following objectives for our plan:

1. Support a low-cost and affordable energy system through reducing energy demand and promoting energy efficiency.
2. Optimise the use of local renewable energy sources within Flintshire, encouraging local ownership and community participation.
3. Promote safe, healthy, and sustainable places to live, work and visit – helping to generate connected and resilient communities.
4. Create a resilient energy system capable of meeting future energy demands that reduces carbon emissions and protects and enhances Flintshire's natural assets.
5. Promote a low carbon economy, providing learning and skills for all to create a prosperous, thriving, resilient Flintshire.

Understanding the future energy system

We know that we need to transition our energy system in Flintshire to net zero by 2050.

We also know that there are multiple plausible and attractive future energy systems for Flintshire, depending on a range of factors. This includes how the cost of technologies might change over time, as well as wider policy decisions that will be made by Welsh and UK Governments. These factors will influence the uptake of hydrogen, for example.

Scenario analysis

To inform our plan, we used scenario analysis to explore what a net zero future energy system could look like under different future outcomes, including considering the potential for reduction measures and potential energy sources. We modelled four future energy scenarios and modelled the most cost- and carbon-effective way to meet demand in each one. Through doing this, we were able to identify technologies that played a significant role in all the future scenarios modelled. These technologies represent low- and no-regrets options (meaning that they are likely to be most cost-effective and provide relatively large benefits) which are very likely to be important parts of the future energy system, regardless of the uncertainty of the future.

Deployment modelling

We looked at how aspects of each energy proposition might be deployed between now and 2050, creating deployment pathways. Deployment pathways indicate:

- the scale of change required over time,
- the sequencing of activity that needs to happen to achieve a net zero energy system.

Deployment pathways for different components were informed by broader plan objectives, local and regional strategic priorities, policies and national targets and using this context, helped us to define a suitable level of ambition, and bring all this evidence together into an action plan.

3. The future energy system
Overview

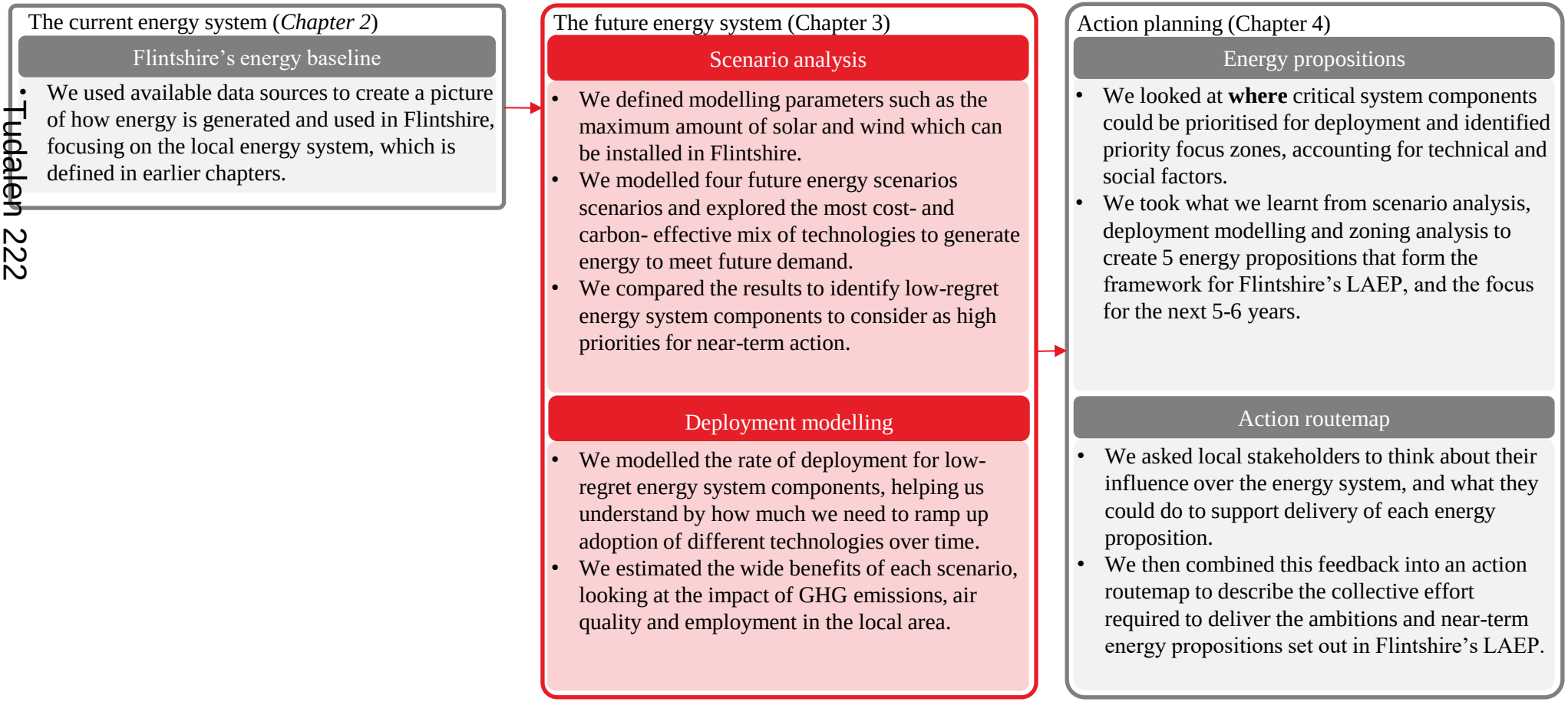


Figure 3.0.1: Summary of steps taken to produce the LAEP

3. The future energy system

Future energy scenarios and pathways

Summary of future energy scenarios

Do Nothing	• A scenario for comparison which considers committed activities and assumes that current and consulted upon policy goes forward and remains consistent. • This scenario provides a cost counterfactual. • There is no decarbonisation target for this scenario, and we do no use it in optimisation modelling.
National Net Zero	• Uses the lowest cost and carbon combination of technologies to meet Wales' 2050 net zero target. • Assumes a moderate level of energy demand reduction across the system. • Model is allowed to import and export to the electricity grid, this assumes that the electricity grid is decarbonised and reinforced to allow for the demands, likely to be a combination of offshore wind, hydrogen CCGT, grid level battery storage, nuclear (these are considered national assets and outside the scope of the LAEP)
Low Demand	• Considers the lowest future energy demand across different sectors. • Explores the impact of energy-reducing initiatives (home fabric improvements) and uptake of active travel and public transport use. • Model finds the lowest cost and carbon combination of technologies to meet predicted future energy demand. • Import and export of electricity as National Net Zero
High Demand	• Considers the highest future energy demand across sectors. • Model finds the lowest cost and carbon combination of technologies to meet predicted future energy demand. • Import and export of electricity as National Net Zero
High Hydrogen	• Considers the highest plausible future energy demand across different sectors. • Uses a cost- and carbon-optimal range of technologies to meet predicted future energy demand. • Considers hydrogen for heavy goods vehicles and industry. • The optimisation model was not forced to use hydrogen for undertaking any heating. Hydrogen was separately explored through hydrogen network modelling.

Figure 3.0.2: Summary of future energy scenarios

3. The future energy system
Scenario analysis

National Net Zero scenario

Figure 3.3 shows a potential future energy system for Flintshire. This system results from modelling to create the most cost and carbon optimal system. We have run a number of scenarios to support us in making decisions. The optimisation modelling informs the deployment modelling and the actions that go into the plans, but is not the "final plan" for the local authority area.

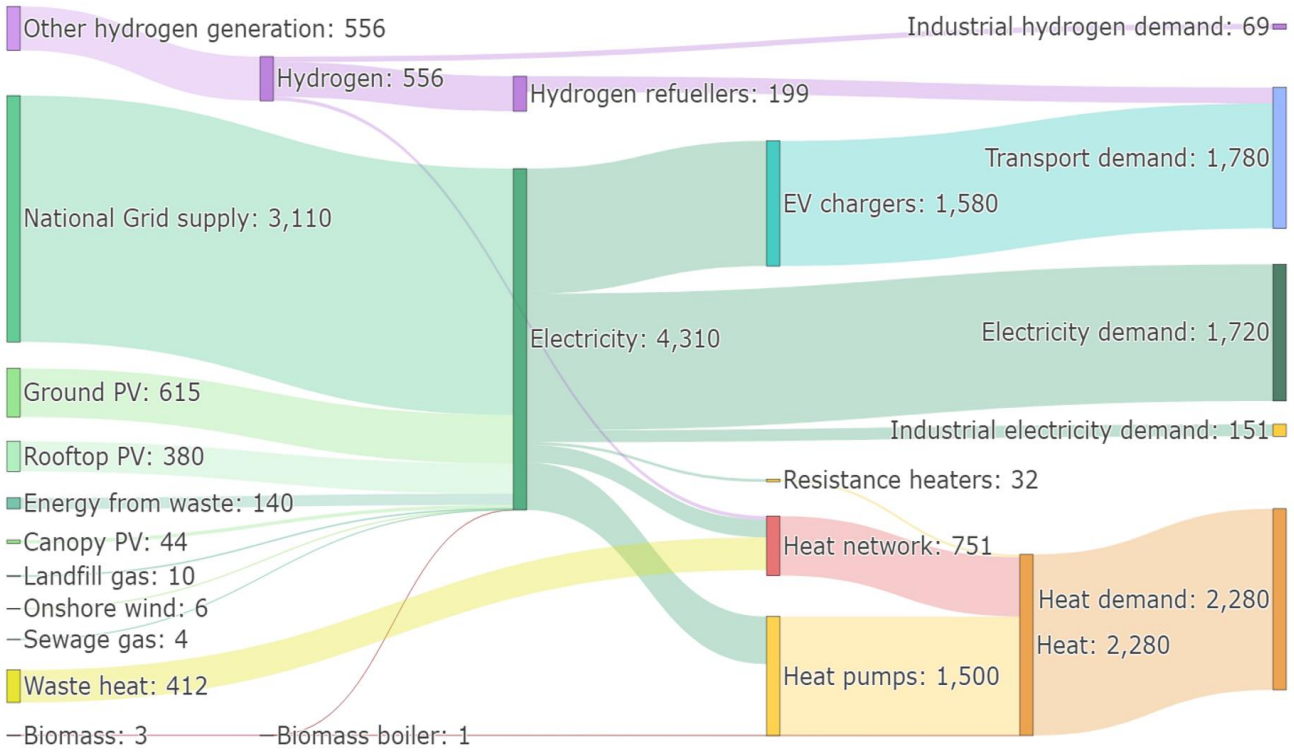
Hydrogen supply required for heavy transport and heavy transport

Electricity supply could be almost four times as great

Local renewables could provide 28% of electricity supply, compared to 23% in the baseline

Waste heat sources could supply a lot of heat in a future energy system via heat networks

Biomass supply reduces substantially as industrial processes switch to hydrogen or electricity for heat processes



Majority of transport demand could be met through electric vehicles (89%) and some hydrogen refuellers (11%) for heavier vehicles

Electricity demand could increase by over 40% by 2050

Heat demand could grow by almost 30% and be met by a predominant mix of heat pumps (66%) and waste heat (33%). This will all be met by 70% of the energy supply required for heat in 2019

Figure 3.0.3: A Sankey diagram for a potential future 2050 energy system (energy flows in GWh/year)

3. The future energy system
Scenario analysis

Energy system components

Figure 3.4 provides an overview of the variations in energy components observed in the optimisation modelling results across future energy scenarios, benchmarked against the baseline results.

Optimisation modelling shows ground-mounted and rooftop solar consistently increasing across all scenarios; contributing to meeting both Flintshire's energy demand but also exporting in times of surplus to the National Grid, and serving broader energy needs. In contrast, biomass generation sees a decline across all scenarios, likely due to a reduced dependency resulting from the enhanced output of solar and wind farms. Hydrogen is incorporated into the energy mix in all scenarios, sustaining Flintshire's industrial and transport demands.

Transport demand decarbonises, primarily due to the supply of electricity through EV charge points. Hydrogen also contributes to this demand, albeit to a lesser extent.

Heat demand is predominantly catered for by heat pumps, a trend that is consistent across all scenarios. While heat networks and other technologies contribute to this demand, their usage is comparatively less.

Energy system components	Baseline (GWh)	National Net Zero (GWh)	High Demand (GWh)	Low Demand (GWh)	High Hydrogen (GWh)
Ground-mounted PV	77	615 ↑			
Rooftop PV	11	380 ↑			
Onshore wind	6	6 →			
Sewage gas	1	4 ↑			
Biomass	715	3 ↓		2 ↓	3 ↓
Hydrogen import	0	556 ↑	553 ↑	555 ↑	1,850 ↑
Import from Grid	975	3,110 ↑	3,130 ↑	1,940 ↑	2,350 ↑
EV chargers	3	1,580 ↑	1,600 ↑	1,580 ↑	972 ↑
Hydrogen Refuellers	0	199 ↑	198 ↑	199 ↑	712 ↑
Heat pumps	15	1,500 ↑		507 ↑	1,500 ↑
Heat networks	0	751 ↑		747 ↑	751 ↑
Resistance heaters	40	32 ↓		13 ↓	32 ↓
Biomass boilers	356	1 ↓			

Figure 3.0.4: Comparison across the scenarios

3. The future energy system
Scenario analysis

Energy system components

Energy system components	Baseline (GWh)	National Net Zero (GWh)	High Demand (GWh)	Low Demand (GWh)	High Hydrogen (GWh)
Petrol/diesel	3,620	0 ↓			
Oil	303	0 ↓			
Coal	167	0 ↓			
Natural gas	1,430	0 ↓			
Solid fuels	53	0 ↓			
Energy from waste	50	140 ↑			
Export to National Grid	0	0 →	0 →	2 ↑	0 →

Figure 3.0.4 (continued): Comparison across the scenarios

Impact on energy demand

Figure 3.0.5 shows how the energy demand could change for each optimised scenario between 2023 and 2050.

All scenarios show a potential for an increase in total energy demand between 2023 and 2030 and then a reduction by 2050 (against both 2023 and 2030). Energy demand increases initially as a result of growth in housing and commercial property, before efficiency measures, and electrification of heat and transport take over and result in a peak in demand in the mid-2030s. Ultimately energy demand is only slightly lower in three of four scenarios by 2050.

The greatest reduction in total energy demand is understandably seen in the Low Demand scenario, primarily driven by improving building energy efficiency to achieve heat demands that are associated with homes with EPC A ratings.

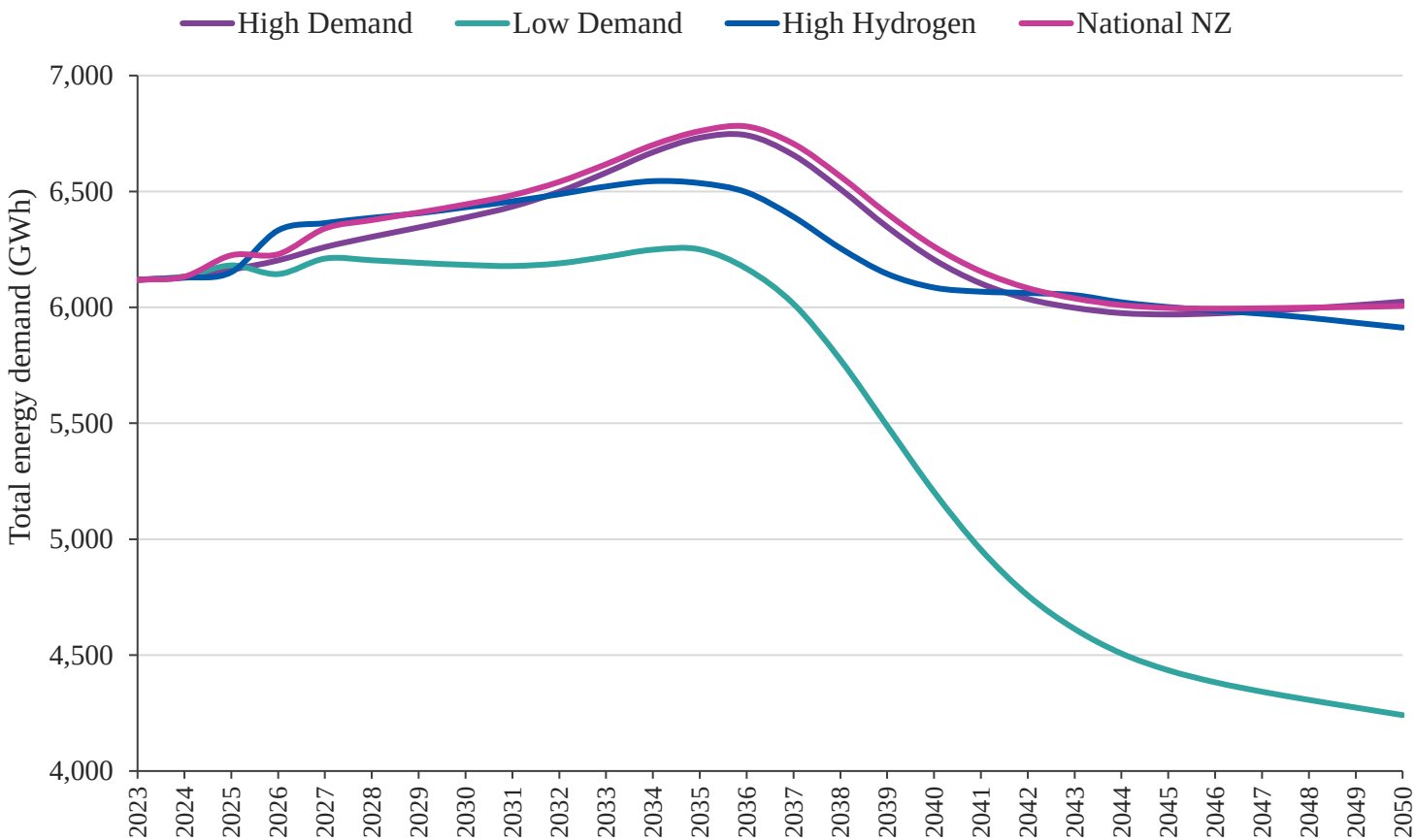


Figure 3.0.5: Change in total energy demand by scenario between 2023 and 2050 (GWh)

Impact on GHG emissions

Deployment modelling sets out the rate at which each energy component could be deployed in each optimisation scenario and the Do Nothing scenario. The Do Nothing scenario is based on current deployment rates and policy levers, whereas the other scenarios show trajectories that meet the optimisation models.

Figure 3.6 shows the gap in the carbon emissions between the Do Nothing scenario and the optimised scenarios. The optimised scenarios achieve a reduction in GHG emissions of at least 92% against 2023, while the Do Nothing achieves a 4% reduction.

Our deployment modelling provides additional evidence on the realism of delivering the changes suggested by the optimisation modelling. It helps us to determine the actions needed in the next five years to set us on the pathway to net zero in 2050. There are also bigger systemic changes that will be needed to achieve the scale of change set out in this plan.

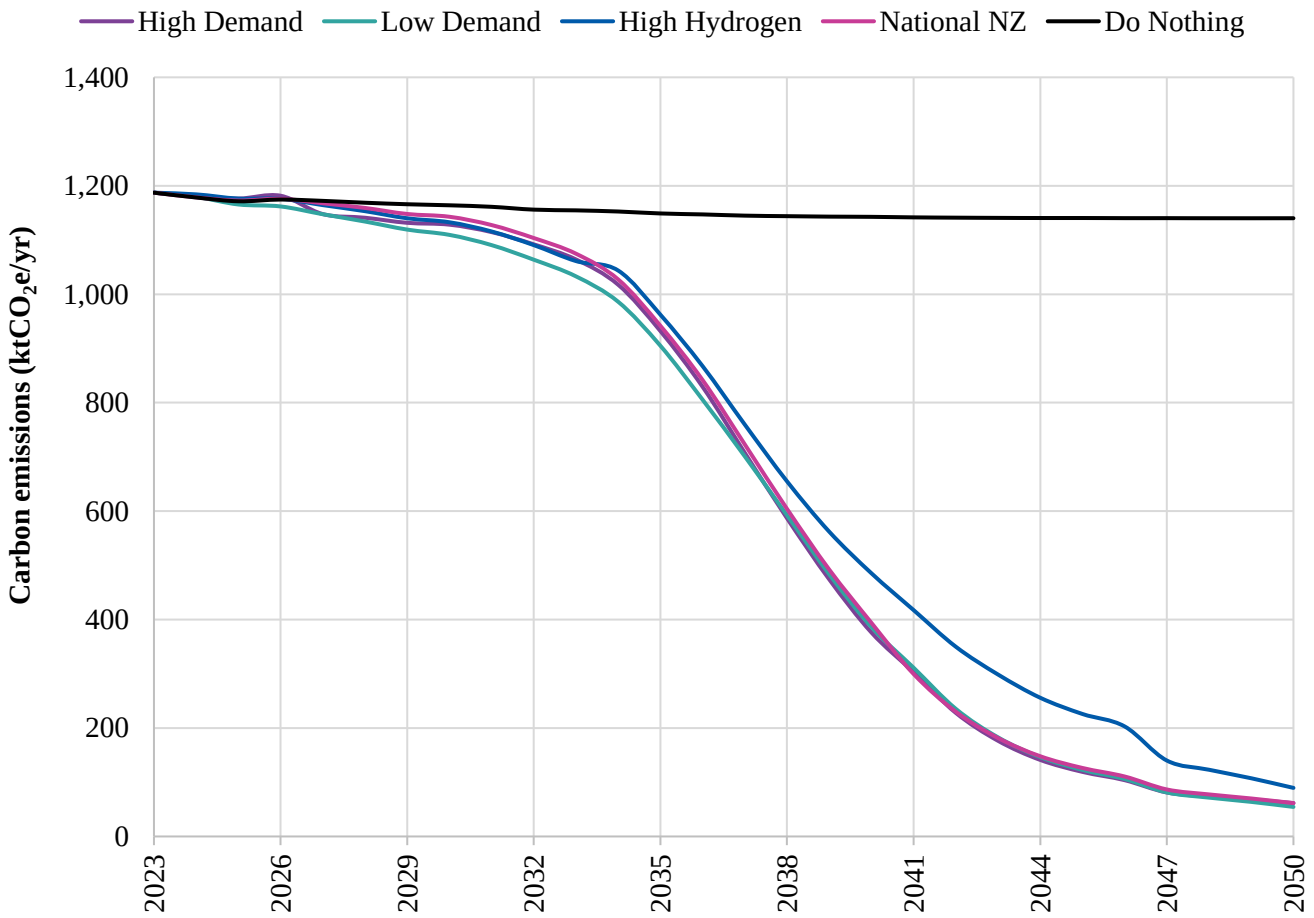


Figure 3.0.6: Carbon emissions ($ktCO_2e$/year) over time for each scenario

Impact on GHG emissions

The deployment modelling also shows how these pathways contribute to the Welsh Government emissions reduction targets. For Flintshire, Figure 3.7 shows that the 2023 baseline is a 30% reduction on the 1990 levels, all the pathways continue to underperform against the Welsh Government targets. All pathways also miss the net zero target in 2050, this is a result of residual emissions within the energy system. This is likely to always be expected to some extent as there will always like be hard to reduce emissions that arise from areas such as hydrogen production, or non-renewable electricity generation.

Scenario	2023	2030	2040	2050
High Demand	30%	34%	78%	96%
Low Demand	30%	35%	77%	97%
High Hydrogen	30%	34%	72%	95%
National Net Zero	30%	33%	77%	96%
Do Nothing	30%	32%	33%	33%
Welsh Government Targets	53%	63%	89%	100%

Table 3.0.1: GHG emissions from deployment against the Welsh Government emissions reduction targets

3. The future energy system
Deployment modelling

Socio-economic impacts

Reducing the amount of energy we use and using renewable energy sources for power generation can have wider environmental, social and economic benefits so it is important that they are fully understood to support decisions that impact the future of the energy system. For example, for every £1 invested in energy efficiency measures, the NHS can save £0.42 (amounting to annual savings of £1.4 billion in England alone)[M41].

Employment impacts

Investments in local energy systems can be expected to have employment benefits by providing local, skilled jobs. These will include direct jobs from construction and operational phases of the development as well as associated supply chain and multiplier effects[M42].

Impact on air quality

It can also impact the quality of the air which in turn impacts: human health, productivity, wellbeing and the environment, which is why it is so important to understand when planning future policy or programmes of work. Activity costs presented in Figure 3.8 show estimates for the impact of air pollution per unit of fuel consumed in each future energy scenario and estimates for the employment impacts associated with each future energy scenario, compared to the Do Nothing scenario

Metric	Do Nothing	National Net Zero	High Demand	Low Demand	High Hydrogen
Energy change (GWh, relative to 2023)	0	-113 (-2%)	-94 (-2%)	-1,878 (-31%)	-206 (-3%)
Change in GHG emissions ($ktCO_2e$, relative to 2023)	-47	-1,126	-1,125	-1,133	-1,097
Cumulative air quality activity costs between 2023-2050 (£m, *2022 prices*)	£0	£1,200	£1,177	£1,198	£1,170
Employment impacts between 2023-2050 relative to the Do Nothing scenario (net FTE)	0	7,178	7,194	7,325	8,760

Table 3.0.2: Summary of economic impacts for each scenario: employment impacts and air quality activity costs. Figures shown relate to the period 2023 – 2050. Air quality activity costs are presented using 2022 prices and are not discounted

3. The future energy system
Future energy scenarios and pathways

Summary of deployment

Our deployment model helps us to think about where we are now and where we need to get to, providing a starting point to frame the challenge and for more detailed analysis. We have included theoretical pathways which have a high degree of uncertainty as there are many variable factors and unknowns. The deployment modelling can't take into account every factor, some of the things that will impact deployment include:

- Technological advance and innovation
- Supply chains and how they develop
- Large scale activity to decarbonise infrastructure at other levels: regional, UK and beyond.

*According to the National Charge Point Registry[M43] as of May 2023. Refers to individual charge points, and assuming 4kWp per charge point

**Assuming 4kWp per roof

***Renewable generation capacity is shown for technologies where current installed capacity is >5MW

	Measure	2023	By 2030	By 2050
	Number of homes retrofitted	13,00 homes with EPC A-C (35%)	Up to 25,000 homes retrofitted	Up to 61,100 homes retrofitted
	Buildings with heat pumps installed (#)	700	Up to 14,600	Up to 95,300
	EV charge points (#)*	220	Up to 8,430	Up to 63,840
	Buildings with rooftop solar PV (#)**	2,900 (12 MW)	28,000 (112 MW)	99,700 (399 MW)
	Ground-mounted solar PV capacity (MW)	80 MW	228 MW	645 MW
	Other renewable capacity (MW)***	44 MW	73 MW	110 MW

Figure 3.0.7: Summary of deployment of various technologies between 2023, 2030 and 2050

4. Action planning

4. Action planning
Energy propositions

We shared what we learnt from exploring different energy futures and deployment pathways with our stakeholders and discussed with them what key drivers will be critical for the transition to net zero. We then considered their feedback, our strategic vision and objectives and agreed energy propositions to act as the framework for Flintshire's LAEP. There are numerous inter-dependencies and interactions between these propositions, as shown here, and this highlights the importance of a whole system approach with a co-ordinated programme of delivery to meet the net zero target by 2050. The following section describes each energy proposition in more detail, drawing together the evidence collected from baselining, scenario analysis and spatial modelling to propose priority areas to test critical, low-regrets system components that make up each energy proposition.

Vision

Flintshire County Council envisions a sustainable future with a net zero energy system that is affordable and promotes community health, well-being, and economic growth. We commit to a clean energy transition that fosters a resilient, inclusive, and prosperous community, ensuring a harmonious balance between environmental stewardship and social progress.

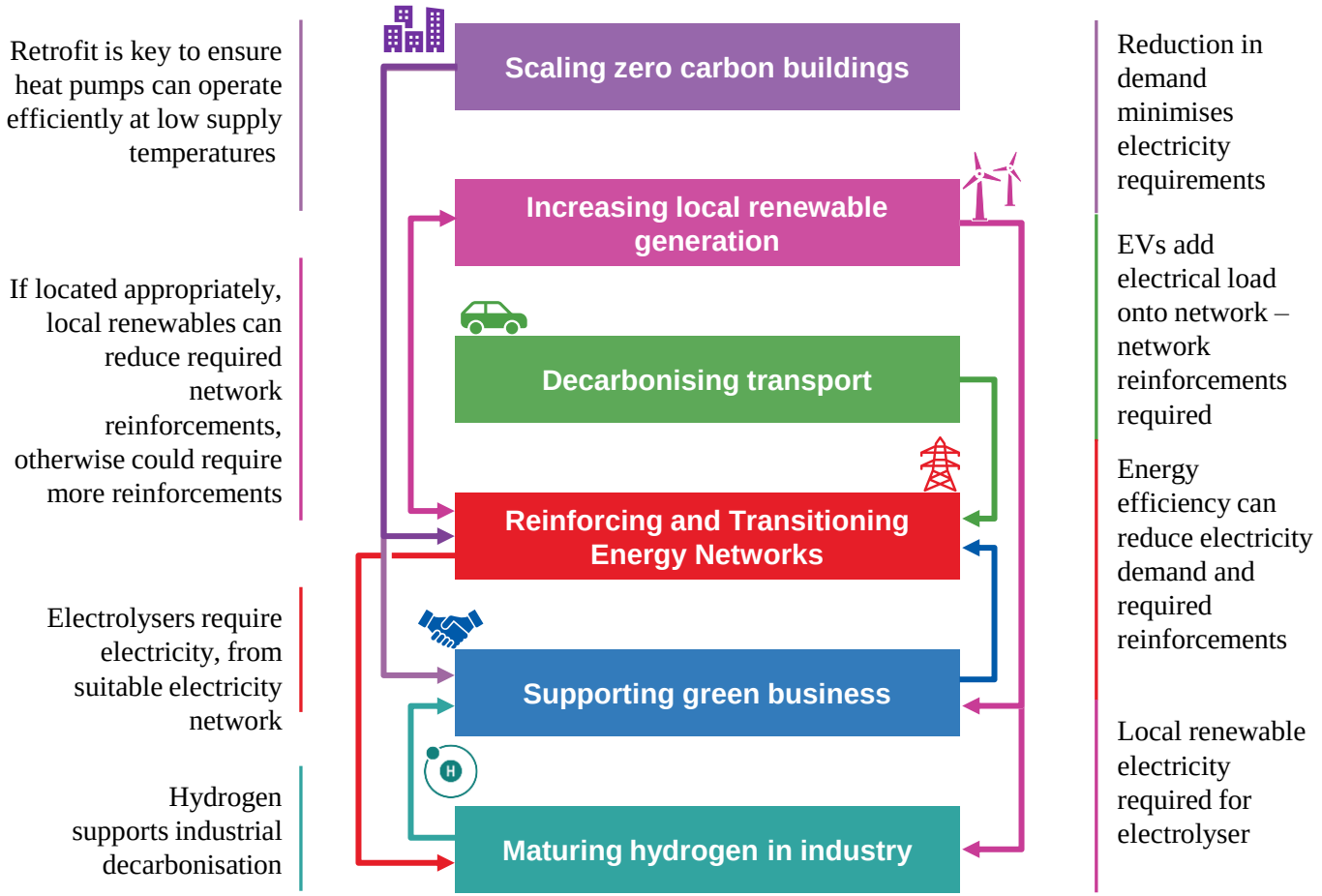


Figure 4.0.1: Summary of energy propositions and their inter-dependencies

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4. Action planning
Energy propositions

Energy propositions in more detail

Scaling zero carbon buildings

Supporting and deploying energy efficiency measures across the county to reduce energy demand and costs.

Ensuring buildings are safe, healthy and low carbon in operation and design.

Decarbonising transport

Enabling the rollout of ultra low/zero carbon vehicles across the county and transitioning to a zero carbon council fleet.

Promoting active and sustainable travel within the region.

Increasing local renewable generation

Investigating opportunities for local and community ownership of renewables, providing low cost, clean energy to residents.

Supporting future green business

Encouraging and supporting businesses to adopt low carbon measures and reduce energy costs.

Create an attractive environment for sustainable businesses to make base in Flintshire.

Maturing hydrogen in industry

Exploring the potential for hydrogen within particular sectors and understand the infrastructure requirements for implementation.

Reinforcing and Transitioning Energy Networks

Grid reinforcement will be required to accommodate the shift towards electric vehicles and heating.

Even in a low hydrogen scenario the gas grid will require repurposing for hydrogen within some applications.

Figure 4.0.2: Summary of propositions

4. Action planning
Energy propositions

Identifying priority focus zones and creating an action routemap

Although the exact form of the decarbonised energy system in 2050 is uncertain, there are actions we can take now with relative certainty that will help us maintain the ability to meet our 2050 Net Zero ambition and capitalise on the opportunities that this transition will bring.

Plan on a page

As a starting point, Flintshire's "plan on a page," shown in Figure 4.0.3 on the next page, indicates the location and scale of change that scenario modelling indicates for Flintshire be on a pathway to Net Zero by 2050. The map highlights five modelling zones identified as priority focus zones for the low-regret energy system components included in Flintshire's energy propositions: heat pumps, EV chargers, rooftop solar PV, ground-mounted solar PV, onshore wind, and insulation retrofits. To prioritise where each low-regret energy system component could be deployed, each modelling zone was ranked using two or more of the following considerations:

- **Off-gas homes** – prioritise zones with higher baseline proportion of off-gas housing. These homes will be the most challenging to transition to hydrogen and therefore are the most likely no-regrets targets for conversion to heat pumps.
- **Socioeconomics** - prioritise zones with higher baseline rates of deprivation (lower WIMD score).
- **Property ownership** - prioritise zones with the highest baseline percentage of social housing.
- **Substation generation headroom** – prioritise zones with the most baseline generation headroom available.
- **Listed buildings** – prioritise zones with the least number of currently listed buildings.
- **Domestic energy efficiency** – prioritise zones with the highest baseline percentage of homes with an EPC rating of D or below.
- **Built additional substation capacity** - prioritises zones where the least upgrades are required in the high demand scenario, since heat electrification is typically a major contributor to grid upgrade requirements (which may be back-logged by several years).
- **Built EV charging capacity** – prioritise zones with the most EV charging built in the high demand scenario.
- **Built additional capacity of each local generation technology** (rooftop PV, ground-mounted PV, or onshore wind) – prioritise zones where the most additional new capacity is built between the baseline and 2050 high demand scenario.

For more details on the methodology behind the "plan on a page", please see Chapter 4 of the Technical Report.

In the map (Figure 4.0.3 on the next page), green areas show modelling zones identified as priority focus zones, where the modelling indicates that conditions are most favourable to trial deployment of energy system components at pace and scale. Blue areas show "progress" zones where the conditions are less favourable in the near-term for delivery compared to the green zones, and where only tried and tested delivery models should be deployed. A consistent level of deployment will still be required in these zones to transform the local energy system at the pace indicated by the deployment analysis.

4. Action planning

Energy propositions

Plan on a page

To support transformation of the energy system, pilot projects may be useful. The map below highlights areas that could provide a useful focus for these pilots.

Figure 0.4 identifies zones with particularly favourable conditions for specific energy components, making them ideal locations for pilot studies. The summary boxes detail the location, opportunity type, potential capacity, required investment for each component, and total investment necessary for both energy component installation and electricity network infrastructure in each zone by 2030. Ranges have been calculated by taking the minimum and maximum results from each future energy scenarios modelled.

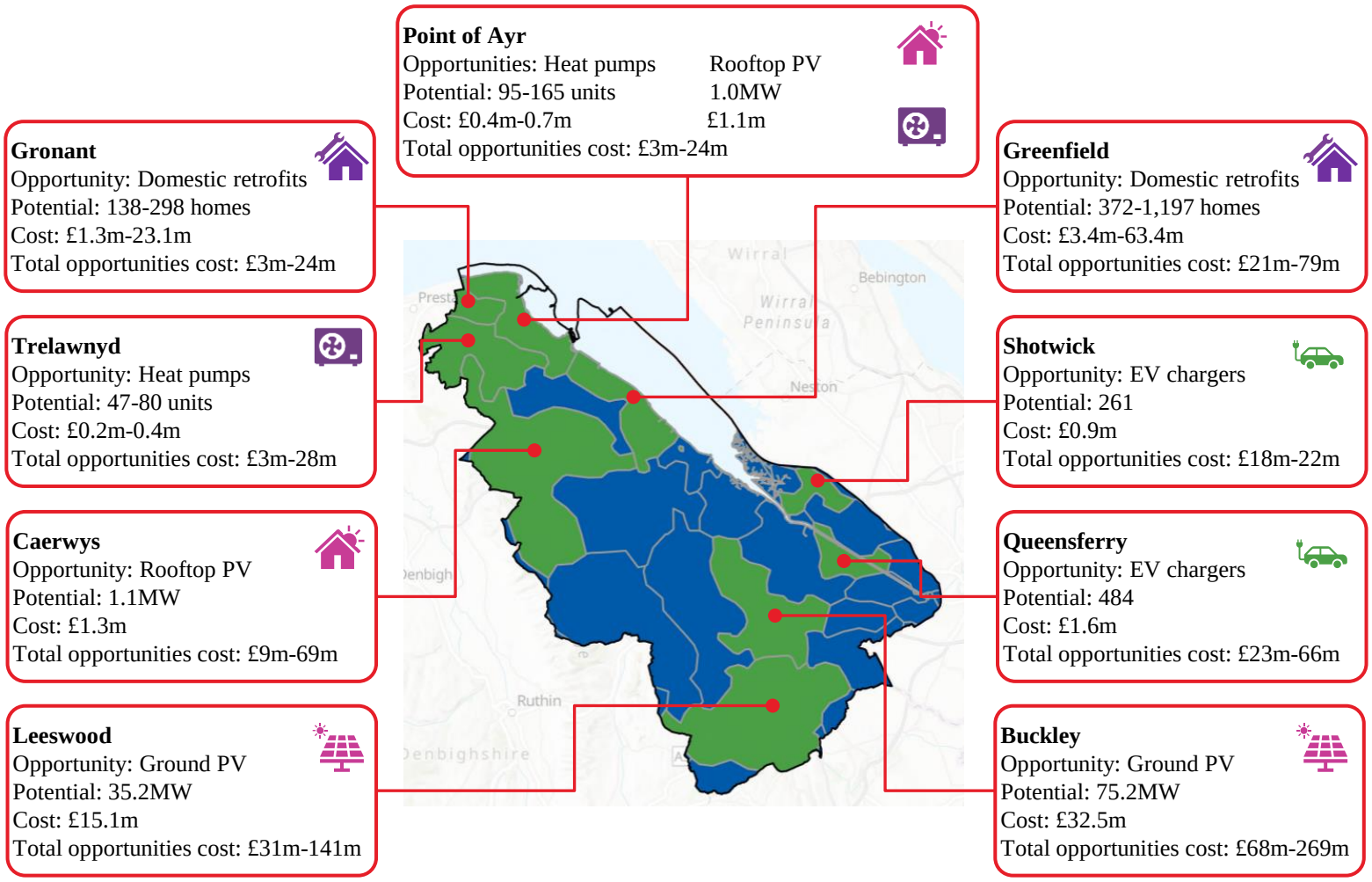

Figure 4.0.3: Flintshire's spatial representation of opportunities, including 2030 ambition and investment (million £) – in High and Low Demand scenarios. Zone boundaries are defined by primary substation service areas

4. Action planning
Energy propositions

Identifying priority focus zones and creating an action routemap

Action routemap

Our energy propositions describe where our priorities lie based on the evidence presented thus far. Our **action routemap** takes each energy proposition and outlines critical, enabling actions that we will take collectively alongside our stakeholders in the coming decade, with a particular focus on what we can achieve in the next 5-7 years. Our action routemap has been developed as a dynamic plan that recognises the influence that wider contextual changes at national and local level will have on the way we choose to transition to a net zero energy system, such as national regulation, policy and strategic plans. As a result, we expect to regularly review and update our routemap based on these dependencies.

Each action will require four key elements to be successful:

- Mobilising finance
- Strong and consistent policy frameworks
- Identifying delivery owners
- Community engagement

As Flintshire County Council, our role in delivering each energy proposition will vary. Some actions call for council action in the material delivery of programmes, whilst others require the council to act as the facilitator for market-driven change.

Through the LAEP process, we also identified that some of the actions are best delivered collaboratively through the regional partnership. This is because there are economies of scale, and it would be more efficient to have joined up and focused public resources. The regional actions will require detailed design work, to create projects and programmes, to progress them to implementation stage - with an initial focus on the tried and tested. The council will take an active role in supporting Ambition North Wales going forward.

Local ownership is a key focus throughout this plan, and where possible the action taken should leverage the progress made through the Welsh Government's recent Co-operation Agreement[M63] with Plaid Cymru, which includes key goals on tackling climate change in a way that maximises local benefits.

The following section provides further detail on each of the actions that we will undertake under each energy proposition, as well as our key asks of others. Due to the relative uncertainty of longer-term actions, we have chosen not to focus on detailed scoping of these in this report and instead, focus on actions we intend to deliver in the short-term, subject to appropriate support. For more details on the action plan, please see the Technical Report for further details.

4. Action planning

Routemap | short term actions

#	Lead	Scaling Zero Carbon Buildings	2024	2025	2026	2027	2028	2029	2030
1.1	FCC	Develop and implement programme of support for off-gas grid homes							
1.2	FCC	Develop programme for retrofit of Council owned buildings							
1.3	FCC	Promote rollout of EPCs to all Flintshire residents							
1.4	FCC	Complete existing ECO4 and ORP 2 and 3 funding programmes							
1.5	FCC	Upskill Council planning and regeneration team staff on retrofit of 'heritage' buildings, and novel technologies (e.g. heat pumps and charging hubs)							
1.6	FCC	Develop emissions standards for operation and construction of Council new builds and retrofits							
1.7	FCC	Explore opportunities to engage with the supply chain to ensure they are adequately aware of the scale of change required for domestic retrofit							
1.8 B.1.8	WG	Apply lessons learnt from Optimised Retrofit Programme to retrofitting the privately rented and owner-occupied sectors through Welsh Zero Carbon Hwb.							
1.9 B.2.1	WG	Using the learning from other information hubs to develop an information service that provides a trusted source of retrofit and energy efficiency information for consumers. Explore the potential of establishing an advice hub to support regional decarbonisation / low carbon energy initiatives.							
1.10 R1.4	Warm Wales	Work with Community Interest Companies (CIC) to provide a regional service of wrap around support for residents covering education, behaviour change, energy advice and support.							
1.11 3A	RSLs	Provide support and incentives for households to install energy efficiency measures and low-carbon heating systems, ensuring such support is targeted at those in fuel poverty and/or in most need.							
1.12 3C	FCC; RSLs	Ensure PAS 2035 surveys and a clear plan for retrofit measures are prepared for individual social homes, in accordance with the Welsh Housing Quality Standard (WHQS)[M20].							

FCC - Flintshire County Council; WG – Welsh Government; RSL – Registered Social Landlords

4. Action planning

Routemap | short term actions

#	Lead	Scaling Zero Carbon Buildings	2024	2025	2026	2027	2028	2029	2030
1.13 3D	WG; LAs	Review current support provision to tenants and landlords in the private-rented sector to ensure minimum energy efficiency standards are met. Review enforcement provisions to ensure minimum statutory standards within the sector are achieved.							
1.14 5C	Business Wales / M-Sparc; North Wales Mersey Dee Business Council	Explore development of support mechanisms for small to medium-sized enterprises (SMEs) to encourage uptake of energy efficiency improvements to commercial buildings.							
1.15 B.1.7	WG	Work with local authorities and regional bodies to determine an approach to coordinated, street-by-street approach to retrofit and the mechanisms for delivery (e.g. governance, resource, finance, policy). Co-ordinate a retrofit plan for all housing tenures which expands on the Optimised Retrofit Programme.							
1.16 B.5.1 3E	WG; LAs	Identify specific local planning constraints (e.g. permitted developments i.e. 3 metre rule for heat pumps, permissive planning for listed buildings, new build regulations) limiting progress to net zero and delivering the LAEPs and work with Welsh Government to resolve these.							
1.17 B.5.2	WG	Consider tighter building regulations to support delivery of net zero ready buildings including a consultation on Part L regulations in 2024							
1.18 B.1.2 3B	WG	Develop and agree an approach and delivery plan for tackling owner-occupied retrofit. Review existing and explore new potential financial mechanisms to support owner-occupiers and building owners seeking to undertake energy efficiency retrofit works.							
1.19 E.4.1	WG	Identify procurement frameworks for renewable technologies which consider local and ethical sourcing of goods and services. Develop national procurement framework, learning from previous ECO 4 roll out and the Optimised Retrofit Programme, to deliver street-by-street retrofit.							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; RSL – Registered Social Landlords

4. Action planning

Routemap | short term actions

#	Lead	Decarbonising Transport	2024	2025	2026	2027	2028	2029	2030
2.1	FCC	Apply pressure to Welsh Government for greater direction for on street EV charging							
2.2	FCC	Explore EV charging technologies for kerbline properties where no off-street options are available							
2.3	FCC	Understand charging facilities potential within town centre regeneration and place making plans, explore SPF and ORCS funding							
2.4	FCC	Ensure commitment to high speed broadband connections for everyone in Flintshire							
2.5	FCC	Lobby for investment in the rail infrastructure to improve service frequency and reduce travel time							
2.6	FCC	Further develop active travel networks and principles, keeping in mind impacts of equalities act							
2.7	FCC	Develop plans for last mile sustainable mobility requirements within the scope of new and improved stations in the North Wales metro programme							
2.8	FCC	Provide public finance options and national standards for EV charging infrastructure.							
2.9	FCC	Release pilot EV charge point locator and costing tool for EV charge points.							
2.10 4C	ANW; WGES	Collaborate on opportunities to decarbonise the public sector fleet, public service vehicles, and commercial and industrial fleets and the co-ordination of associated infrastructure design and development across local authority boundaries.							
2.11 4D	ANW; North Wales Corporate Joint Committee; TfW; SPEN	Work together to deliver the most appropriate electric vehicle public charging infrastructure across the region, aligning with national work being undertaken through Transport for Wales.							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales; TfW – Transport for Wales; SPEN – SP Energy Networks; WGES – Welsh Government Energy Service

4. Action planning

Routemap | short term actions

#	Lead	Decarbonising Transport	2024	2025	2026	2027	2028	2029	2030
2.12 4F	ANW	Support greater awareness raising of UK Government funding for development of electric vehicle charging infrastructure such as the on-street residential charging scheme.							
2.13 4G	ANW; WGES	Continue to support organisations such as local community car clubs to deliver community-oriented, low-carbon transport infrastructure and services.							
2.14 R4.1	North Wales Corporate Joint Committee	Establish a Regional Transport Officer's Group that provides a forum for collaboration and alignment between local and national government in addition to Transport for Wales.							
2.15 R4.2	North Wales Corporate Joint Committee	Explore opportunities around bus franchising across the region.							
2.16 R4.3	North Wales Corporate Joint Committee	Produce the first Regional Transport Plan (RTP) in line with that Welsh Government statutory guidance.							
2.17 T.2.4	WG	Develop a national procurement framework for EV infrastructure							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales; TfW – Transport for Wales; WGES – Welsh Government Energy Service

4. Action planning

Routemap | short term actions

#	Lead	Increasing Local Renewable Generation	2024	2025	2026	2027	2028	2029	2030
3.1	FCC	Promote community energy schemes							
3.2	FCC	Continue to rollout renewables in line with REAs, land assessments and constraints mapping							
3.3	FCC	Facilitate rooftop solar PV uptake in owner-occupied dwellings through knowledge sharing and signposting							
3.4	FCC	Understand local potential for solar carports							
3.5	FCC	Support SMEs with rooftop solar installation for reducing energy costs by highlighting energy savings, local installers and potential costs							
3.6	FCC	Further explore possibilities for geothermal energy generation within old coal fields, this can build on the work that has been undertaken by the Coal Authority.							
3.7 G	ANW	Explore the development of an investment prospectus for renewable developments currently in the pipeline.							
3.8 2A	Ynni Cymru; ANW	Engage with Welsh Government to identify and build on opportunities that Ynni Cymru could provide to North Wales.							
3.9 2B	ANW	Explore how to improve communication of available funding sources for the development and delivery of a range of low-carbon power generation projects (e.g. onshore and offshore wind, solar PV, nuclear, and tidal and marine energy).							
3.10 2D	Ynni Cymru; ANW	Support workstreams in increasing local ownership of energy projects to be delivered in line with proposed guidance on local and shared ownership in Wales.							
3.11 2E	ANW	Explore the potential of establishing an advice hub to support regional decarbonisation / low carbon energy initiatives.							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales

4. Action planning

Routemap | short term actions

#	Lead	Increasing Local Renewable Generation	2024	2025	2026	2027	2028	2029	2030
3.12 2F	ANW	Maximise opportunities for public procurement to support the acceleration of renewable energy generation and secure local economic and social value. - Ensure that public procurement strengthens local supply chains / local jobs (social value). - Ask the supply chain to deliver against public sector carbon ambitions through procurement frameworks.							
3.13 G	ANW	Maximise opportunities for community benefits funds from energy infrastructure projects (on the distribution network) to support local and regional decarbonisation initiatives, recognising the need to target those communities and areas most impacted by such developments.							
3.14 R2.1	ANW	Explore the opportunities that Power Purchasing Agreements could provide to energy generation across the region.							
3.15 R2.2	ANW; WGES	Continue to explore the opportunities presented by solar canopies in car parking spaces and the enablers to scale the technology across the region.							
3.16 RN.4.1	WG; Trydan Gwyrdd Cymru	Identify and explore opportunities for the development of renewables on public sector owned land							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales; WGES – Welsh Government Energy Service

4. Action planning

Routemap | short term actions

#	Lead	Supporting green business	2024	2025	2026	2027	2028	2029	2030
4.1	FCC	Promote work undertaken by AMRC where appropriate							
4.2	FCC	Continue to support Deeside Decarbonisation Forum and signpost funding opportunities							
4.3	FCC	Understand potential for redevelopment plan of Mostyn dock, undertake opportunities mapping							
4.4	FCC	Understand how sustainability can be worked in to Flintshire's digital strategy and potential for data supported decarbonisation							
4.5	FCC	Look to undertake heat mapping exercise and understand heat network potential							
4.6	FCC	Support SMEs to develop plans to decarbonise and signpost to funding opportunities							
4.7	FCC	Continue to support town centre place making investment and signpost funding opportunities available to businesses and social enterprises							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales

4. Action planning

Routemap | short term actions

#	Lead	Maturing hydrogen in industry	2024	2025	2026	2027	2028	2029	2030
5.1	FCC	Plan for and be aware of upcoming hydrogen project funding opportunities							
5.2	FCC	Develop local strategy to understand local need, requirements, challenges, and opportunities for hydrogen							
5.3	FCC	Look to support research into hydrogen co-challenges for local businesses							
5.4 N.4.3	ANW	Support the emerging hydrogen economy, taking account of proposed hydrogen projects across the region.							
5.5 N.4.4	WG; NRW	Publish a Welsh Government carbon intensity standard for hydrogen production based on that of UK Government. This standard can be used as a basis for future permitting by Natural Resources Wales.							
5.6	WWU	Publish findings from North Wales Conceptual Plan for hydrogen infrastructure.							
5.7 N.3.5	WWU	Make the network hydrogen ready. Deliver programme to convert remainder of gas network not covered by the REPEX programme to enable a 100% hydrogen conversion, WWUs sustainability strategy from 2023 identifies a desire to complete this between 2035-2040.							to 2040 >
5.8 N.4.4	WWU	Develop hydrogen and bio-methane projects.							to 2050 >
5.9 N.4.5	WWU	Develop a more detailed understanding of potential hydrogen transport demand and incorporate this demand within existing network demands. This action will be supported by WWU's innovation project HyDrive.							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales; NRW - Natural Resources Wales; WWU – Wales and West Utilities

4. Action planning

Routemap | short term actions

#	Lead	Reinforcing and Transitioning Energy Networks	2024	2025	2026	2027	2028	2029	2030
6.1 N.1.2	SPEN; WWU	Hold regular engagement meetings between FCC, SPEN and WWU						Ongoing basis	
6.2 N.2.2 N.3.3	FCC; SPEN	FCC and SPEN to work collaboratively to understand future demands (electricity) and use this to influence ED3 Planning and investment from OFGEM.							
6.3 N.2.1	SPEN	Inform local authorities about available data resources by providing access to the DFES report and the resulting NDP (Network Development Plan) via SPEN's Open Data Portal as well as other datasets such as heat maps, network infrastructure & usage. Requests for additional, bespoke reports can also be made via the portal.							
6.4 N.2.3	SPEN	Use all relevant outputs from the LAEPs to inform SPEN's DFES (Distribution Future Energy Scenario) Report, in turn SPEN will share the trends and highlights from the DFES with individual LAs.							
6.5 N.2.4	SPEN	Provide low carbon technology (LCT) optioneering services to Local Authorities to support them with site optioneering (cost and timescale) for EV charging, heat pump rollout and renewable generation infrastructure planning.							
6.6 N.2.5	SPEN; WWU	Co-ordinate Net Zero clinics for Local Authorities to discuss decarbonisation of heat, transport and renewables strategies, and willingly contribute to workshops organised by the Local Authorities for local small-medium enterprises (SMEs).						Ongoing basis	
6.7 N.2.6	SPEN; WWU	Discuss and agree any strategic optimisation opportunities with each Local Authority to continue progressing decarbonisation and economic growth plans.						Ongoing basis	
6.8 N.1.3	SPEN; WWU	Plan a method to consolidate the pipelines for all energy-related projects across the electricity and gas/hydrogen networks. This will consolidate all actions planned by electricity and gas/hydrogen networks within an area into one common database. As a starting point, set up ongoing engagement meetings with DataMapWales, NGED SPEN, and WWU to coordinate if and how DataMap Wales may be an appropriate platform to consolidate this information.						Ongoing basis	

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales; SPEN – SP Energy Networks; WWU – Wales and West Utilities

4. Action planning

Routemap | short term actions

#	Lead	Reinforcing and Transitioning Energy Networks	2024	2025	2026	2027	2028	2029	2030
6.9 N.3.1	WWU	Highlight gas infrastructure opportunities. Support Local Authorities in exploring new opportunities to develop the existing gas networks in advance of 100% transition to existing hydrogen network.						Ongoing basis	
6.10 N.3.2	WWU	Include new projects from the LAEP in strategic planning process.							
6.11 N.3.4	WG	Share LAEP outputs on DataMapWales, plan how to keep this data up to date and relevant							
6.12	SPEN	Raise awareness of SPEN's Flexibility Service procurement to support a smarter system.							
6.13 N.2.7	SPEN	SPEN is already looking at industrial decarbonisation through their partnership in the NEW-ID (North East Wales Industrial Decarbonisation) Project. Any opportunities/benefits identified as part of work on this project will be shared with the affected Local Authorities, including Flintshire .							
6.14	WG; Coal Authority; WWU	Explore opportunities for partnership delivery of district heating and cooling networks, using waste heat sources such as mine water.							
6.15 5B	ANW; DDF	Understand the role that micro-grids and other innovative solutions can play in existing industrial clusters such as those in Deeside and Flintshire.							
6.16 R5.1	North Wales Corporate Joint Committee; DDF	Explore and recognise opportunities that will be made available from the Flintshire/Wrexham investment zone.							

FCC - Flintshire County Council; WG – Welsh Government; ANW – Ambition North Wales; SPEN – SP Energy Networks; WWU – Wales and West Utilities; DDF – Deeside Decarbonisation Forum

4. Action planning

Routemap | short term actions

#	Lead	Enabling actions	2024	2025	2026	2027	2028	2029	2030
7.1 A	ANW	Ensure effective alignment between local, regional and national energy strategies, plans and initiatives.							
7.2 D	ANW	Provide regional support in the delivery of commitments made in the Climate Action Wales public engagement strategy (July 2023) to help citizens take action to reduce demand, improve energy efficiency and use energy in a way which supports our vision							
7.3 1.1.3	ANW; Ynni Cymru; WG	Continue to explore and support opportunities for smart local energy systems in the region. Using outputs from the LAEP, map smart local energy system opportunities and identify feasibility/demonstrator projects through engagement with key stakeholders including community energy groups and general public.							
7.4 R1.1	WG; Ofgem; National Grid ESO	Ensure alignment between the scope and function of the new Regional Energy Strategic Planners (RESPs) with Ofgem's policy design. Consultation of the policy design will be published in the summer of 2024 with the RESPs in operation by late 2025/early 2026							
7.5 R1.2	North Wales Corporate Joint Committee	North Wales Corporate Joint Committee to support the Race to Zero campaign and provide oversight on carbon emissions across the region							
7.6 E3.1 C	RSP; WG	Lead on developing the skills requirements identified in the Regional Skills Partnership's (RSP's) Green Skills Report and Welsh Government's Net Zero Skills Action Plan. Map and identify skills and labour needs and gaps up to 2050 for retrofit and low carbon new builds; renewable deployment; decarbonised transport and business / industry decarbonisation.							
7.7 E3.2	WG	Review and develop educational programmes to meet skills needed							
7.8 E3.3	WG	Develop a communication strategy to educate, promote skills, training and the need for a supply chain							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales; WGES – Welsh Government Energy Service; RSP – Regional Skills Partnerships

4. Action planning

Routemap | short term actions

#	Lead	Enabling actions	2024	2025	2026	2027	2028	2029	2030
7.9 R1.5	ANW; WGES	Work with Welsh Government to create a governance structure and performance management framework for the LAEPs to facilitate monitoring of progress and performance of the LAEPs across the Region.							
7.10 E2.2	WG	Using the outputs from the LAEPs and REPs, create a national plan which covers the gaps such as national and regional assets.							
7.11 R1.3	North Wales Corporate Joint Committee	Develop the first regional Strategic Development Plan (SDP). Include policies in the plan that support low carbon building practices and low carbon new builds.							
7.12	Bangor University / M-Sparc; Wrexham University; ANW	Strengthen the link between research, development and innovation with regards to current and emerging technology and the Energy Strategy priorities.							

FCC - Flintshire County Council; WG – Welsh Government; LA – Local Authority; ANW – Ambition North Wales; WGES – Welsh Government Energy Service

4. Action planning

Routemap | short term

National Targets	2024	2025	2026	2027	2028	2029	2030
Up to 1GW of electrolytic hydrogen secured (2025) [UK][M44]							
Decision on hydrogen to heat buildings (2026) [UK][M45]							
Up to 10GW hydrogen capacity in UK (50% electrolytic) [UK][M44]	Progressing towards 2030						
Up to 50GW of offshore wind capacity including up to 5GW of innovative floating wind (2030) [UK] [M44]	Progressing towards 2030						
Future Homes Standard consultation suggests all space heating and hot water demand be met through low carbon sources in new builds (2025)[M46]							
All new social homes built to Welsh Development Quality Requirements 2021 without fossil fuel heating (from 2025)[M47]							
All existing social homes to have a plan for minimising environmental impact and improving energy performance (2027) [Wales][M48]							
-37% GHG emissions by 2025 (rel. to 1990) [Wales][M49]							
-63% GHG emissions by 2030 (rel. 1990) [Wales][M49]	Progressing towards 2030						
Meet the equivalent of 100% of electricity needs from renewable sources by 2035 [Wales][M26]	Progressing towards 2035						
1.5GW of renewable capacity to be locally owned (exc. Heat pumps) (2035) [Wales][M26]	Progressing towards 2035						
580,000 heat pumps to be installed in Wales by 2035, contingent on scaled up support from the UK Government and reductions in the cost of technology (2035) [Wales][M26]	Progressing towards 2035						
Minimum EPC E to rent out any property (from 2023 onwards) and EPC C from 2030 [UK][M51]							
1 public charge point for every 7 to 11 electric vehicles (2025) [Wales][M52]							
Rapid charging available every 20 miles on the strategic trunk road (2025) [Wales][M52]							
£220 million committed through Active Travel Fund (2022-2025) [Wales]							
-10% car miles travelled/person (2030) [Wales][M03]	Progressing towards 2030						
80% new cars and 70% new vans sold to be zero emissions[x] (2030) (ZEV mandate) [UK][M53]	Progressing towards 2030						
100% new cars and vans sold to be zero emissions (2035) (ZEV mandate) [UK][M53]	Progressing towards 2035						
Net zero public sector by 2030 [Wales][M54]	Progressing towards 2030						

5. Next steps

5. Next steps
Enabling conditions for success

Through the LAEP development process, we identified that broadly, each action requires four key elements to be successful. These are:

- Actions to mobilise finance
- A strong and consistent policy framework
- Accountable delivery owners and
- A community engagement element

Progressing energy propositions

We, as a county want to make sure that there is a well-defined governance structure for managing the delivery of the LAEP. As an area-wide plan it is the responsibility of all who live and operate in the area to support its delivery, and the chosen governance framework will need to reflect this. We, as a Council, will seek to bring the delivery of our LAEP into alignment with our plans for delivering our Climate Change Strategy and other plans where activities are mutually beneficial for addressing the climate emergency and meeting our climate change targets.

The council is currently strengthening its governance arrangements to support delivery of its Action Plan to Net Zero Carbon. Currently the climate change strategy programme is monitored by Climate Change Committee is made up of representatives from each political party. The Committee is supported by Officer Groups for each theme with representation from each of the stakeholder portfolios. Progress reports will be received by the Environment & Economy Scrutiny Committee to deliver further development of the plan. Scrutiny of the programme is also available from Internal Audit as appropriate.

Roles and responsibilities

The Council's role in each action will vary. Some actions call for Council action in the delivery of programmes, whilst other actions involve the Council as a convener, or co-ordinator between multiple organisations.

As a Council, we will decarbonise assets within our direct control, such as council buildings and the council transport fleet. Further, we will drive and influence the decarbonisation of the wider area through our role as:

Planning Authority:

- Preparing planning policies and allocating land in our Local Development Plan
- Development management – taking decisions on planning applications submitted to the local planning authority for development; as well as preparing Local Impact Assessments for schemes which are determined by the Infrastructure Planning Commission

Place-maker:

- Acting at a council wide level to achieve a low carbon economy.
- Taking forward wider community action and communicating the need to increase the uptake of renewable energy.

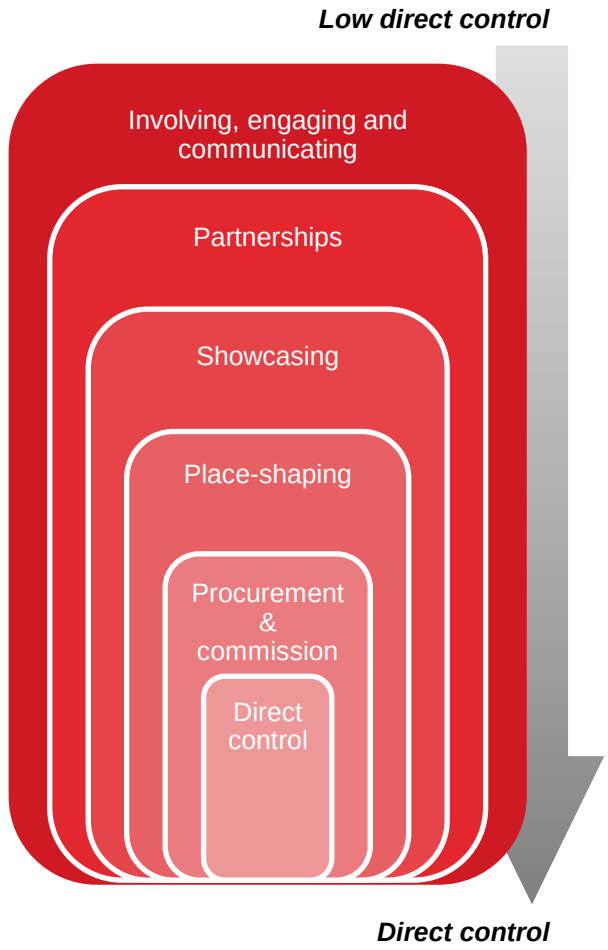

Figure 5.0.1: A local Council's roles and level of influence

5. Next steps
Enabling conditions for success

For this delivery of the LAEP and our own Climate Change Strategy to be successful, we will require a collective, co-ordinated effort from many different stakeholders, which means closer collaboration between the Council and our partners, and building relationships with key stakeholders that hold influence over different parts of the energy system. We will leverage our existing partnerships to do this, such as the Public Sector Board (PSB), Public Sector Decarbonisation Group and others.

Regional perspective

Developing this LAEP in close collaboration with other local authorities in Wales recognises that a consistent, co-ordinated plan for creating a net zero energy system in North Wales can bring wider economic and social benefits and capitalise on the unique potential in each local area. This regional approach to energy planning recognises the environmental, economic and social dependencies between different local areas and energy systems. Ambition North Wales, a regional representative in national discussions on energy, as well as responsible for co-ordinating North Wales' Energy Action Plan and managing the North Wales Growth Deal, recognises its critical role in endorsing this way of working, and how it might support this approach where it is most effective. Ambition North Wales plans to:

- Act as a regional resource to support local authorities to deliver their LAEPs.
- Ensure effective alignment between each LAEP, North Wales Regional Energy Strategy and the emerging National Energy Plan.
- Develop the skills requirements identified in the Regional Skills Partnership's Green Skills Report and Welsh Government's Net Zero Skills Action Plan.
- Encourage, facilitate and support a joined-up approach to delivering local actions that are common across the region to be efficient, effective and consistent (e.g. cross-border collaboration on funding applications).
- Facilitate engagement between local authorities and regional stakeholders e.g. continue to facilitate forums like the Regional Steering Group, where updates and support can be shared regionally between local authorities, networks and other local and regional stakeholders.
- Provide regional support in the delivery of commitments made in the Climate Action Wales public engagement strategy (published July 2023) to help citizens take action to reduce demand, improve energy efficiency and use energy in a way which supports our vision.

5. Next steps
Enabling conditions for success

National perspective

Welsh Government has committed to achieving net zero emissions in Wales by 2050 and recognises that a significant part of this will depend on transforming the energy system to enable the reduction and decarbonisation of energy generation and use in Wales. As such, it committed to providing the resource and funding for each Local Authority to develop a Local Area Energy Plan (LAEP). Having Local Area Energy Plans (LAEP) for every Local Authority in Wales provides an opportunity for Welsh Government to aggregate the findings into a national energy plan that is coherent with local energy priorities and needs and identifies large-scale opportunities to accelerate the transition at pace and scale. Welsh Government is well-placed to:

- Develop a national energy plan using the outputs of the LAEPs and four Regional Energy Strategies which covers aspects of the energy system that Welsh Government could influence (e.g. national assets, rebalancing energy costs etc.) [E2.2]
- Utilise the findings from LAEP to influence national energy infrastructure planning to support local energy ambitions
- Understand what policy and/or institutional support might be needed to empower Local Authorities and regional public bodies to drive energy innovation at a local level.
- Work with local and regional bodies to establish an effective local-national governance framework to enable co-ordinated decision-making and monitoring.
- Scale-up local energy plans to identify gaps to enable us to plan for a system that is flexible and smart – matching local renewable energy generation with energy demand

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5. Next steps
Enabling conditions for success

Finance

For those actions that relate directly to our statutory duties as a local council and align with our immediate priorities, we will develop an investment plan to support the delivery of a Local Authority programme of works to enable the delivery of the LAEP. This may be from usual capital markets or through more innovative financing mechanisms such as community municipal investments, Pay as you Save or net-metering. Innovative finance options to be explored for individual energy consumers such as green mortgages.

For actions that are best delivered by other local, regional or national organisations, partnering and engaging with these organisations will be critical for discussing Flintshire's ambitions and how to make them investable.

Monitoring and review

This plan sets out key actions that will be taken by various stakeholders across Flintshire for the first five years to set the local area on a journey to achieve a net zero energy system. The plan needs to be flexible to adapt to changes in the future.

We will work with regional and national partners to develop a monitoring framework which builds on existing data and processes and helps us understand the progress Flintshire is making towards its committed actions and ambitions set out in this plan.

We will make use of publicly available datasets such as the Energy Performance Certificate Register[ML19], the Micro Generation Certification Scheme[ML20], the Renewable Energy Planning Database[M62] and publications such as Renewable Generation in Wales report[M61].

We will also track GHG emissions reduction, building on our existing submissions to Welsh Government for Public Sector Reporting as a starting point. We recognise that available data will lag a few years behind.

Our action routemap has been developed as a dynamic plan that recognises the influence that wider contextual changes at national and local level will have on the way we choose to transition to a net zero energy system, such as national regulation, policy and strategic plans. As a result, we expect to regularly review and update our routemap based on these dependencies.

The whole plan will be updated at least every five years to take account of key factors, including policy changes at a UK and Welsh Government level, changes in costs and the effectiveness of technologies.

Appendices

Table of figures

Reference	Description	Page number
Figure 0.0.1	LAEP and support documents purpose and audience summary	6
Figure 0.0.2	LAEP priority energy proposition areas for Flintshire	7
Figure 0.0.3	Summary of energy propositions	8
Figure 0.0.4	Flintshire's spatial representation of opportunities, including 2030 ambition and investment (million £)	11
Figure 1.0.1	LAEP landscape across Wales	16
Figure 1.0.2	Schematic of electricity and gas transmission and distribution network and the system boundary for LAEP	17
Figure 1.0.3	Schematic of the local system scope for LAEP	18
Figure 1.0.4	Geographic boundary for LAEP	20
Figure 2.0.1	Summary of cross-cutting regulation / policies at local, regional and national level	22
Figure 2.0.2	Summary of sector-specific regulation / policy at local, national and regional level	23
Figure 2.0.3	Summary of stakeholders engaged	24
Figure 2.0.4	How to read a Sankey diagram (units are GWh/year)	26
Figure 2.0.5	Sankey diagram showing energy input, conversion and output in Flintshire (GWh/year)	27

Table of figures

Reference	Description	Page number
Figure 2.0.6	Electricity consumption (MWh/year) (domestic and non-domestic properties) by substation zone across Flintshire	28
Figure 2.0.7	Major industrial loads (2019) and heat demand (2023) by substation zone across Flintshire	28
Figure 2.0.8	Transport energy consumption (combined total across cars, light goods vehicles (LGV) and heavy goods vehicles (HGV) by LSOA	29
Figure 2.0.9	Local energy generators and rooftop PV capacity (MW) by outward code	30
Figure 2.0.10	Electricity generation headroom	31
Figure 2.0.11	Electricity demand headroom	31
Figure 2.0.12	Percentage of properties that are not connected to the gas distribution network (2023)	32
Figure 2.0.13	Main heating type for properties that are not connected to the gas distribution network	32
Figure 2.0.14	Doughnut of Flintshire's GHG emissions by sector for baseline years	34
Figure 2.0.15	Doughnut of Flintshire County Council's GHG emissions for baseline financial year 2018/19	34
Figure 2.0.16	Summary of activities to date that have contributed to decarbonising the local energy system	35
Figure 3.0.1	Summary of steps taken to produce the LAEP	39
Figure 3.0.2	Summary of future energy scenarios	40

Table of figures

Reference	Description	Page number
Figure 3.0.3	A Sankey diagram for a potential future 2050 energy system	41
Figure 3.0.4	Comparison across the scenarios	42
Figure 3.0.5	Projected energy demand (GW) by sector and scenario in baseline year, 2030 and 2050	43
Figure 3.0.6	Carbon emissions ($ktCO_2e$/year) over time for each scenario	44
Figure 3.0.7	Summary of deployment of various technologies between 2023, 2030 and 2050	47
Figure 4.0.1	Summary of energy propositions and their inter-dependencies	49
Figure 4.0.2	Summary of propositions	50
Figure 4.0.3	Flintshire's spatial representation of opportunities, including 2030 ambition and investment	52
Figure 5.0.1	A local Council's roles and level of influence	67

Table of tables

Reference	Description	Page number
Table 3.0.1	GHG emissions from deployment against the Welsh Government emissions reduction targets	45
Table 3.0.2	Summary of economic impacts for each scenario	46

Glossary of terms

Term	Definition or meaning
Action	The process of doing something – a specific action assigned to a responsible person preferably with a date to be completed.
Anaerobic Digestion	Processes biomass (plant material) into biogas (methane) that can be used for heating and generating electricity.
Baseline	The baseline is the data showing the current energy system, containing the 2019 data sets provided by the LA and publicly available data.
Batteries	Devices that store electrical energy to be used at a later time.
Biomass boiler	A boiler which burns wood-based fuel (e.g. logs, pellets, chippings) to generate heat and electricity.
Carbon Capture and Storage (CCS)	The process of capturing and then storing carbon emissions before they enter the atmosphere.
Certainties	A fact that is definitely true or an event that is definitely going to take place. In terms of a local energy system, certainties include funded projects, etc.
Demand	Local energy demand that the local energy system needs to meet.
Demand headroom	The difference between the electrical capacity of a substation, and the electricity demand at the substation at the time of peak demand.
Deployment modelling	A model investigating rates by which to deploy specific technologies between the baseline year and 2050 to achieve the end state developed by the optimisation model for each scenario. The model considers broader plan objectives and local, regional, and national strategic priorities, policies, and targets to help us to define a suitable level of ambition and inform an action plan.
Dispatchable energy generation	Energy generation that can turn on and off (i.e. isn't controlled by the weather) – this is likely to be gas turbines of some sort.

Glossary of terms

Term	Definition or meaning
Distribution network	Takes energy from transmission network and delivers it to users via pipes or wires at low pressure / voltages.
Electricity network	Interconnected infrastructure which consists of power stations, electrical substations, distribution lines and transmission lines. The network delivers electricity from the producers to consumers.
Electrolyser	A piece of equipment that uses electricity to split water into hydrogen and oxygen.
Energy Proposition	A proposition is an energy component with a scale and a timescale. For instance, X MW of wind turbine to be built in 5 years, 10,000 buildings to retrofit with XX by 2030, or a pilot project such as hydrogen storage innovation. These are typically near term, low regrets energy components that are needed in future energy systems (it is likely that these appear in all scenarios).
Energy System Component	A term used to describe anything that can have a direct impact on energy demand and/or the way energy is supplied. E.g. installing retrofit measures can reduce overall heating demand, increasing solar PV capacity can change the supply mix and the way that the energy system operates.
Focus zone	A modelling zone which has been identified as an area in which to target near-term installation, upgrade, retrofit, or other activities related to a specific energy system component.
Generation	Local generation – size below 100MW.
Generation headroom	Generation headroom in a local authority's electricity distribution network refers to the remaining primary substation capacity at the time of peak generation, crucial for maintaining a stable and reliable power supply to meet the community's needs
Grid electricity	Electricity that is supplied by the electricity network.
Grid substation	The physical equipment comprising a substation with a 132kV-33kV transformer(s) connecting the grid-level, extra high voltage electricity lines to the primary-level, high voltage electricity lines. The grid substation facilitates connection with the national grid.
Heat network	A distribution system of insulated pipes that takes heat from a central source and delivers it to a number of domestic or non-domestic buildings.
Heat pump	A piece of equipment that uses a heat exchange system to take heat from air, ground or water and increases the temperature to heat buildings.

Glossary of terms

Term	Definition or meaning
Hydrogen	A flammable gas that can be burned, like natural gas, to generate heat or power vehicles. The by-product is water only, no carbon.
Infrastructure	Local energy distribution infrastructure, includes storage assets if these are at grid level.
Landfill gas	Gases such as methane that are produced by micro-organisms in a landfill site that can be used as a source of energy.
Lever	We use the term policy levers to refer to the 'governing instruments' (Kooiman, 2003) which the state has at its disposal to direct, manage and shape change in public services.
Local energy system	The distribution level energy system, excludes the transmission and national assets.
Longer-term options	The likely outcome of these is less certain and dependent upon actions and decisions being made that are not under our control, e.g. a national policy or the capability / availability of a technology.
Major industrial load	The power demand of industrial sites in the 2019 NAEI Point Sources data are large enough to be classified as major industrial loads. Sites that aren't included in this database are likely too small to have a significant impact on the energy system singlehandedly.
Methane reformation	Process of producing hydrogen by heating methane from natural gas and steam, usually with a catalyst. Produces carbon dioxide as a by product.
Modelling zone	A specified area in our modelling which is the smallest level of granularity for analysis. The zones are used through energy modelling, deployment modelling, and mapping. Zones were created by intersecting the Local Authority boundary with the primary substation service area boundary, as described in the "Methodology - electricity and gas network infrastructure" section of the Technical Report. *May also be called "zone" or "substation zone" in the reports.*
National Asset	National infrastructure (can be supply or demand and the accompanying transmission / distribution infrastructure) – defined as over 100MW, unless it produces heat which can only be used locally this is generally excluded from LAEP particularly the modelling.

Glossary of terms

Term	Definition or meaning
National grid	A generic term used in the reports referring to the electricity network serving Wales, including both the transmission and distribution networks and facilitating the flow of electricity between neighbouring areas or regions. *May also be called generically "grid" in the reports.*
National Net Zero	The National Net Zero modelled in the LAEP. Details of assumptions are in the methodology section.
Natural Heritage	This includes features which are of ecological, geological, geomorphological, hydrological or visual amenity importance within the landscape, and which form an essential part of the functioning of the natural environment and natural assets.
Net Zero	Net zero when used in this LAEP is the energy net zero as it does not include all emissions, only energy emissions.
No regrets/ low regrets	Options which are common to all scenarios, cost-effective, provide relatively large benefits, and are very likely to be important parts of the future energy system, regardless of future uncertainty.
Optimisation modelling	Modelling to create the most cost and carbon optimal system.
Option	A term used to describe ways that a particular objective can be achieved. In the context of this LAEP, an option could be deploying a particular energy system component
Outward code	The first part of a postcode i.e. BS1.
Pathway	A pathway is how we get from the current energy system, to the most likely net zero end point. The pathway will consider what is needed from across the scenarios, the supply chain, number of installers etc. The propositions will make up the more certain part of the pathway, whereas the longer-term energy components will need further definition in the future.
Primary substation	The physical equipment comprising a substation with a 33kV-11kV transformer(s) connecting the primary-level, high voltage electricity lines to the consumer-level, low voltage electricity lines.
Primary substation service area	The area bounding the buildings or other electricity demands which are served by a primary substation (or, in ANW, a group of primary substations acting together to serve one area).

Glossary of terms

Term	Definition or meaning
Programme	A series of projects, usually with a theme, that is run collectively.
Project	Strategic scale projects being implemented or planned for implementation in the local energy system that will significantly affect local demand or local supply.
Resistance heating/ heater	Generate heat by passing electrical currents through wires.
Scenario	A scenario is a set of assumptions for a particular end point (usually 2050) which are modelled in our optimisation model. We modelled 5 different scenarios to see what was common across the scenarios and therefore is a "no regrets" measure, and what changed between the modelled scenarios.
Solar PV	Convert solar radiation into electricity using photovoltaic (PV) cells.
Strategic objective	Strategic objectives are purpose statements that help create an overall vision and set goals and measurable steps to achieve the desired outcome. A strategic objective is most effective when it is quantifiable either by statistical results or observable data. Strategic objectives further the vision, align goals and drive decisions that impact change.
Strategic options	Strategic options are longer-term changes to demand, generation and infrastructure that will lead onto decarbonisation of the local energy system - and the key variables that determine scenarios.
Substation upgrades	Interventions at an existing primary substation designed to increase the capacity of the substation, such as upgrading an existing primary substation or installing a new primary substation. *May also be called 'substation interventions' in the reports.*
Supply	Energy supply options – this is how energy is delivered from the point of source – so a supply option would be solar PV.
Supply/generation headroom	The difference between the electrical capacity of a substation, and the power being supplied to the substation at a given time.
Transmission network	Move energy via pipes or wires for long distances around the country at high pressure/ voltages.
Uncertainties	Uncertainty results from lack of information or from disagreement about what is known or even knowable.
Wind power	Harnessing the kinetic energy of wind to turn a turbine to generate electricity.

Units of measure

Unit	Definition or meaning
°C	Degree(s) Celsius – a unit of temperature on the Celsius scale.
GWh	Gigawatt hour(s) – a unit of energy representing 1 billion watt-hours.
$kgCO_2e$	Kilogram(s) of carbon dioxide equivalents – a unit of measurement for greenhouse gas warming potential, expressing the equivalent weight of carbon dioxide with the same global warming potential.
$ktCO_2e$	Kilotonne(s) of carbon dioxide equivalents - a unit of measurement for greenhouse gas warming potential, expressing the equivalent weight of carbon dioxide with the same global warming potential. Represents 1 million kgCO2e.
kV	Kilovolt(s) – a unit of potential energy of a unit charge in a point of a circuit relative to a reference (ground) representing 1000 volts.
kW	Kilowatt(s) – a metric unit of power measuring rate of energy consumption or production representing 1000 watts.
kWh	Kilowatt hour(s) - a unit of energy representing 1000 watt-hours.
kWp	Peak kilowatt(s) – the maximum power rating possible produced by an energy generation source (i.e., amount of power produced in ideal generation conditions).
MW	Megawatt(s) – a metric unit of power measuring rate of energy consumption or production representing 1 million watts.
MWe	Megawatt(s) electric – a unit of electric power output from a generation source representing 1 million watts electric.
MWth	Megawatt(s) thermal – a unit of thermal power output from a generation source representing 1 million watts thermal.
MWh	Megawatt hour(s) - a unit of energy representing 1 million watt-hours.
tCO_2 per capita	Tonne(s) of carbon dioxide per capita – a unit of mass of carbon dioxide emitted per member of a population per year. Represents 1000 $kgCO_2$ per capita.

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Local Area Energy Plan (LAEP)

Technical Report

Abbreviations

Acronym	Definition or meaning
ANW	Ambition North Wales.
BEIS	Business, Energy and Industrial Strategy.
CAPEX	Capital Expenditure.
CCGT	Combined Cycle Gas Turbine.
CCR	Cardiff Capital Region.
COP	Coefficient of Performance.
DESNZ	Department for Energy Security and Net Zero.
DFES	Distribution Future Energy Scenarios.
DfT	Department for Transport.
DNO	Distribution Network Operator.
EfW	Energy from Waste.
EPC	Energy performance certificate.
ESC	Energy Systems Catapult.
EV	Electric Vehicle.

Acronym	Definition or meaning
GHG	Greenhouse Gas.
HGV	Heavy Goods Vehicles.
LAEP	Local area energy planning or Local area energy plan.
LGV	Light Goods Vehicles.
LSOA	Lower super output area, a small area classification in the UK designed to have a comparable population.
LULUCF	Land Use, Land Use Change and Forestry.
MSOA	Middle super output area, a medium-sized area classification in the UK designed to have a comparable population.
NAEI	National Atmospheric Emissions Inventory.
NGED	National Grid Electricity Distribution.
NZ	Net Zero.
NWTM	North Wales Transport Model.
OPEX	Operational Expenditure.
RFI	Request for Information.

Abbreviations

Acronym	Definition or meaning
RIIO	Revenue = Incentives + Innovation + Outputs, a regulatory framework used by the UK energy regulator, Ofgem.
SDP	Strategic Development Plan.
SMR	Steam Methane Reformation.
SPEN	SP Energy Networks.
SSE	Scottish and Southern Energy plc.
TfW	Transport for Wales.
WWU	Wales and West Utilities.

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Contents

Abbreviations		2
Table of figures		5
Table of tables		11
1	Introduction	14
2	Stakeholder engagement	20
3	The current energy system	25
4	The future energy system	56
5	Action planning	107
Appendices		132

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Table of Figures

Reference	Description	Page number
Figure 1.1.1	Summary of LAEP reports' purpose and audience	16
Figure 1.1.2	Progress made in the development of LAEPs across Wales	18
Figure 1.1.3	Illustration of transmission and distribution of gas and electricity from supply to consumer, and what parts of this system are included in the system boundary for LAEP	19
Figure 1.1.4	Location of the North Wales economic region (red) and the LAEP system boundary for Flintshire (purple)	20
Figure 3.1.1	Process of mapping primary substation service areas to the local authority boundary	28
Figure 3.1.2	Map of substation zones in Flintshire	29
Figure 3.1.3	Estimated annual mileage (million miles / year) for all vehicles in Flintshire by substation zone (2019)	32
Figure 3.1.4	Comparison of modelling data to DfT road traffic statistics	33
Figure 3.1.5	Annual transport energy consumption; our analysis based on TfW data compared to DESNZ sub-national fuel consumption statistics	34
Figure 3.2.1	Map showing the boundary of Flintshire	40
Figure 3.2.2	Fuel poverty in Flintshire in 2019	41
Figure 3.2.3	Index of Multiple Deprivation by LSOA in Flintshire in 2019	41
Figure 3.2.4	CO_2 emissions by sector in 2023, excluding LULUCF	42

Table of Figures

Reference	Description	Page number
Figure 3.2.5	CO_2 emissions by fuel in 2023, excluding LULUCF	42
Figure 3.2.6	How to read a Sankey diagram	43
Figure 3.2.7	Baseline Sankey diagram, representing energy flows in Flintshire in GWh/year (2023)	44
Figure 3.2.8	Distribution of domestic properties by archetype	45
Figure 3.2.9	Distribution of non-domestic properties by archetype	46
Figure 3.2.10	Monthly buildings energy profile for Flintshire (2023)	47
Figure 3.2.11	Electricity consumption (GWh/year) (domestic and non-domestic properties) by substation zone across Flintshire (2023)	48
Figure 3.2.12	Major industrial loads (2015) and heat demand (2023) by substation zone across Flintshire.	48
Figure 3.2.13	Proportion of domestic homes by EPC rating in Flintshire by LSOA. (2023)	49
Figure 3.2.14	Energy efficiency of domestic properties across Denbighshire, rated EPC A-C and EPC D and below (2023)	49
Figure 3.2.15	Total mileage (million miles / year) by vehicle type (2019)	50
Figure 3.2.16	Public EV chargepoints registered on the National Chargepoint Registry across Flintshire	51
Figure 3.2.17	Transport energy consumption (combined total across cars, light goods vehicles (LGV) and heavy goods vehicles (HGV) by LSOA (2019)	51

Table of Figures

Reference	Description	Page number
Figure 3.2.18	Major industrial loads (2019) and heat demand (2023) by substation zone across Flintshire.	52
Figure 3.2.19	Local energy generators. Data is based on Energy Generation Wales (2019) and Renewable Energy Generation Database (2019)	54
Figure 3.2.20	Electricity demand headroom	55
Figure 3.2.21	Electricity generation headroom	55
Figure 3.2.22	% of properties that are not connected to the gas distribution network across Flintshire (2023)	56
Figure 3.2.23	Main heating type of domestic buildings that are not connected to the gas distribution network across Flintshire (2023)	56
Figure 4.1.1	Summary of future energy scenarios	60
Figure 4.1.2	Optimisation modelling input data and desired outputs	62
Figure 4.1.3	Technologies included in optimisation modelling	64
Figure 4.1.4	Areas suitable for wind and solar development	70
Figure 4.1.5	Modelled electricity flow for each zone	71
Figure 4.1.6	Heat sources identified, with top five sites named and capturable heat output noted in MW	74
Figure 4.2.1	Annotated Sankey diagram showing energy flows under the National Net Zero scenario (GWh in 2050)	76

Table of Figures

Reference	Description	Page number
Figure 4.2.2	Annotated Sankey diagram showing energy flows under the Low Demand scenario (GWh in 2050)	77
Figure 4.2.3	Annotated Sankey diagram showing energy flows under the High Demand scenario (GWh in 2050)	78
Figure 4.2.4	Annotated Sankey diagram showing energy flows under the High Hydrogen scenario (GWh in 2050)	79
Figure 4.2.5	Monthly electricity generation and consumption in the High Demand scenario	81
Figure 4.2.6	Proportion of heat supplied to buildings by technology in 2050 for each scenario	82
Figure 4.2.7	Map showing the number of additional triple glazing fittings completed by 2050 by substation zone in the Low Demand scenario	84
Figure 4.2.8	Map showing the number of solid wall insulation measures fitted by 2050 by substation zone in the Low Demand scenario	85
Figure 4.2.9	Map showing the number of additional cavity wall insulation measures fitted by 2050 by substation zone in the Low Demand scenario	85
Figure 4.2.10	Map showing the number of additional loft insulation measures fitted by 2050 by substation zone in the Low Demand scenario	86
Figure 4.2.11	Map showing the number of additional floor insulation measures fitted by 2050 by substation zone in the Low Demand scenario	86
Figure 4.2.12	Map of identified zones for heat network potential in a high demand scenario	87
Figure 4.2.13	Total annual vehicle miles by scenario and vehicle type	88
Figure 4.2.14	Future capacity of onshore renewables in each scenario	89

Table of Figures

Reference	Description	Page number
Figure 4.2.15	Map of electricity network upgrades in the high demand scenarios	91
Figure 4.2.16	Trends from optimisation model runs	94
Figure 4.3.1	Change in total energy demand by scenario (GWh)	97
Figure 4.3.3	Projected electricity and heat demand for buildings in each scenario	98
Figure 4.3.3	Projected energy demand from road vehicles by scenario	99
Figure 4.3.4	GHG emissions (ktCO2e) over time for each scenario compared to the Do Nothing scenario	101
Figure 5.1.1	Overview of the approach taken to develop the near-term recommendations for the LAEP	108
Figure 5.1.2	Summary of energy propositions	110
Figure 5.1.3	Flintshire's spatial representation of opportunities, including 2030 ambition and investment (million £) – in Low and High scenarios	112
Figure 5.1.4	Focus zone rankings for domestic insulation retrofits by modelling zone	113
Figure 5.1.5	Focus zone rankings for heat pump installations across Flintshire by modelling zone	114
Figure 5.1.6	Baseline fraction of homes without gas heating in Flintshire	114

Table of Figures

Reference	Description	Page number
Figure 5.1.8	Focus zone rankings for EV chargers by modelling zone	118
Figure 5.1.9	Future car mileage in 2050 by substation zone	118
Figure 5.1.10	Summary of scale of renewables deployment across scenarios	119
Figure 5.1.11	Areas suitable for wind and ground-mounted solar PV development in Flintshire and substation generation headroom (MW)	120
Figure 5.1.12	Focus zone rankings for rooftop solar PV by modelling zone	121
Figure 5.1.13	Focus zone rankings for ground-mounted solar PV by modelling zone	121
Figure 5.1.14	Focus zone rankings for onshore wind by modelling zone	121
Figure 5.1.115	SPEN's annual DFES process (credit: SPEN)	122
Figure 5.1.16	Map showing where substation interventions will be required by 2050 if the rest of the plan is followed	123

Table of tables

Reference	Description	Page number
Table 1.1.1	Summary of content in Local Area Energy Plan and Technical Report	17
Table 2.1.1	Overview of engagement activity for identified stakeholder groups	23
Table 2.1.2	Groups of stakeholders engaged at each stage of the LAEP process	25
Table 3.1.1	Electricity and gas network infrastructure – data sources	28
Table 3.1.2	Baseline data sources (buildings)	30
Table 3.1.3	Demand differences between sub-national energy consumption statistics and building profiles	31
Table 3.1.4	Summary of building archetypes used	31
Table 3.1.5	Baseline data sources (transport)	35
Table 3.1.6	Baseline data sources (industry)	36
Table 3.1.7	Baseline data sources (local energy generation)	37
Table 3.1.8	Baseline emission factors (local energy generation)	38
Table 4.1.1	Technology parameters	63
Table 4.1.2	Assumptions for domestic buildings in each future energy scenario	65

Table of tables

Reference	Description	Page number
Table 4.1.3	Assumptions for non-domestic buildings in each future energy scenario	66
Table 4.1.4	Assumptions for vehicle fuel type in each future energy scenario	67
Table 4.1.5	Assumptions for future transport energy demand in each future energy scenario	68
Table 4.1.6	Summary of assumptions related to hydrogen demand applied to future energy scenarios	72
Table 4.2.1	Comparison across the scenarios	80
Table 4.2.2	Proportion of homes with insulation measures	83
Table 4.2.3	Existing and maximum future capacity of onshore renewables	90
Table 4.2.4	Impact of key sensitivities on the future local energy system	93
Table 4.3.1	Summary of data sources used to inform deployment modelling	96
Table 4.3.3	GHG emissions reduction for each scenario compared to the Welsh Government emissions reduction targets	101
Table 4.3.4	Summary of economic impacts for each scenario: employment impacts and air quality activity costs	102
Table 4.3.5	Air quality activity cost factors	103

Table of tables

Reference	Description	Page number
Table 4.3.6	Summary of economic impacts for each scenario: employment impacts and air quality activity costs	104
Table 4.3.7	Indicative investment requirements	106
Table 5.1.1	Summary of feedback from workshop 5 (pathway prioritisation) – “prioritising energy system components”	109
Table 5.1.2	Input data and relative weighting factors used in “plan on a page” calculations	111
Table 5.1.3	Investment costs for the Scaling zero carbon buildings proposition for 2050	115
Table 5.1.4	Investment costs for the Decarbonising transport proposition for 2050	117

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Chapter 1: Introduction (stage 1)

1. Introduction

Introduction to Technical Report

Flintshire's Local Area Energy Plan (LAEP) provides an evidence-based plan of action that identifies the most effective route to a net zero local energy system for an area. This LAEP has been developed by bringing local organisations and groups together to discuss the evidence created as part of the development process and collectively agree on the best way forward to achieve this objective.

Applying this approach, a LAEP puts local needs and views at the centre of the planning process, and helps creates a co-ordinated, place-based plan that avoids the duplication of efforts, aims to save money, and realises additional social benefits that might otherwise have been over-looked.

The LAEP has been divided into two separate documents to make the content accessible to a variety of audiences and to make it easier for readers to find what they are looking for:

This is the **Technical Report**, which contains the graphs, charts, maps and supporting data for the results published in the LAEP. It also provides more detail about the approach to the modelling and scenario analyses that we completed.

The **Local Area Energy Plan** focuses on Flintshire's local energy strategy and action plan.

The report is structured so that it follows the seven-staged development process outlined in ESC's LAEP Guidance[T01]. It includes additional supporting information related to stages 1-5, which are categorised into the introduction (Stage 1-2), the current energy system (Stage 3) and the future energy system (Stages 4-7). The table overleaf summarises what is included in this report and the Local Area Energy Plan in more detail.

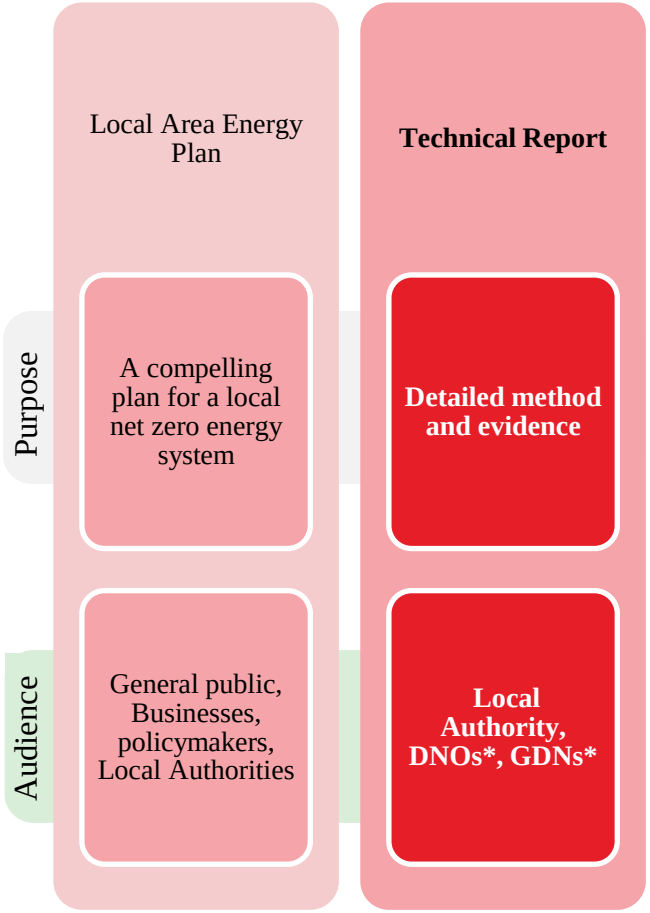

Figure 1.1.1: Summary of LAEP reports' purpose and audience. *DNO – electricity distribution network operator, GDN – gas distribution network operator

Summary of content in Local Area Energy Plan and Technical Report

	Stage	Included in the Technical Report	Included in the Local Area Energy Plan
Introduction	1	• Overview of LAEP programme • Process of preparing to create LAEP, identifying resources, appointing lead organisation and agreeing roles.	• Overview of LAEP programme
	2	• Summary of stakeholder identification process • Overview of stakeholder engagement plan	• Summary of stakeholder engagement
The current local energy system	3	• Data sources used to inform the energy system baseline • Detailed definition of the system boundary and scope of assessment • Assumptions used to define the energy system baseline • Additional analysis not included in Local Area Energy Plan • Local, regional and national policy review	• Summary of energy system baseline • Summary of local, regional and national policy drivers for LAEP
The future local energy system	4	• Modelling approach for scenario analysis • Assumptions applied: cost, network dependencies • Sensitivity analysis results • Comparing scenarios and defining energy propositions	• Description of scenarios • Summary of key outputs and aspects of scenarios such as cost, emissions savings, energy savings and impact on networks • Defining energy propositions
	5	• Modelling approach for deployment model • Illustration of focus zones for each energy proposition across buildings, industry, transport and renewable generation • Describing deployment rates for different technologies related to each energy proposition across buildings, industry, transport and renewable generation • Opportunities with neighbouring local areas / regional	• Summary of deployment pathways for each scenario and setting level of ambition • Illustration of key focus zones for each energy proposition across buildings, industry, transport and renewable generation, with an indication of deployment from deployment modelling
Action Plan	6 - 7	• Analysis and evidence to support implementation for each energy proposition	• Action plan routemap • Details of near-term actions • Details of enabling actions, such as upskilling, funding

Table 1.1.1: Summary of content in Local Area Energy Plan and Technical Report

1. Introduction

The energy transition across Wales

The Welsh Government's "Net Zero Wales" plan[T02] establishes an increased level of ambition on decarbonisation, with a legally binding target to reach net zero emissions by 2050. It is the first national government to fund the roll-out of LAEP to all its local authorities. The programme is being co-ordinated through a regional approach, where LAEPs are being developed for local authorities in Mid Wales, South West Wales, North Wales and the Cardiff Capital Region. Several suppliers have been selected to produce the LAEPs for each region, as detailed in the map.

To contribute to the Welsh Government's commitment of producing a "National Energy Plan" in 2024, upon completion of the LAEP programme Energy Systems Catapult[T03] will aggregate the LAEPs into a national view. To support this task, they are working with the Welsh Government to create and import standardised LAEP outputs for aggregation into the DataMapWales platform[T04]. The Catapult is also providing technical advisory support to the Welsh Government throughout the programme.

The LAEPs will also form the basis of the 'National Energy Plan' Welsh Government have committed to produce in 2024.

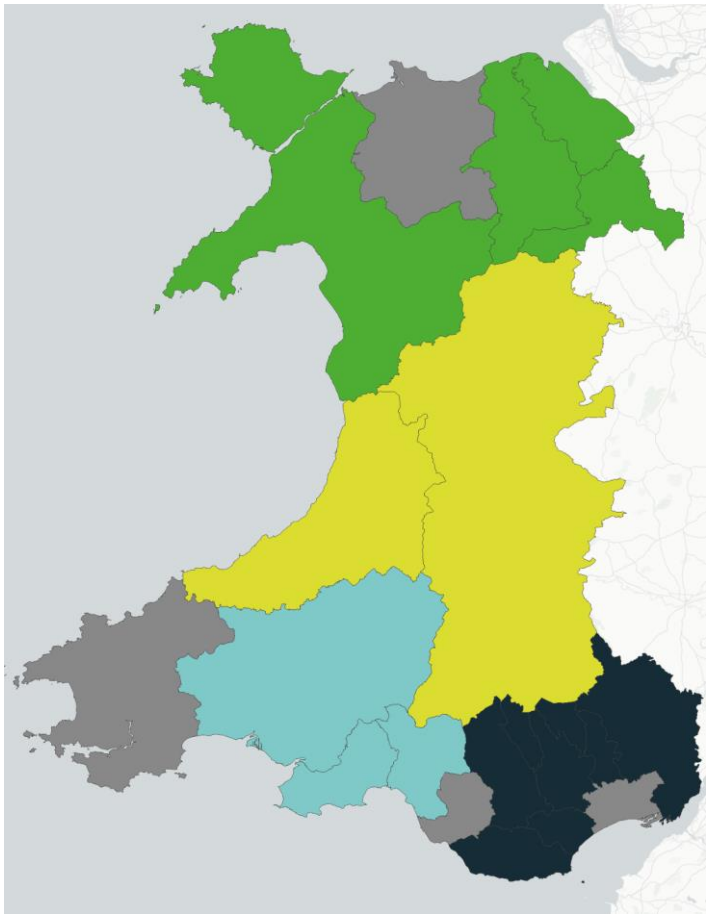

Figure 1.1.2: Progress made in the development of LAEPs across Wales

The local energy system

A LAEP considers energy use, supply and generation within the council boundary.

There are three core parts to the local energy system:

Infrastructure – The physical assets associated with the energy system such as electricity substations.

Supply – Generation (renewable and non-renewable), storage and distribution of energy to local consumers for use in homes, businesses, industry and transport.

Demand – The use of energy driven by human activity e.g. petrol/diesel used in vehicles, gas burned for heat in homes is required for the energy system to operate.

Fuel for transport, heat and power in buildings and heat and power for industrial processes and other energy needs are considered together in the planning process to ensure that the interactions and dependencies between the generation and use of different energy sources across different sectors are fully considered. This can also help to identify where different systems can work better together to improve the overall resilience and flexibility of the energy system.

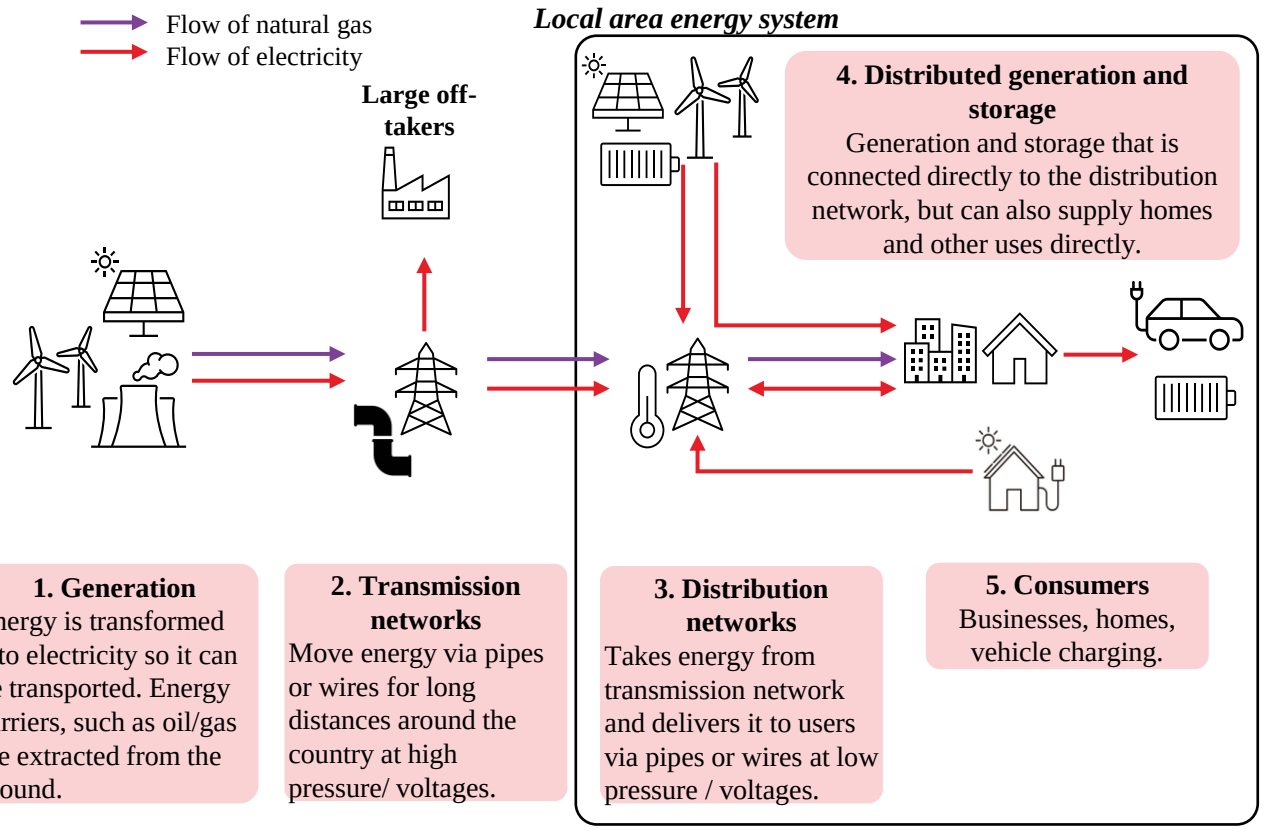

Figure 1.1.3: Illustration of transmission and distribution of gas and electricity from supply to consumer, and what parts of this system are included in the system boundary for LAEP

1. Introduction
The local energy system

Boundary

The LAEP is a plan to support the transition of the local energy system to net zero, and therefore requires an understanding of the emissions produced by the local energy system as well as energy supply, use and infrastructure. To do this, the geographic boundary was used to set the boundary of the study, which meant that any energy generating assets, energy use and infrastructure in that boundary was considered for inclusion in the LAEP.

Scope

The scope of the LAEP was then determined based on NSC's LAEP Guidance[T03]. The Guidance states that certain energy assets should be considered national rather than local, where the asset serves the wider energy needs of the UK. Considering this, electricity connection at lower voltages (132kV / 33kV / 11kV) was defined as "local" and included in the modelling for the LAEP. Any assets connected at higher voltages (400kV / 275kV) or with capacities > 100 MW were considered "national" and excluded from the modelling unless otherwise specified. This includes, for example, Connah's Quay Power Station.

If local government has control over the siting of generation/production and associated infrastructure (e.g. through the planning process) then it is local energy production. When permitting for siting and construction is controlled by national organisations (e.g. for offshore wind) then it is national energy production. Energy generation should be considered local where the key input to energy production is a local resource. Energy generation where the key resource comes from outside the local area (e.g., imported biomass) should be considered part of the national energy system.

Like the above, any demand connected to the transmission network is excluded, as we are focused on the local distribution network.

The scope of the LAEP also excludes energy use in shipping, aviation, exports, military transport, and oil refineries because they are considered national decarbonisation challenges and should be addressed by central Government.

Emissions

Emissions from sources that are not related to the energy system are excluded. This includes emissions from land use, land use change and forestry, industrial processes and waste and wastewater treatment processes. Please refer to Appendix B1 for a summary of emissions in scope.

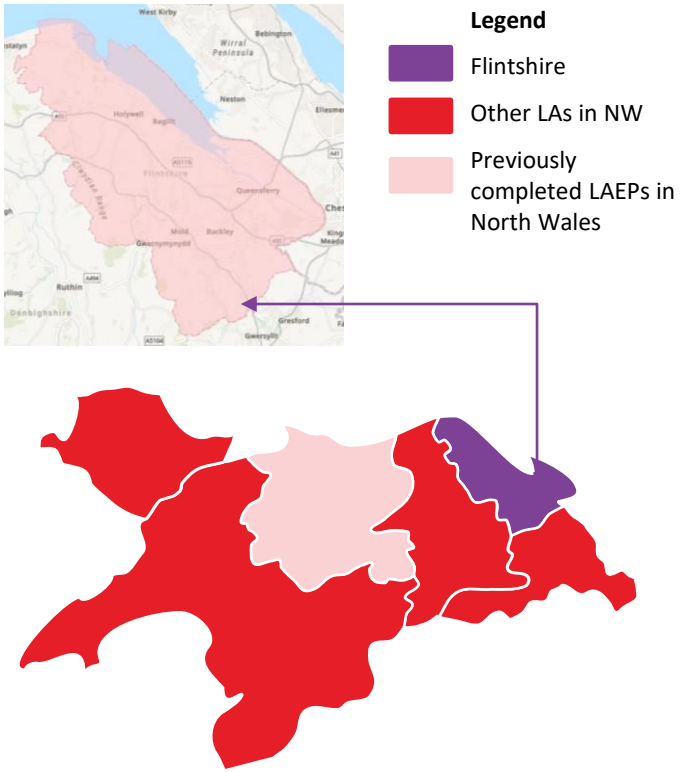

Figure 1.1.4 Location of the North Wales economic region (red) and the LAEP system boundary for Flintshire (purple)

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Chapter 2: Stakeholder engagement (stage 2)

2. Stakeholder engagement

Stakeholder identification process

This section provides a detailed overview of the stakeholder identification and prioritisation process. It describes the methodology and definitions used to understand and identify the stakeholders relevant to a local authorities.

1. Stakeholder definitions and roles

Specific definitions and roles are included in the introduction (see Table 2.0.0 overleaf). Our approach was particularly guided by the imperative to involve a broad cohort of secondary stakeholders with specific local knowledge, experience and / or influence over the local energy system within the local authority area. As LAEP is a whole systems approach at the local authority level, so we needed individuals from a broad range of stakeholder organisations with the appropriate level of local expertise and local knowledge. To avoid stakeholder fatigue and to ensure we addressed regional synergies we created the additional regional secondary stakeholder group described in the introduction.

2.Stakeholder identification and mapping

A pre-developed stakeholder mapping tool was provided to each local authority to collect stakeholder data, both for organisations and appropriate target individuals. These were reviewed with the LAEP programme teams so that their wider knowledge of the local energy system and potential stakeholders could be used to jointly iterate and continuously improve the final stakeholder map. The mapping tool was then used to allocate identified stakeholders to either a primary or secondary stakeholder role based on a scoring schema that reflected their respective knowledge and influence of the local energy system.

3. Stakeholder engagement planning

We reviewed the scored stakeholder lists with each Local Authority and ANW and using the results from the analysis completed in stage 3, we ensured that where possible, stakeholders that represented key components of the local energy system were considered, for example, where industry is a key component, stakeholders were identified.

4. Limitations and mitigation

Some limitations applied to our stakeholder mapping, and we undertook mitigations to address them as far as possible:

1. Knowledge within the local authority team of the local energy system and participants with high levels of local knowledge and / or local influence. Mitigated through iterative reviews of the developing stakeholder mapping and inclusion of the wider programme team's local knowledge and experience of stakeholders across all relevant sectors in each local authority.
2. Sufficient data and information on stakeholder organisations was needed to identify appropriate individual(s). Mitigated by networking with participants, continuous improvement, promotion of LAEPs locally.

2. Stakeholder engagement

Stakeholder identification process

Stakeholder group	Organisations	Role in LAEP development	Method of engagement
Primary stakeholders	Local Authority officers, council member(s), energy network operators i.e. Distribution Network Operators, (DNOs) and Gas Distribution Networks (GDNs).	Responsible for the creation of the LAEP, as well as having executive decision-making powers. Contribute existing and future policies and programmes relevant to the LAEP.	Steering groups, workshops, bi-weekly meetings, emails, 121 interviews
Secondary local stakeholders	Other local government organisations, major energy users, organisations with influence over and / or local knowledge of specific energy system components (e.g. developers, housing associations), community energy organisations, local organisations active in net zero and decarbonisation, transport sector organisations	Responsible for shaping the direction and actions collectively agreed in the LAEP. Contribute advice and guidance to the LAEP programme given influence over and / or local knowledge of specific element(s) of the local energy system, e.g. share details of existing programmes and projects.	Interactive workshops
Secondary regional stakeholders	Transmission network operators, transport providers, housing associations, growth deal organisations, landowners, national parks, further education, public bodies or national organisations (e.g. TfW) with a regional influence, trade organisations.	Responsible for shaping the actions and considering opportunities to deliver at scale across local authority boundaries by providing advice and guidance given regional influence and / or knowledge of specific elements of the regional energy system.	Interactive workshops
Technical advisors for LAEP	Energy Systems Catapult (ESC).	Ensuring a consistent approach is taken to the development of LAEPs in Wales.	Monthly meetings and invited to attend all workshops

Table 2.1.1: Overview of engagement activity for identified stakeholder groups

2. Stakeholder engagement

Overview of stakeholder engagement plan

This section describes the methodology used to engage with primary and secondary (local and regional) stakeholders throughout the programme.

1. Contract meetings

As part of the overarching programme, a national forum brought together all suppliers, local authority leads, the regional leads, Welsh Government and the Technical Advisor to share learnings and maintain a consistent approach across Wales. The suppliers and regional leads also had regular catch ups to share assumptions and challenges.

We held regional steering groups for Cardiff Capital Region/North Wales, attended by the regional and local authority leads, as well as bi-weekly meetings with the local authority leads.

2. Interactive, online workshops

Interactive online workshops were used as the primary means of engaging with both primary and secondary stakeholders. The benefits of using them included: reduced time commitments for participants ensuring attendance was maximised, the interactivity of workshops allows participants to contribute dynamically, e.g. verbally, chat, Miro boards, enabling a broader data collection via these interactive tools, and the ability to cost effectively deliver multiple workshops. As well as enabling local workshops to be delivered the use of virtual workshops meant regional stakeholder workshops were easier to convene.

3. Approach to workshops

The purpose of each of the interactive workshops were tailored to the objectives of respective stage of the LAEP. Agendas were constructed to deliver the purpose(s), see Table 2.0.1 overleaf. For each agenda item a clear aim was set that supported achievement of one or more of the workshop's purpose. Using the research question(s) and / or outcome needed to achieve the aim presentation material, exercises, facilitation material and appropriate means of data collection were created.

4. Workshop data collection, analysis and synthesis

Appropriate means of data collection were used to ensure a complete and accurate record of participants responses was made. These included:

- Workshop recordings
- Chat transcripts
- Workshop exercises requiring inputs in response key research questions best presented and facilitated visually used Miro boards
- Post-workshop emails and follow-up interviews

Analysis, evaluation and synthesis of data was undertaken to achieve the workshop outcomes. Examples include: identification of comments relating to missing data in material presented, evaluation and synthesis of the data to identify key themes emerging from a synthesis of collected data.

5. Limitations and mitigation

Some limitations applied to our methodology, and we undertook mitigations to address them as much as possible:

Potential risk of a lack of structure to the data collection given the open discursive nature of workshops. Mitigated through clear workshop briefings, purpose(s), agenda and sound facilitation to ensure participants had a range of opportunities to contribute and group discussions remained focussed on the research questions.

Potential risk participants have a personal preference for text based or commercial reason for not contributing comments in an open forum. These were mitigated through the use of chat, and facilitation introducing chat comments on participants behalf, and the opportunity to contribute for an extended period after the workshop by email.

2. Stakeholder engagement

Regional
Local

Overview of stakeholder engagement plan

LAEP stages>>	1	2	3	4	5	6	7
Objectives / Purposes	Governance set-up. Identify relevant regional policy and strategic drivers for work and create objectives Review stakeholder mapping	Review constituents of the local energy system Review the local energy system baseline. Review potential scenarios	Agree regional scenarios to be used in the LAEP modelling Identify local scenarios for each LA Review regionally consistent assumptions for LAEP modelling	Review potential futures for the local energy system Determine 'low regrets' near-term propositions Understand local barriers and enablers	Review near-term, low regrets propositions Share deployment pathways to net zero. Identify local and regional actions and responsibilities	Identify opportunities for regional collaboration and focus from local discussions.	Launch of LAEP report
Key outputs	Objectives for the LAEP Stakeholder mapping refined	Set local strategic energy objectives, local policy drivers.	Agree four future energy scenarios, as well as a reference “do-nothing” scenario.	Identify low-regrets, near term energy propositions.	Agree collective action to address barriers to delivering energy propositions locally	Agree regional actions and responsibilities to support the delivery of the local propositions	Final comments
Technical advisor							
Primary							
Regional							
Secondary							

Table 2.1.2: Groups of stakeholders engaged at each stage of the LAEP process

Technical report

Chapter 3: The current energy system (stage 3)

Methodology

3. The current energy system

Methodology overview

This section provides a detailed overview of the energy system baseline, and describes the methodology and assumptions used to understand current energy infrastructure, what types of energy are used, what technologies are used to convert it from one form to another (e.g. heat) and how much is consumed.

1. Data collection

We compiled energy consumption data and the capacities for existing energy generators across Flintshire from local and regional sources, prioritising the highest level of granularity possible. We circulated a Request for Information (RFI) to the Local Authority to gather council-owned datasets and policy documents to inform the broader context for renewable energy in the area. Sectoral datasets were sourced through other organisations such as Transport for Wales (TfW), distribution network operator (DNO) and the gas distribution network operators (GDN) where relevant. Publicly available data sources and existing databases were also used where appropriate. The resulting dataset comprised of six core modules; buildings, transport, industry, renewable energy, heat networks, and energy supply infrastructure. Detailed methodologies for each of these modules are outlined overleaf.

We collected baseline data for 2023 to include the most up to date data for housing stock and renewable generation installations. The exception to 2023 datasets was for transport (2019 for North Wales) and industry data (2019). Transport and industry datasets are the least likely to have changed in terms of electrification over the years 2019 to 2023, and transport is the most likely dataset to have changed due to COVID-19.

2. Data validation

The calculated results were cross-referenced with existing datasets to evaluate their accuracy. This validation process was essential to understand any discrepancies between datasets and ensure the overall precision of our reporting. The Department for Energy Security and Net Zero's (DESNZ) (formerly BEIS) sub-national total final energy consumption dataset[T05] formed the main source of validation, with other datasets also considered for other emission sources.

3. Data analysis

Maps were generated to present spatial information related to the current energy system to support analysis.

1. **Context:** maps showing socioeconomic and energy efficiency data.
2. **Demand:** maps showing electricity, heat/gas and transport demand data.
3. **Infrastructure:** maps showing primary substation demand headroom, generation head and the proportion of properties that are not connected to the gas.
4. **Supply:** maps showing energy generators.

Methodology – electricity and gas network infrastructure

Electricity

Capacity data was combined with the corresponding primary substation service area, assigning primary substation capacity and headroom to each service area.

Each 11kV cable was mapped to a primary substation, and then to a Local Authority boundary. Where primary substation service areas intersected one or more Local Authority boundaries, they were divided into smaller modelling zones at the boundary. The capacity of the primary substation was then distributed proportionally among its constituent modelling zones based on the modelling zone's area as a fraction of the primary substation service area.

In some cases, these primary substation did not have corresponding capacity and/or headroom. For modelling purposes, they were assigned an unlimited capacity.

For five small areas in the North Wales region, there was no data provided. These areas with data gaps were referred to as modelling zones, with an unlimited capacity for modelling purposes.

Exclusions

This piece of analysis only considers the distribution network, as the transmission network is considered a national asset and therefore out of scope of the LAEP.

Gas

We used the percentage of off-gas homes derived EPC data[T07] to understand the extents of the existing natural gas service area. The EPC data contains address-level statistics for around 60% of homes, including information on heating type. The percentage of off-gas homes in the current system is the proportion of domestic EPC records that are not heated by natural gas. To extrapolate the on- or off-gas designation to buildings without an EPC rating, we created building archetypes and extrapolated the statistics using a nearest-neighbour extrapolation method.

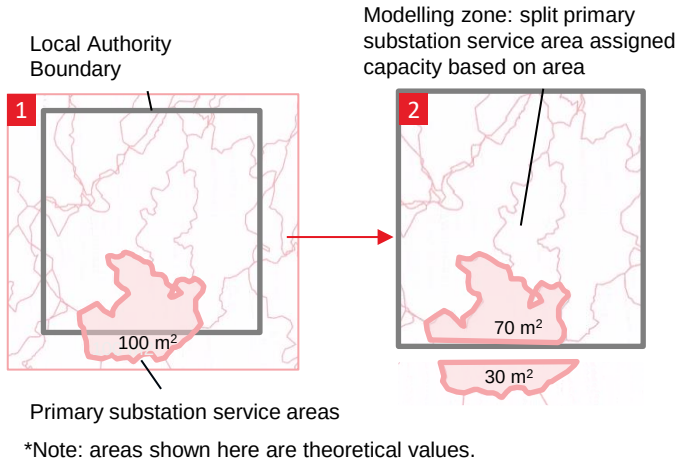


Figure 3.1.1: Process of mapping primary substation service areas to the local authority boundary

Data input	Data source	Data type	Data quality
Primary substation service areas and headroom	SPEN Open Data Portal[T06]	Primary	Five small areas in the north Wales region were not included within any SPEN substation zones.
Off-gas grid homes	EPC data[T07]	Primary	Heating-type data available for ~60% of homes

Table 3.1.1: Electricity and gas network infrastructure – data sources

Methodology – electricity and gas network infrastructure

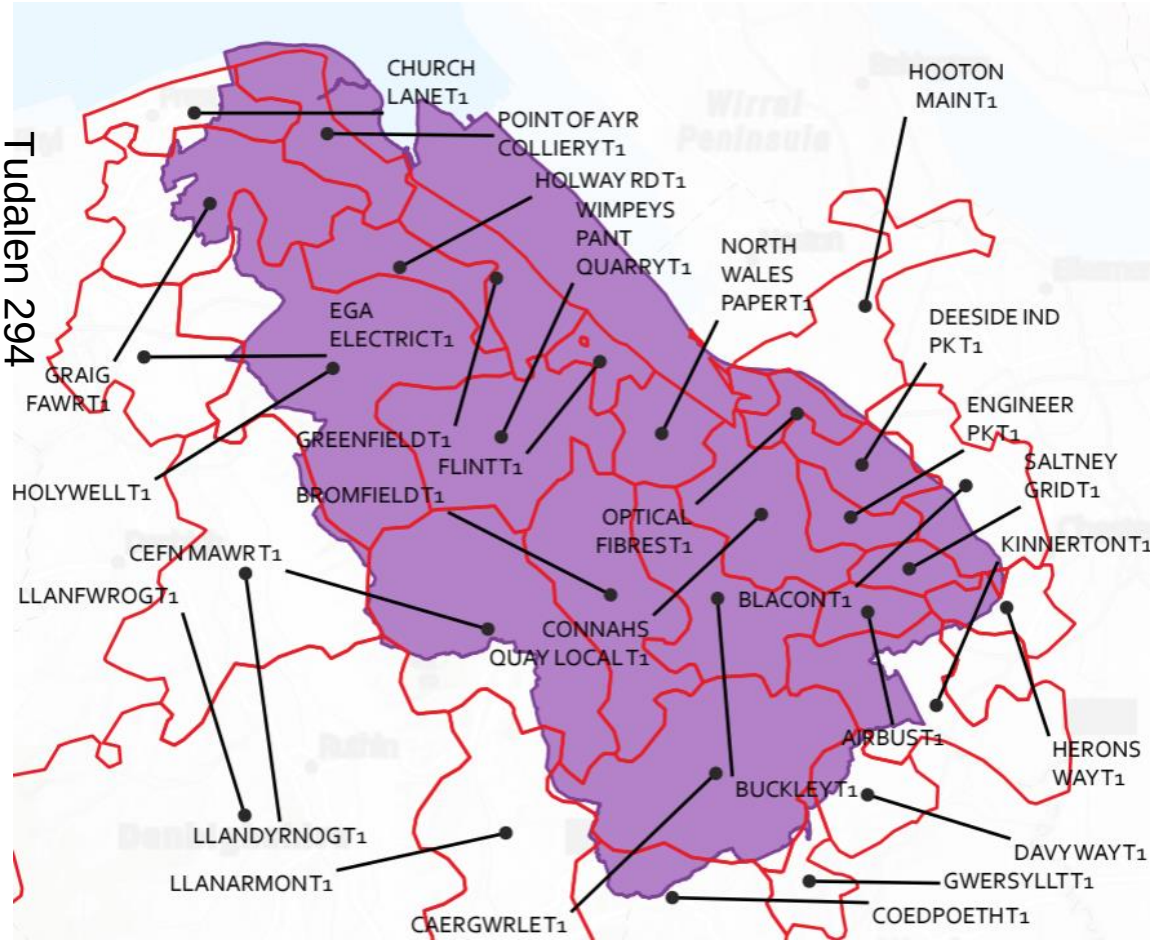


Figure 3.1.2 shows the geographic boundary of Flintshire county borough (purple) which is also the boundary used for Flintshire's LAEP. The primary substation service areas that supply energy within the geographic boundary are shown in red. Where primary substation service areas intersected one or more Local Authority boundaries, they were divided into smaller modelling zones. Most of the analysis, results, and maps in this report are presented in terms of these smaller modelling zones, which may also be called "substation zones" or simply "zones."

Figure 3.1.2: Map of substation zones in Flintshire

Methodology – buildings energy demand

Carbon Trust has a well-established address-level database that uses a "bottom-up" approach for both domestic and non-domestic properties. The Carbon Trust's address-level model enables a more accurate assessment of building-level energy demand and provides a detailed platform for assessing decarbonisation measures and scenarios.

We created an address-level database for this assessment by combining energy performance certificate (EPC) and council data with Ordnance Survey (OS) AddressBase[T08].

For properties with no EPC record, we extrapolated insulation statistics at the postcode level. See Appendix B3.

Where possible, we supplemented this database with council-supplied data to improve the accuracy of energy consumption statistics.

Data input	Data source	Data type	Data quality
Address-level attribute data (property type, insulation, construction age, heating fuel etc.)	Domestic & non-domestic EPC, display energy certificates (DEC)[T07]	Primary	Approximately 60% of building stock covered. Attributes extrapolated to remaining buildings based on closest neighbours. Last updated April 2023.
Outline polygons for buildings (GIS mapping)	OS AddressBase Plus[T08]	Primary	Quality assured by GeoPlace and contains the most extensive and accurate information available. Last updated April 2023.
Gas and electricity consumption data	Council-supplied data	Primary	Council-owned stock only.
Domestic heat and electricity demand profiles	Profiling tool commissioned by NGED and developed by Hildebrand[T09]	Secondary	Uses data from approximately 10,000 smart meters from across the UK categorised by archetype to estimate average electricity and heat demand profiles.
Non-domestic heat, electricity and cooling profiles	CIBSE non-domestic electricity and gas benchmarks[T10] and Arup's normalised profiles	Secondary	Building profiles used have been tested against other buildings of the same type.

Table 3.1.2: Baseline data sources (buildings)

3. The current energy system

Methodology – buildings energy demand

We categorised all domestic and non-domestic properties into a numbered list of archetypes based on the following parameters:

- Property type and built form (e.g. Detached house, top floor flat)
- Construction age (before/after 1930)
- Level of insulation
- Prevalence of building type in Wales

An archetype is assigned the median or most common attributes of all properties in the archetype category. E.g. the median attributes for archetype 1 are cavity wall (filled); insulated loft; uninsulated solid floor; 38kWh/m^2 electricity demand; and 114kWh/m^2 annual heat demand.

Data validation

We generated building profiles at the archetype level and aggregated to Local Authority area to compare the annual consumption with DESNZ's sub-national energy consumption statistics[T05].

Differences are expected between this dataset and this approach due to the difference in scope, boundary, technology efficiencies, occupancy and consumer behaviour. The DESNZ's sub-national statistics[T05] are therefore used to sense check our results and scale the fuel consumption where the difference is high Consumption taken from DESNZ's statistics[T05] is 13% lower per domestic address than the bottom-up generated profiles for electricity. One possible reason for the difference is occupancy – the bottom-up method assumes all properties are occupied, which is important for sizing a 2050 electricity network.

For non-domestic consumption, one limitation of the archetype approach is that it does not capture the range of ways floor area can be used in each archetype. See Appendix B3 for a detailed list of energy benchmarks.

Flintshire	% diff
Domestic electricity demand difference	-13%
Domestic heat demand difference*	-16%
Non-domestic electricity demand difference	80%
Non-domestic heat demand difference	89%
Un-occupancy (Census 2021)[T11]	5%
% non-domestic properties with no archetype	56%

Table 3.1.3: Demand differences between sub-national energy consumption statistics and building profiles. *Sub-national statistics reports gas consumption which was used as a proxy for heat demand

No.	Description
1	Detached - after 1930 - medium/high efficiency
2	Detached - low efficiency
3	Terrace - medium efficiency
4	Terrace - before 1930 - low efficiency
5	Semi-detached - after 1930 - low efficiency
6	Semi-detached - after 1930 - high efficiency
7	Semi-detached - before 1930 - low efficiency
8	Semi-detached - before 1930 - high efficiency
9	Flat (any floor) - high efficiency
10	Top floor flat - low efficiency
11	Bottom floor flat - low efficiency
12	Office
13	Retail
14	Hotel/Hostel
15	Leisure/Sports Facility
16	Schools, nurseries And Seasonal Public Buildings
17	Museums/Gallery/Library/Theatre/Hall
18	Health Centre/Clinic
19	Care Home
20	Emergency Services, Local Gov Services, Law, Military
21	Hospital
22	Warehouse
23	Restaurant/Bar/Café
24	Religious building
25	Transport Hub/Station
26	University Campus
27	Other non-domestic

Table 3.1.4: Summary of building archetypes used

3. The current energy system

Methodology – transport energy demand

Here we explain the approach taken to assess the transport demand baseline. The outputs of this baselining are regional mileage demand maps and the transport values in the baseline Sankey diagrams per local authority.

We used data from Transport for Wales (TfW) transport models[T12] to estimate annual road mileage data between different parts of a local area. TfW's data provided the number of trips between two different 'travel zones' (defined by TfW) on an average day according to vehicle type. In this data, a trip is defined by the transport zone where a vehicle's journey starts and the transport zone where it ends; therefore vehicles which pass through a transport zone without stopping are not counted. We estimated the route distance to be 130% longer than the distance between each area's centre point. This 'route indirectness' factor was based on Arup work from a previous local area energy plan in Wales. We then scaled up that daily mileage value to an annual mileage value.

We then geospatially mapped these annual mileage values from the TfW travel zones to substation zones. We summed over vehicle types to produce the map shown on the right in Figure 3.0.2.

We also estimated the energy consumption in kWh associated with these mileage values using vehicle type-specific kWh/mile factors, derived from external sources of miles per gallon provided in Table 3.1.3: baseline data sources (transport). The sum of this over a local authority resulted in the transport demand value for the baseline.

Exclusions

Note that trips by rail are not included. Rail is considered a national asset.

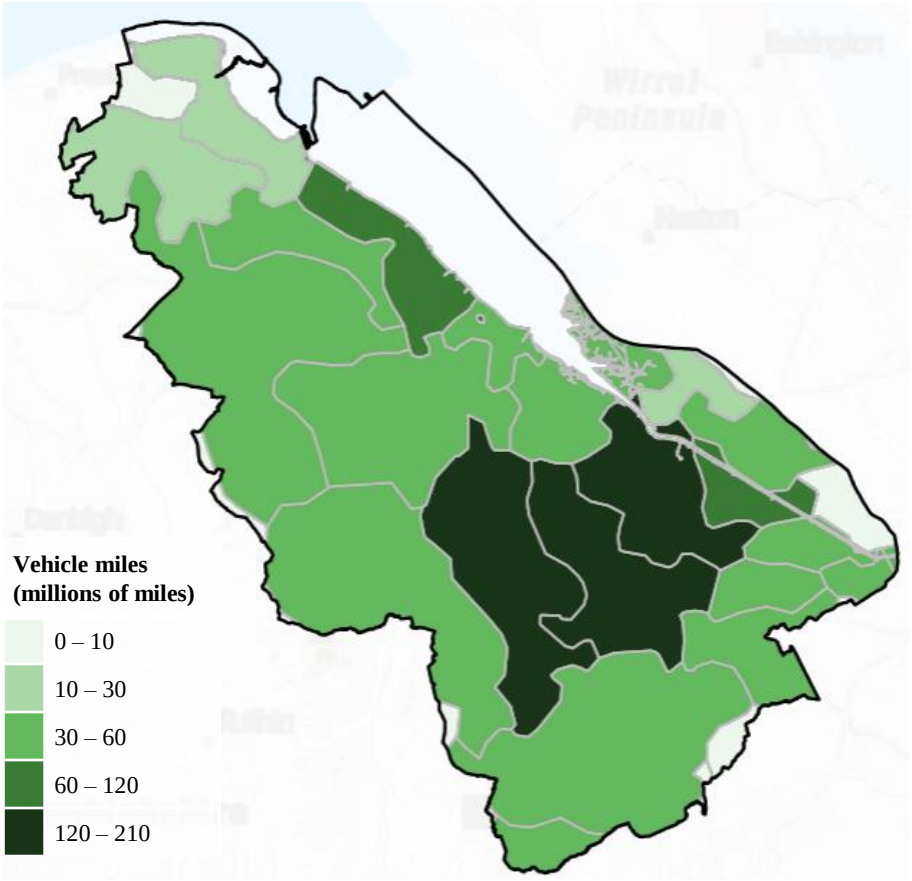


Figure 3.1.3: Estimated annual mileage (million miles / year) for all vehicles in Flintshire by substation zone (2019)

Methodology – transport energy demand

Data validation

We compared our baseline results against two datasets: our mileage values were compared against the Department for Transport (DfT) road traffic statistics[T13], and the energy consumption values were compared against the DESNZ sub-national road transport fuel consumption statistics[T14].

The mileage comparison is on the right, which compares total mileage of all vehicles. We found our estimates to be broadly consistent with the DfT dataset – in some cases above and in some cases below, meaning the differences are likely due to differing levels of route directness in different local authorities.

The TfW dataset was used for our analysis because it was prepared on a zonal basis for each Local Authority, which provided more detail compared to the DfT road traffic statistics which were prepared by Local Authority area.

Please see the energy consumption comparison on the next page.

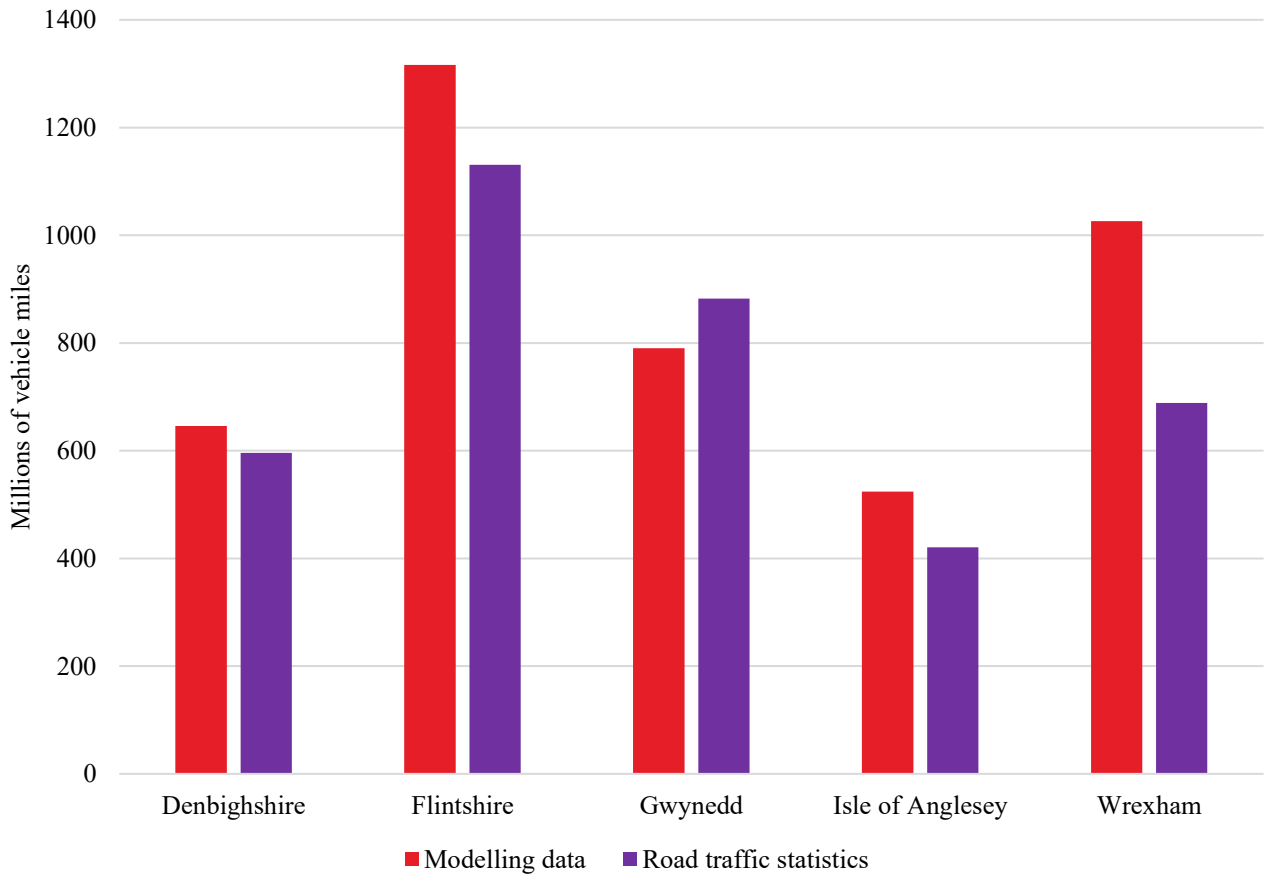


Figure 3.1.4: Comparison of modelling data to DfT road traffic statistics[T13]

Methodology – transport energy demand

The energy consumption comparison is on the right, showing the total energy consumption as estimated by our method and by the DESNZ sub-national fuel consumption statistics[T14]. Our estimates were found to be very consistent with the DESNZ dataset.

Mapping of local electric vehicle charge points

In the baseline maps, we mapped local charge points according to the postcodes supplied in the National Chargepoint Registry[T15] and, where provided, local authority records. For Flintshire's baseline, we used information from the National Chargepoint Registry[T15] so that it was consistent with data sources used across Wales for reporting and have specified any differences in the following sections where they apply. It was decided that any data provided by Flintshire County Council wasn't included in Figure 3.0.4 because it is not clear if (or how many) chargers are duplicated with the mapped National Chargepoint Registry[T15] data.

Exclusions

Note that trips by rail and therefore energy demand from rail transport is not in scope and excluded from the energy baseline. Rail is considered a national asset. Journeys made by off-road vehicles are also excluded.

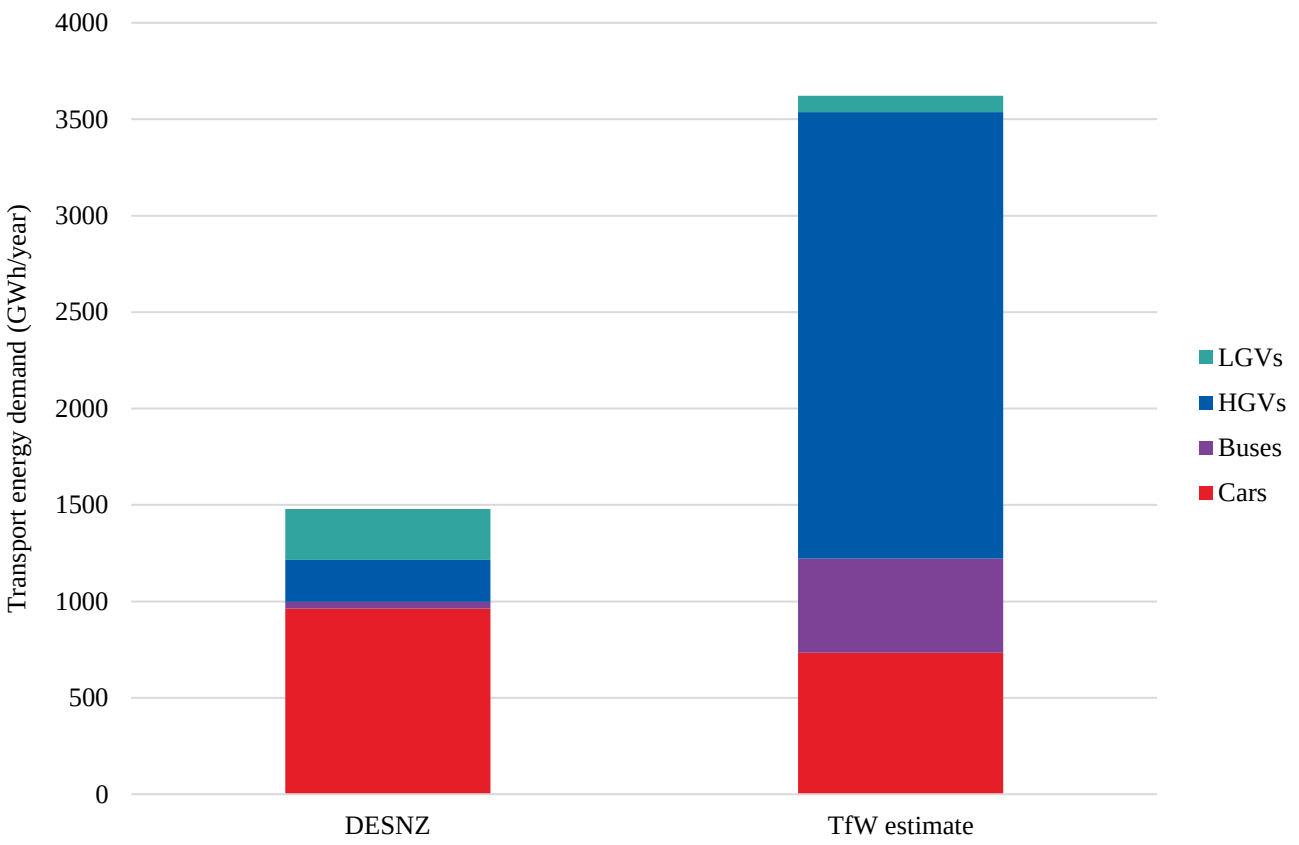


Figure 3.1.5: Annual transport energy consumption; our analysis based on TfW data compared to DESNZ sub-national fuel consumption statistics

3. The current energy system

Methodology – transport energy demand

Data input	Data source	Data type	Data quality
Demand tables	North Wales Transport Model (NWTM)[TN12]	Primary	Total number of trips between zones for a typical 24-hour period only. Trip distances not available
Miles per gallon values for cars and LGVs	Env0103: Average new car fuel consumption: Great Britain. Assumes average age of 10 years for cars and 9.3 years for LGVs[T16].	Secondary	"Obtained under consistent, carefully controlled laboratory conditions and do not reflect external factors"
Miles per gallon values for HGVs	Env0104: Average heavy goods vehicle fuel consumption: Great Britain. Assumes average age of 11 years[T17].	Secondary	"Obtained under consistent, carefully controlled laboratory conditions and do not reflect external factors"
Miles per gallon values for buses	Transport for London press release (2014)[T18]	Secondary	Does not differentiate between diesel and petrol. Data source is a press release based on London buses; not UK-wide dataset. The miles per gallon value may differ significantly between driving in London and driving in less urban parts of Wales.
Number of diesel vehicles and total number of vehicles	Vehicle licensing statistics data tables (veh0105)[T19]	Secondary	All non-diesel vehicles assumed to be petrol
Postcodes of charge points	National Chargepoint Registry (NCR)[T15]	Primary	Relies on updates by contributors

Table 3.1.5: Baseline data sources (transport)

Methodology – industry energy demand

We identified industrial demands in each Local Authority using the large point sources database from the National Atmospheric Emissions Inventory (NAEI)[T20]. This includes spatial coordinates for each point source that could be used to locate industrial sites.

The NAEI database also contains information on the emissions generated by each site. For this baseline analysis, we only considered carbon dioxide emissions.

To estimate the energy from emissions at each industrial site, we divided emissions by the appropriate carbon emissions factor[T21].

We sent industry stakeholders an RFI to obtain primary data for the site's annual electricity and gas consumption, to validate calculated industrial energy demands.

Where industrial organisations with large energy demands in Flintshire did not respond to this information request, we used the NAEI emissions to provide a proxy for the energy used by the site. When calculating energy demand, we only considered carbon emissions in the conversion from carbon emissions to energy demand.

Data validation

There was no information on the industrial sites at other sources for cross-referencing.

Exclusions

We omitted national assets connected to the transmission network, as well as assets that did not have any available data.

Data input	Data source	Data type	Data quality
Point source data	NAEI, 2020[T20]	Primary	Only carbon emissions were considered. Other emission types were excluded.

Table 3.1.6: Baseline data sources (industry)

3. The current energy system

Methodology – local energy generation

We mapped generators identified in the renewable energy planning database (REPD)[T22] to modelling zones in geographic information systems (GIS) using address or postcode.

Data validation

We cross-checked data against the energy generation in Wales (EGW)[T23] 2021 report to capture any operational generators that were not captured in renewable energy planning database (REPD[T22] or SPEN's embedded capacity registers (ECR[))TN24. This was the latest report available at the time of developing the baseline.

As the EGW dataset[T23] includes ground-mounted generators connected to the transmission network, we cross-checked any additional generators identified in EGW against the transmission embedded capacity register (TEC)[T25] to ensure only generators connected to the distribution network were captured.

Exclusions

Offshore wind generators were not captured. Generators with capacities exceeding 100MW were not captured. Generators that did not include an electricity capacity or postcode/address were not included.

Data input	Data source	Data type	Data quality
Installed renewable electricity capacity (MWe) for ground-mounted solar PV, commercial rooftop solar PV, onshore wind, hydropower, biomass, anaerobic digestion, landfill gas, sewage gas, energy from waste, natural gas, oil.	REPD (January 2023)[T22] ECR (April 2023)[TN24] EGW (2021)[T23] Council-supplied data (where available)	Primary	Distribution-connected generators only. REPD: Renewable generators greater than 150kW*, UK wide, updated quarterly. ECRs: Generators or storage greater than or equal to 1MW, DNO supply area, updated monthly. EGW: Generators connected to distribution or transmission network, Wales-wide, updated annually.
Thermal generator installed capacity (MWth)	EGW (2021)[T23]	Secondary	Generators listed by outward code (first half of postcode) as no full postcode available.
Domestic rooftop solar PV	EGW (2021)[T23] Council-supplied data (where available)	Secondary	Rooftop solar PV data was compiled using feed-in-tariff registers and other micro-generator databases. Generators listed by outward code as no full postcode available.

**the minimum threshold for installed capacity was 1MW until 2021, at which point it was lowered to 150kW. This means that projects below 1MW that were going through the planning system before 2021 may not be represented in the REPD.*

Table 3.1.7: Baseline data sources (local energy generation)

Methodology – Greenhouse gas (GHG) emissions

Generation-based emission factors are factors that measure greenhouse gas (GHG) emissions (in CO_2 equivalent) per unit of electricity generated. These were used in this analysis by multiplying the fuel feedstock for each technology in the scope of modelling, with the relevant emission factor.

GHG emission factors and their relevant sources are presented in Table 3.0.7. Each emission factor is a 2023 estimation except for electricity, where a projection was used to reflect grid decarbonisation.

Exclusions

Emissions associated with the extraction, transportation and distribution of the fuel sources are not considered. Lifecycle emissions of generation facilities are also excluded. Renewable energy generators that generate electricity with no intermediary (e.g. solar PV, wind etc.) are modelled as having no associated GHG emissions

Technology	Value	Units	Source
Biomass	0.0119	$kgCO_2e/kWh$	DESNZ, 2023 (Average of 4 biomass fuels: wood logs, wood chips, wood pellets, grass/straw)[T21]
Coal	0.3226	$kgCO_2e/kWh$	DESNZ, 2023 (Coal - Industrial, Gross CV)[T21]
Diesel	0.2391	$kgCO_2e/kWh$	DESNZ, 2023 (Liquid fuels - Diesel (average biofuel blend), Gross CV)[T21]
Electricity grid	0.045	$kgCO_2e/kWh$	National Grid FES 2023 (averaged scenario, without BECCS). Also includes projection to 2050. [T26]
Landfill gas	0.0002	$kgCO_2e/kWh$	DESNZ, 2023 (Biogas - Landfill gas)[T21]
Natural gas	0.1843	$kgCO_2e/kWh$	DESNZ, 2023 (Gaseous fuels - natural gas, Gross CV)[T21]
Oil/LPG	0.2413	$kgCO_2e/kWh$	DESNZ, 2023 (Average of LPG and Fuel Oil, Gross CV)[T21]
Organic matter	0.0002	$kgCO_2e/kWh$	DESNZ, 2023 (Biogas - Biogas)[T21]
Petrol	0.2217	$kgCO_2e/kWh$	DESNZ, 2023 (Liquid fuels - Petrol (average biofuel blend), Gross CV)[T21]
Sewage gas	0.0002	$kgCO_2e/kWh$	DESNZ, 2023 (Biogas - Biogas)[T21]
Waste incineration	0.038	$kgCO_2e/kWh$	Tolvik, 2021 [T26]

Table 3.1.8: Baseline emission factors (local energy generation)

Sponsors:

Delivery partners:

Technical report

Chapter 3: The current energy system (stage 3)

Analysis

3. The current energy system

Analysis - local context

Flintshire, located in the northeast corner of Wales, serves as a key gateway to North Wales from Northwest England. It stands out with a robust industrial sector, notably in advanced manufacturing, setting it apart from other areas in Wales and the UK. The region is recognised nationally for its employment opportunities and economic significance in Wales, with broader importance to the Northwest sub-region.

Diverse towns, villages, employment parks, and picturesque landscapes define Flintshire. Its unique blend of culture and language is evident across various regions. While two-thirds of its population resides near the border, the rest of the county remains rural, hosting diverse landscapes and habitats.

The county's rich heritage, including conservation areas and listed buildings, contributes to its appeal. The natural and built environment serves as a primary asset, pivotal for conservation efforts, attracting investments, promoting tourism, and ensuring sustainability for residents and businesses.

Most of Flintshire's population resides in the east and along the coast, forming key towns like Buckley, Flint, Holywell, Saltney, and Mold. The Deeside area, particularly the Deeside Industrial Park, acts as a growth hub and a major economic driver, housing key employers such as Airbus UK and Toyota. Flintshire plays a pivotal role in the regional economy, contributing high-value manufacturing employment and demonstrating a positive economic outlook despite global challenges.

Flintshire has excellent transport links to the rest of North Wales and Northwestern England being at the intersection of the A55 and A494. Improving rail links through the North Wales Metro programme is increasing sustainable travel options in the region, with new or improved stations at Greenfield, Shotton and Deeside and enhanced rail frequency along the line.

Flintshire has a strong base in renewable energy production, hosting the largest solar park in the UK. This and other solar farms support some of the vast industrial energy demand in the region. Future developments in renewables will focus on solar PV due to the local constraints on wind energy from flight paths and the Clwydian range and Dee Valley area of outstanding natural beauty (AONB).

Climate change poses various risks, including flooding along the Dee Estuary and River Dee, impacting landscapes, habitats, and community well-being

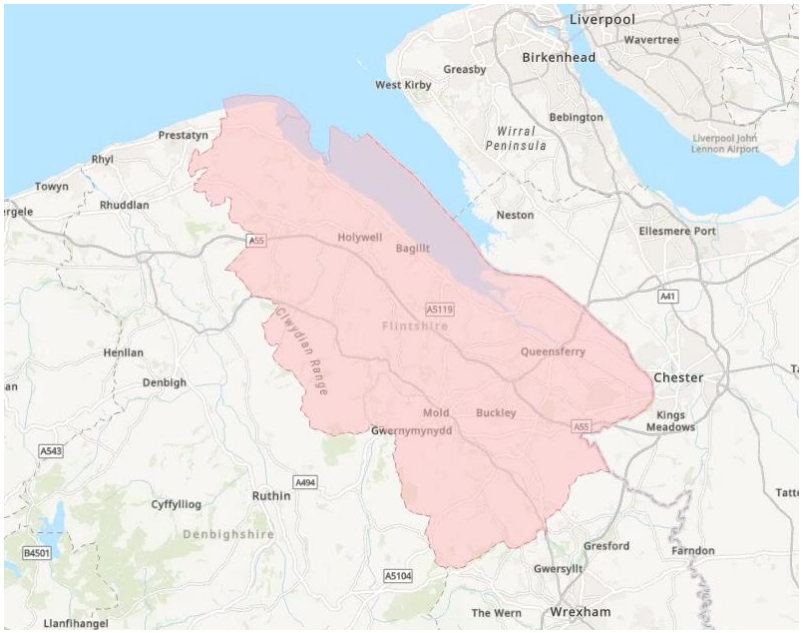


Figure 3.2.1: Map showing the boundary of Flintshire

3. The current energy system

Analysis – socio-economic context

A household is regarded as being in fuel poverty if they are unable to keep their home warm at a reasonable cost. In Wales, this is measured as any household that would have to spend more than 10% of their income on maintaining a satisfactory heating regime.

In 2021, 9% of households in Flintshire were identified to be in fuel poverty in comparison to 14% of households across Wales[T27]. Across Wales, households living in the private-rented sector were more likely to be fuel poor compared to owner-occupiers or those in social housing. These figures are expected to increase to around 45% in 2022[T27], largely driven by the impacts of the pandemic.

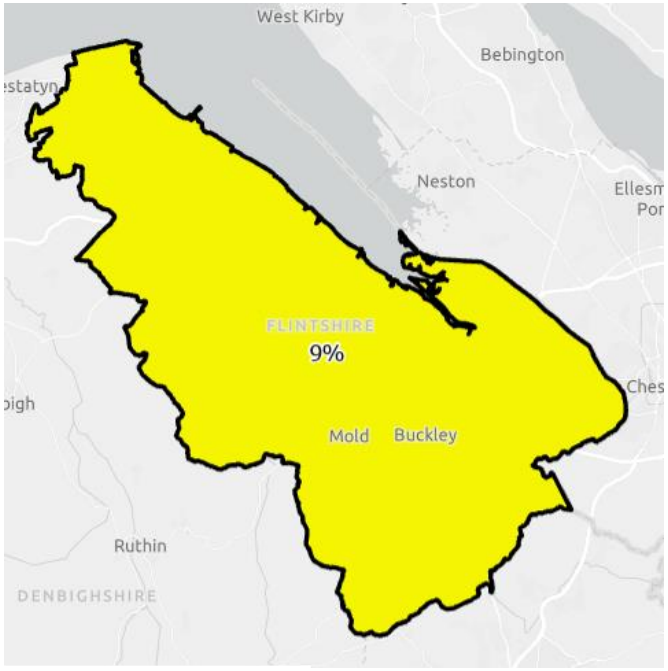


Figure 3.2.2: Fuel poverty in Flintshire in 2019. Data on fuel poverty is only available at the Local Authority level.

The Welsh Index of Multiple Deprivation 2019 (WIMD) is the official measure of deprivation in small areas in Wales. It is a relative measure of concentrations of deprivation at the small area level. Deprivation refers to wider problems caused by a lack of resources and opportunities. The most deprived small area in Flintshire in WIMD 2019 was Shotton and Garden City[T28].

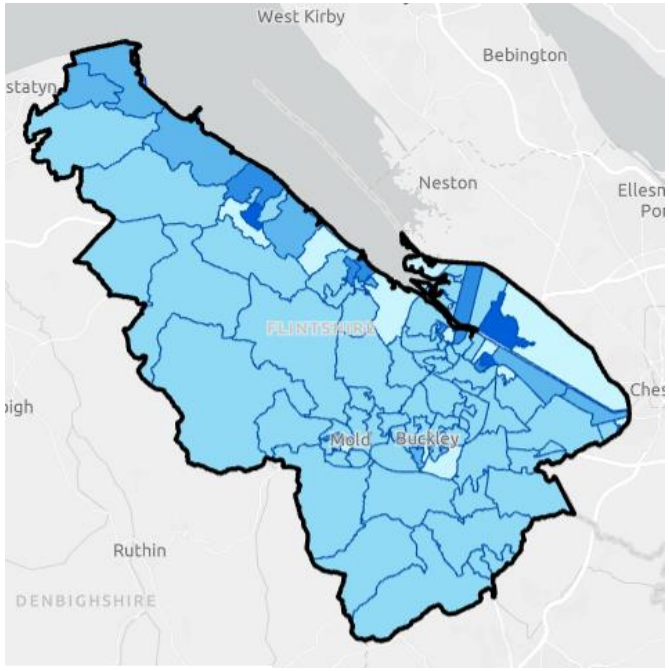


Figure 3.2.3: Index of Multiple Deprivation by LSOA in Flintshire in 2019

Analysis – greenhouse gas (GHG) emissions by sector

The figures presented here are emissions produced by the local energy system, as defined in Chapter 2: The current energy system.

The emissions shown in Figure 3.2.4 include:

Buildings: emissions from heating and electricity use from all buildings

Transport: emissions from road vehicles including cars, vans, lorries, and buses. Trains are not included.

Energy: emissions from electricity plants fired by fossil fuel

Industry: emissions from the large industry sites identified from the NAEI emissions dataset

Greenhouse gas (GHG) emissions in Flintshire in 2023 were 1,187ktCO_2e. GHG emissions per capita were 7.6tCO_2e per capita..

The largest contributors were:

- Road vehicles (60%)
  - 52% of total GHG emissions are from the use of diesel in road vehicles
- Energy used in buildings (34%)
  - 29% of total GHG emissions are from the use of natural gas in buildings.

Flintshire's CO_2e emissions are reducing over time.

NB: The emissions in Figures 3.2.4 and 3.2.5 exclude emissions from waste and land use, land use change and forestry (LULUCF).

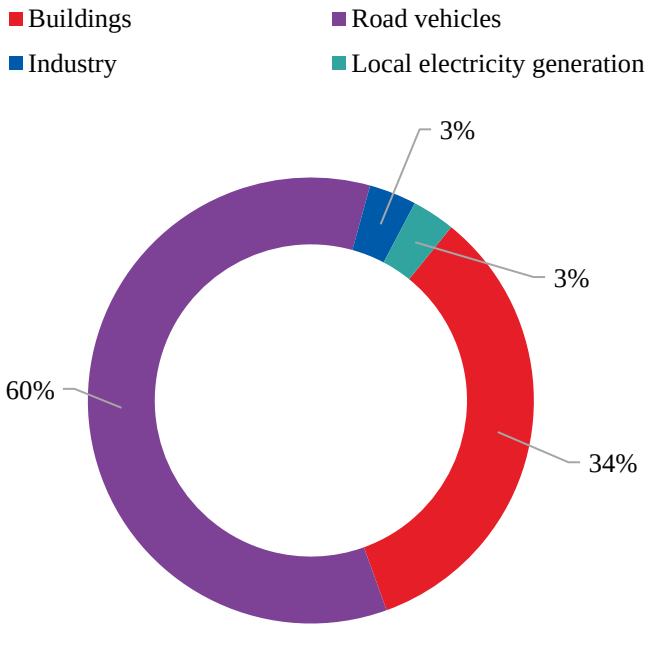


Figure 3.2.4: CO_2 emissions by sector in 2023, excluding LULUCF

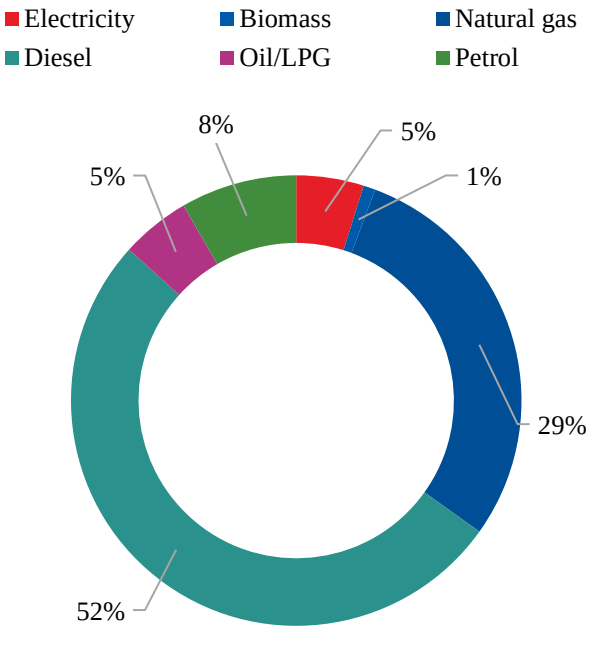
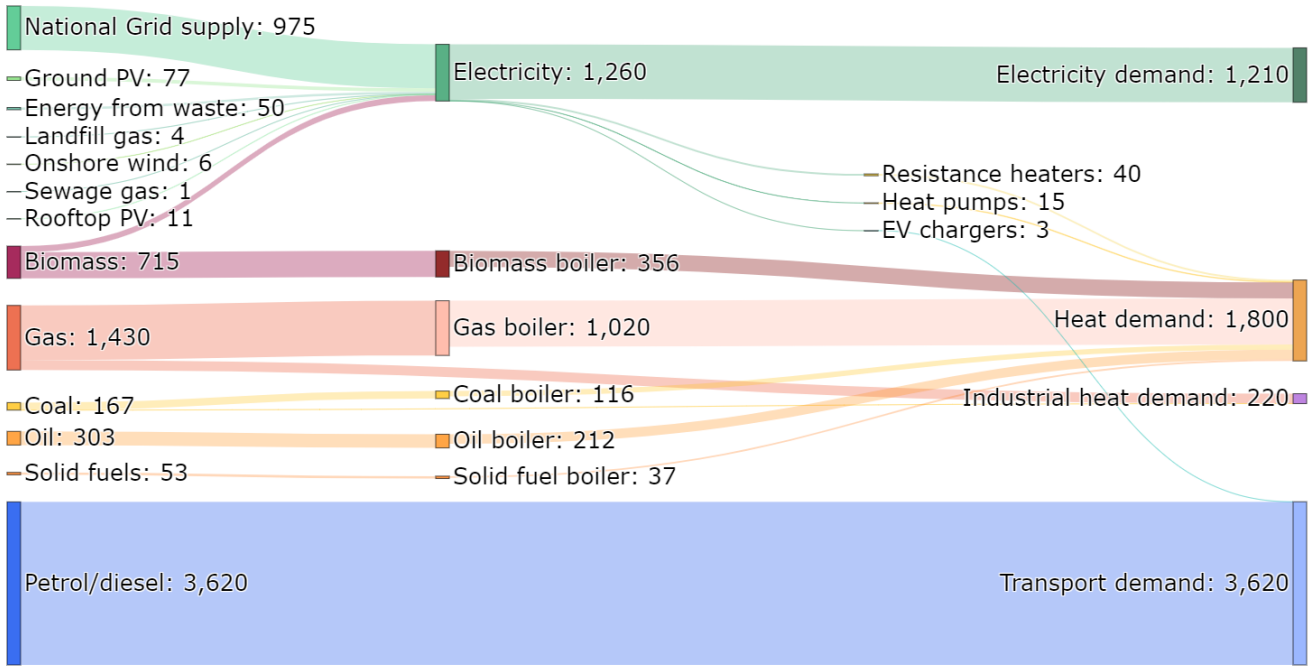


Figure 3.2.5: CO_2 emissions by fuel in 2023, excluding LULUCF

3. The current energy system

How to read a Sankey diagram

This section provides a detailed overview of the local energy system baseline, and describes the methodology and assumptions used to understand current energy infrastructure, what types of energy are used, what technologies are used to convert it from one form to another (e.g. heat) and how much is consumed. The Sankey diagrams are a way of visualising energy transfer from energy sources to energy demands via energy vectors or conversion technologies. They are read from left to right and show a snapshot of a scenario in time e.g., 2050. Energy transfers are drawn to scale and so are helpful to identify the size of each transfer and compare different scenarios. This page and the following, reflect the energy baseline in Flintshire in 2023, apart from the transport (2019) and industry data (2019). Transport and industry datasets are the least likely to have changed in terms of electrification over the years 2019 to 2023, and transport is the most likely dataset to have changed due to COVID-19.



1. Where the energy comes from
This side represents the different **energy sources**, including generation technologies and imports from the national grid

2. How the energy is being converted

3. Where the energy is being used
This side represents the **final demands** for each energy vector: heat demand, electricity, demand, transport demand.

Figure 3.2.6: How to read a Sankey diagram (units are in GWh/year)

3. The current local energy system

Analysis – annual energy flows

The baseline analysis for Flintshire provides insight into the existing energy system in 2023.

Most of the **electricity** within the system is supplied by the National Grid, accounting for 77% of total electricity consumed.
Ground PV, onshore wind and energy from waste generated, on average, 77GWh, 6GWh and 50GWh in 2019 respectively.
Almost all electricity was used to fulfil electricity demand from buildings and industry (i.e. not heat or transport).

Heating comprises the second largest component of energy demand, accounting for 29% of total energy across Flintshire. Due to the moderately high penetration of the gas network in Flintshire, most properties (82%) have heating delivered by gas. 1,430GWh is supplied to the system to meet demand. The remaining heat demand is met by other fuels such as oil, biomass, coal and solid fuels.

Almost all **vehicles** in Flintshire have internal combustion engines (ICEs), with relatively low uptake of electric vehicles (EVs).

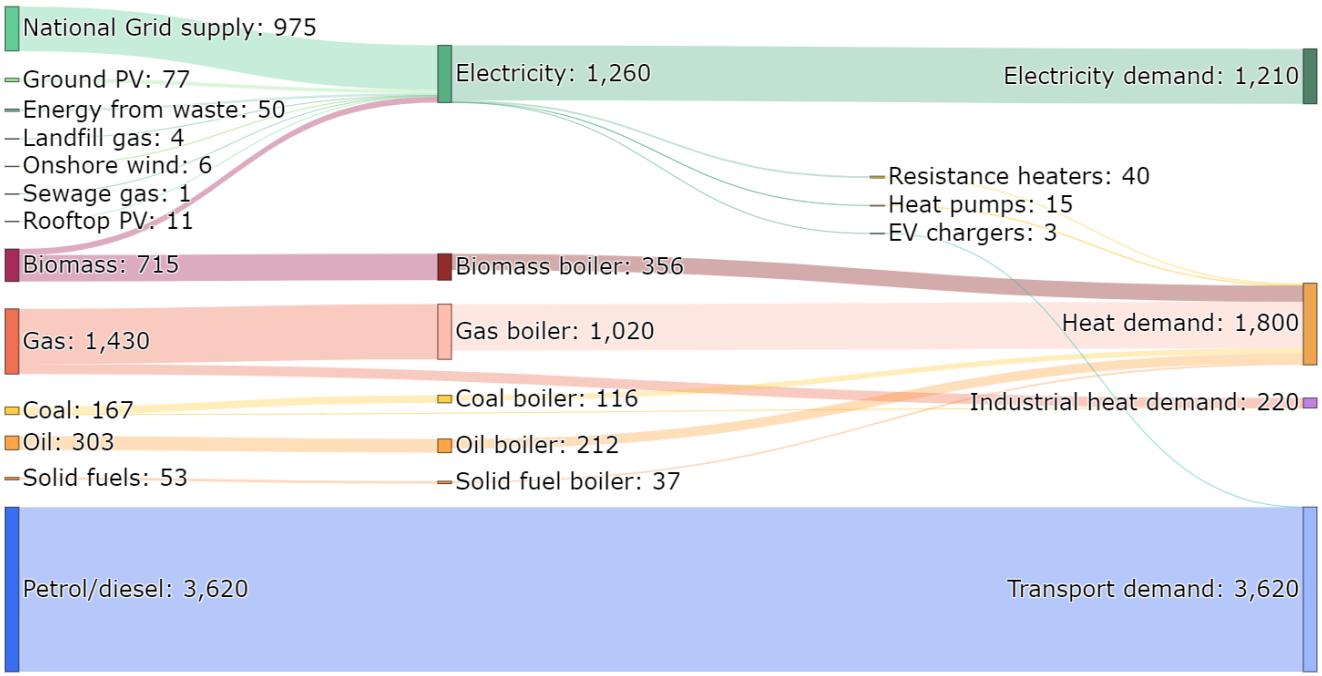


Figure 3.2.7: baseline Sankey diagram, representing energy flows in Flintshire in GWh/year (2023)

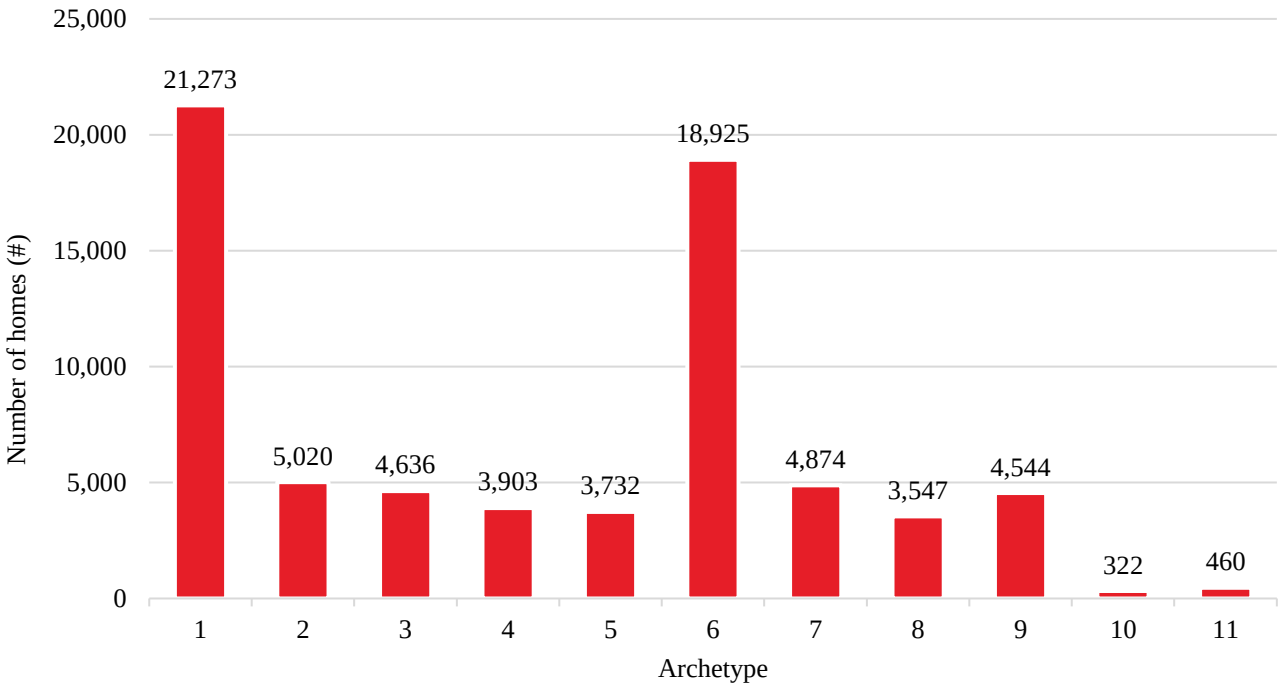
Analysis – buildings energy demand

Heat in buildings constituted 29% of total energy demand in 2023 and domestic heating was responsible for 49% of total heat demand from buildings.

In total, there were 71,236 domestic properties. 81% of homes were semi-detached or detached. Unoccupied homes in Flintshire accounted for 5% of the total stock, this is below the Welsh average of 7%[T11].

82% of homes were connected to the gas grid. This figure was equal to the regional average for Wales[T29], of 82%. Homes that are not connected to the gas network mostly use oil, and to a lesser extent LPG, electricity or a combination for heating.

The energy efficiency of Flintshire's housing stock varies considerably. On average, properties here exhibit below average levels of insulation, influencing their overall energy performance. These distinctions are shown in the EPC ratings, with 42% of properties achieving A-C ratings, above the Welsh average of 40%.



No.	Description	No.	Description
1	Detached - after 1930 - medium/high efficiency	7	Semi-detached - before 1930 - low efficiency
2	Detached - low efficiency	8	Semi-detached - before 1930 - high efficiency
3	Terrace - medium efficiency	9	Flat - high efficiency
4	Terrace - before 1930 - low efficiency	10	Top floor flat - low efficiency
5	Semi-detached - after 1930 - low efficiency	11	Bottom floor flat - low efficiency
6	Semi-detached - after 1930 - high efficiency		

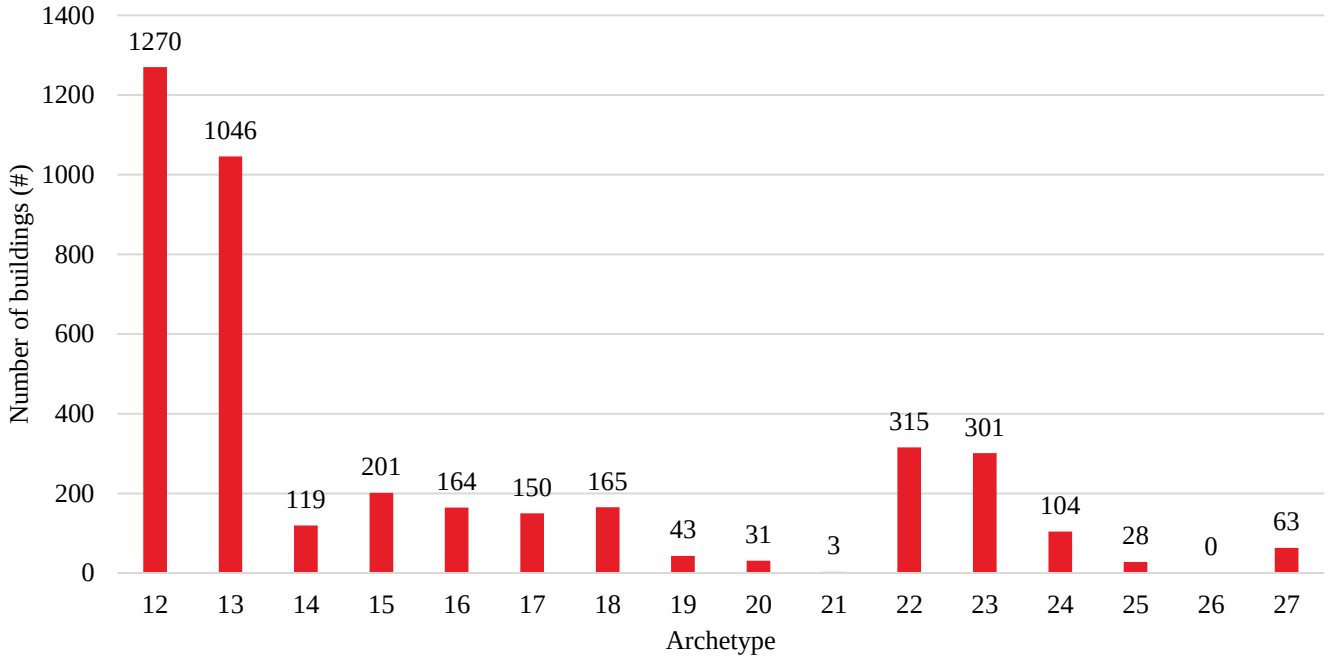
Figure 3.2.8: Distribution of domestic properties by archetype

3. The current energy system

Analysis – buildings energy demand

51% of heat demand in buildings was for non-domestic properties in 2023.

There were a total of 4,003 non-domestic properties with offices being the predominant type, accounting for 32% of non-domestic buildings. 26% of non-domestic properties are used for retail.



No.	Description	No.	Description
12	Office	20	Emergency services, local gov services, law, military
13	Retail	21	Hospital
14	Hotel/hostel	22	Warehouse
15	Leisure/sports facility	23	Restaurant/bar/café
16	Schools, nurseries and seasonal public buildings	24	Religious building
17	Museums/gallery/library/theatre/hall	25	Transport hub/station
18	Health centre/clinic	26	University campus
19	Care home	27	Other non-domestic

Figure 3.2.9: Distribution of non-domestic properties by archetype

Analysis – monthly buildings energy demand profile

Energy demand has been presented on an annual basis in this report, but it's important to recognise that demand for different sources of energy varies on a monthly and daily basis, and this can influence how we design a net zero local energy system to meet demand. For example, Figure 3.1.9 shows monthly electricity and heat demand. Heat demand is much higher in the colder months compared to the summer months, and electricity demand stays relatively consistent across each month. These trends will influence what technologies or energy sources are best suited to deploy for consistent demands and others that are less predictable and similarly, what types of energy supply might be available all the time (dispatchable) compared to those that are not (intermittent).

Tudalen 312

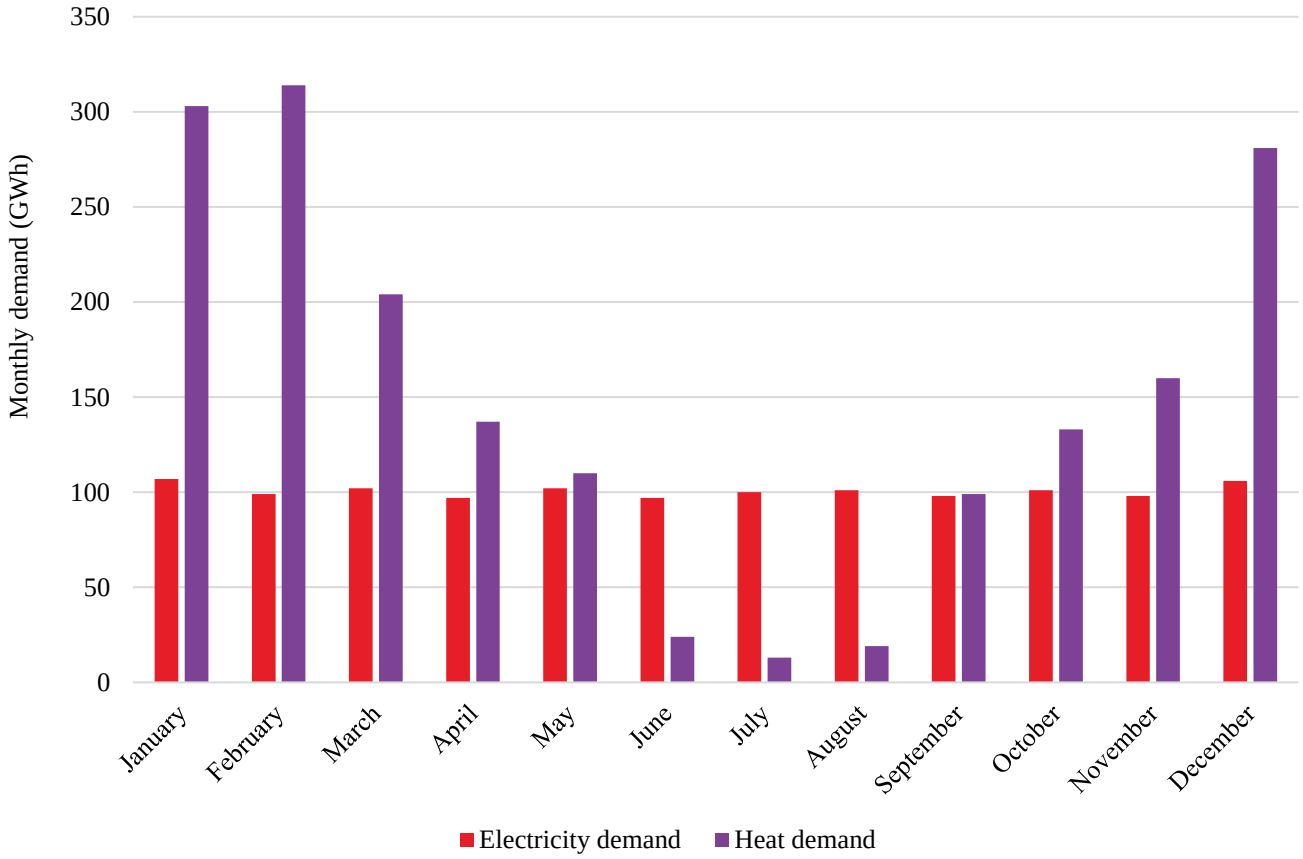
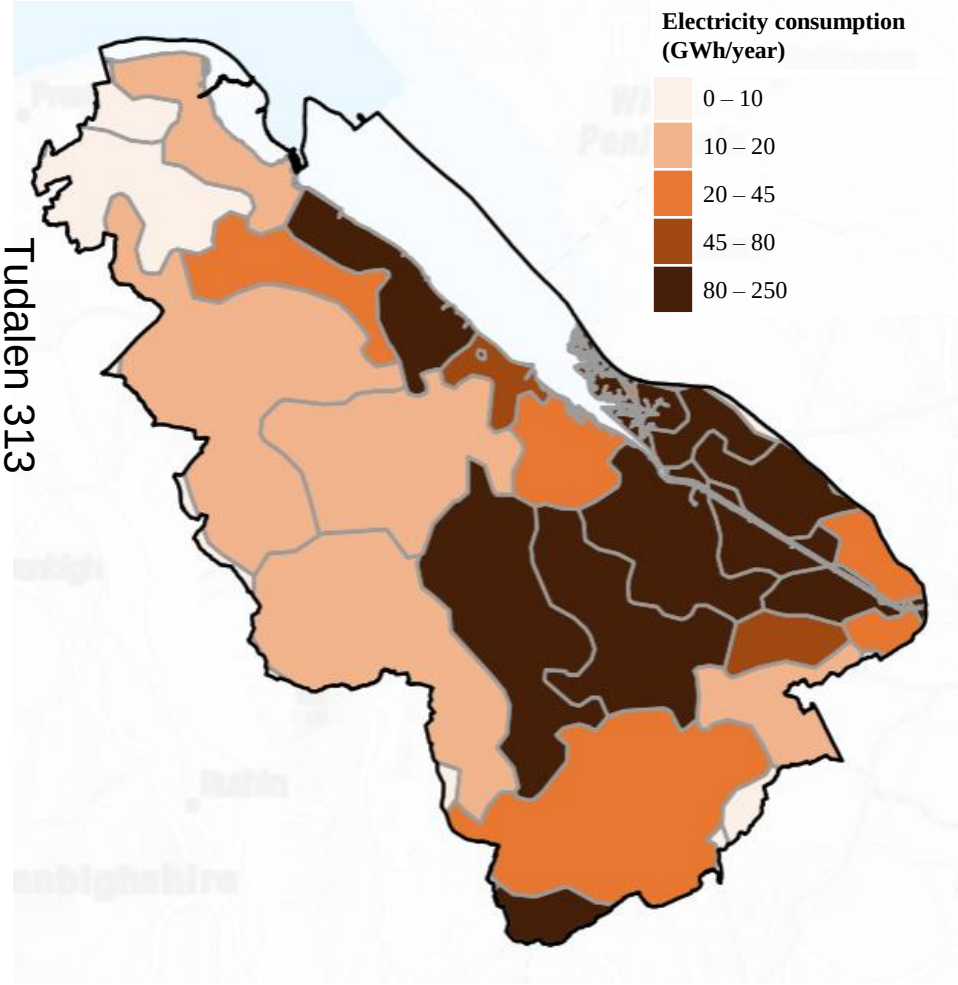


Figure 3.2.10: Monthly buildings energy profile for Flintshire (2023)

Analysis – electricity demand from buildings (GWh/year)



Electricity consumption (total domestic and non-domestic) varied across the area in 2023, except for areas where industrial clusters or larger towns are located (e.g. Deeside, Buckley and Mold) areas with lower population density like Caerwys had lower electricity demands.

Figure 3.2.11: Electricity consumption (GWh/year) (domestic and non-domestic properties) by substation zone across Flintshire (2023). Data is based on meter level electricity consumption data

3. The current energy system

Analysis – heat demand in buildings and industrial energy demand

Heat demand is generally higher in more densely populated locations like Deeside, Mold, and Buckley. These locations are also where most homes and businesses are located, and therefore the higher gas and heat demand.

The industrial landscape in Flintshire is a pivotal component of its economic framework, encompassing a diverse range of sectors and activities.

Emissions from industrial activities significantly contribute to Flintshire's carbon footprint, totalling 40 $ktCO_2e$ in 2023[T49]. Detailed analysis and data on emissions from industries are integral to understanding the environmental impact and sustainability challenges posed by this sector.

Flintshire hosts a diverse array of industries that play a fundamental role in its economic vitality. These industries encompass manufacturing, technology, agriculture, and services, each contributing uniquely to the region's economic fabric. The nature of industrial sites in Flintshire varies, with a mix of fragmented sites and industrial clusters.

Across Flintshire, several key industrial sites serve as economic anchors and employment hubs. These sites are strategically located and encompass various sectors, including paper, printing and publishing; chemicals; food and drink; and vehicles. Highlighting these industrial centres provides insight into their significance in driving local economic growth and job opportunities. The largest sectors and companies are highlighted below and in Figure 3.2.18.

Mechanical Engineering

- J Reid Trading Ltd (natural gas)

Vehicles

- Toyota motor manufacturing UK Ltd (Coal)

Paper, Printing and Publishing Industries

- Kimberly-Clark Ltd (natural gas)
- UPM-Kymmene (UK) Ltd (natural gas)
- Essity UK Ltd (natural gas)

Other Mineral Industries

- Knauf Insulation Ltd (natural gas)
- Tarmac Trading Ltd (natural gas)

Chemical Industry

- Synthite Ltd (natural gas)
- TS Resins Ltd (natural gas)

Food, Drink and Tobacco Industry

- Farmers Boy Ltd (natural gas)

Minor Power Producers.

- Culvery Power Ltd (natural gas)

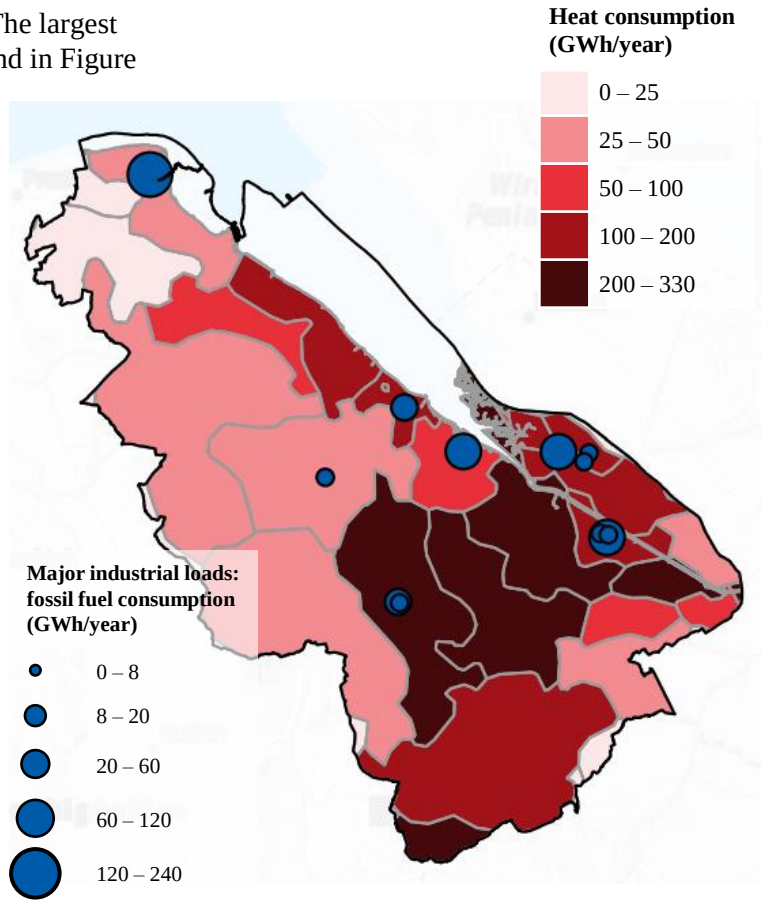


Figure 3.2.12: Major industrial loads (2019) and heat demand (2023) by substation zone across Flintshire. The data is based on meter level gas consumption (MWh/year)

Tudalen 314

Analysis – buildings energy efficiency

The energy efficiency of Flintshire's housing stock varies considerably. On average, properties have below average levels of insulation (e.g. 26% of homes have <100mm loft insulation and 12% had unfilled cavity walls), influencing their overall energy performance. These distinctions are shown in the EPC ratings, with only 35% of properties achieving A-C ratings, relatively high compared to other local authorities in North Wales. There are a higher proportion of homes on the fringes of Flint, Buckley and with EPC A-C ratings. And there are a lower proportion of homes with EPC A-C ratings in and around the Clwydian Range and Dee Valley National Landscape.

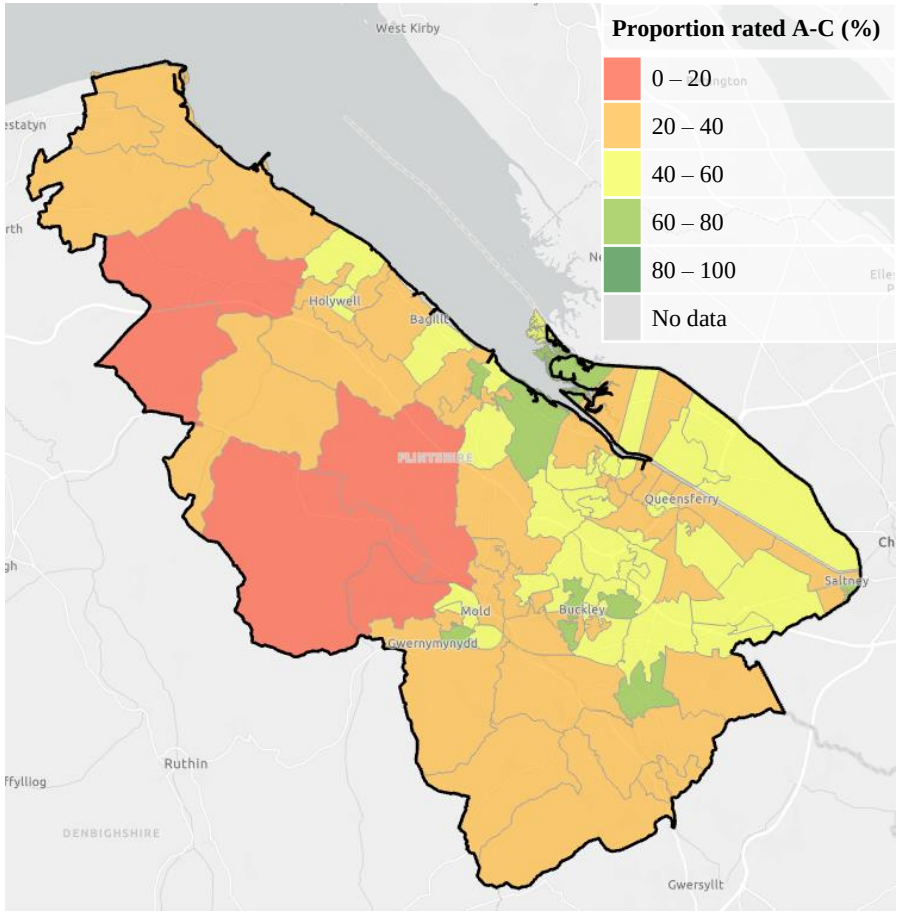


Figure 3.2.13: Proportion of domestic homes by EPC rating in Flintshire by LSOA. (2023)

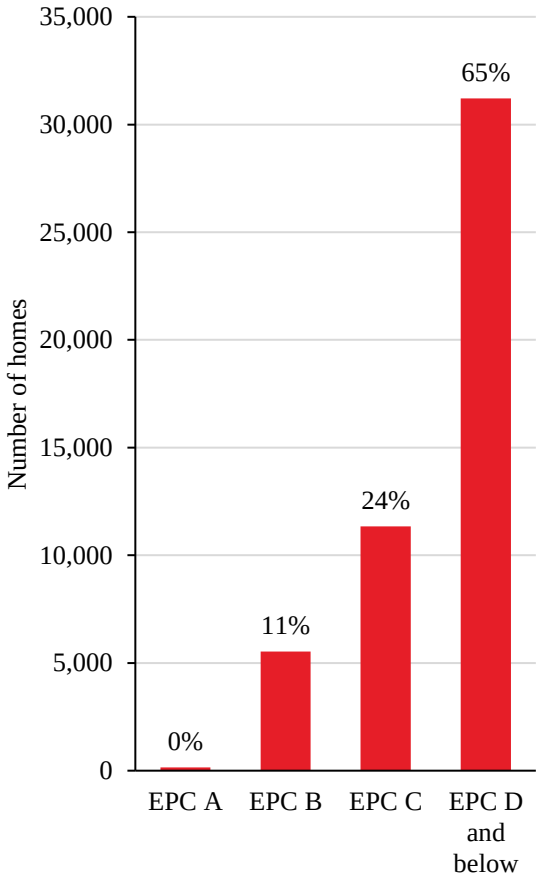


Figure 3.2.14: Energy efficiency of domestic properties across Denbighshire, rated EPC A-C and EPC D and below (2023)

Analysis – transport energy demand

In 2023, transport Flintshire contributed 710 $ktCO_2e$ to the total emissions, accounting for 60% of the overall emissions. The primary sources of these emissions stem from private car usage and HGVs, highlighting the need for sustainable transportation solutions.

Flintshire's proximity to major transportation corridors makes it an attractive hub for businesses in these sectors. This has a significant impact on local employment, fostering economic growth and job opportunities.

HGVs are the main source of transport emissions accounting for over 60% despite only accounting for 29% of mileage due to their higher emissions intensity (gCO2e/km).

In Flintshire, 0.23% of vehicles are electric or hybrid[T40], slightly behind the Wales-wide average of 0.26%[T40]. Flintshire displays a distinctive pattern of car ownership when compared to the national average. 83% of households in the area own cars, with an average of 1.3 cars per household, which is above the national average[T41].

Flintshire County Council has invested in enhancing public transport infrastructure, including the trial of electric buses; improvements to the North Wales metro; development of cycleways; and park and ride schemes aiming to offer residents efficient and sustainable commuting alternatives, reducing reliance on private vehicles.

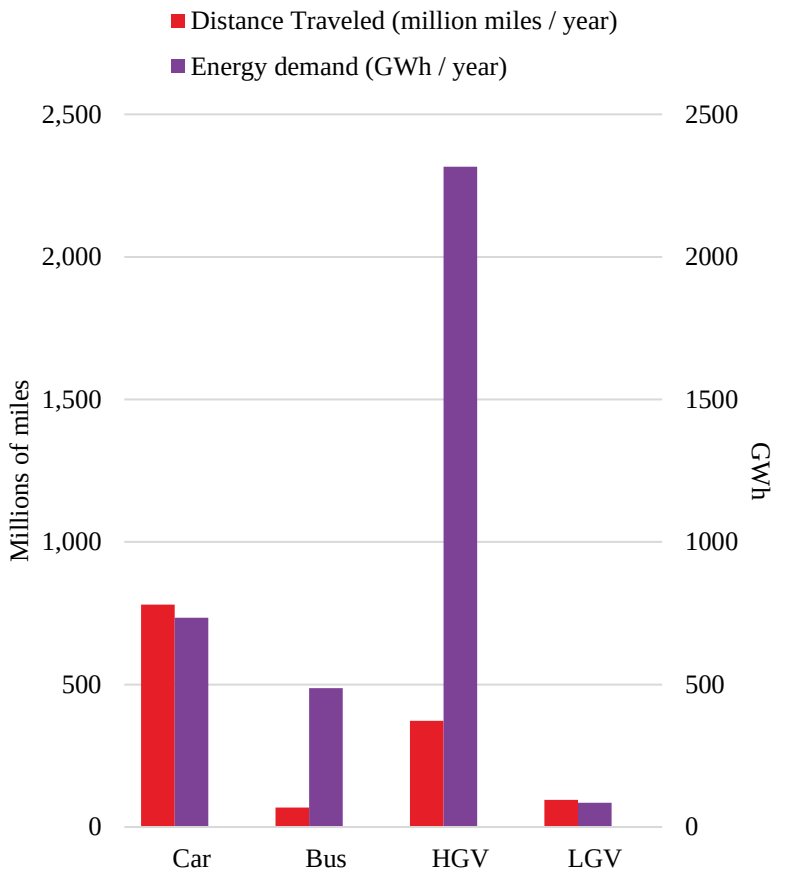


Figure 3.2.15: Total mileage (million miles / year) by vehicle type (2019)

Analysis – transport energy demand

Flintshire's transport landscape varies significantly, influenced by its combination of larger towns along the coast and main roads, and rural areas. More rural regions in the west of the local authority see a reliance on private vehicles due to limited public transport options, longer travel distances to essential services, and the practical necessity of cars. In contrast, more densely populated areas such as Mold, Flint or Deeside feature more robust public transport networks, with residents having the option of buses, cycle networks and trains for daily commuting.

According to the National Chargepoint Registry, there were 53 EV charge points in Flintshire in May 2023[T15]. These points are distributed in areas with high EV concentration and along major transportation routes to facilitate convenient charging for residents and visitors.

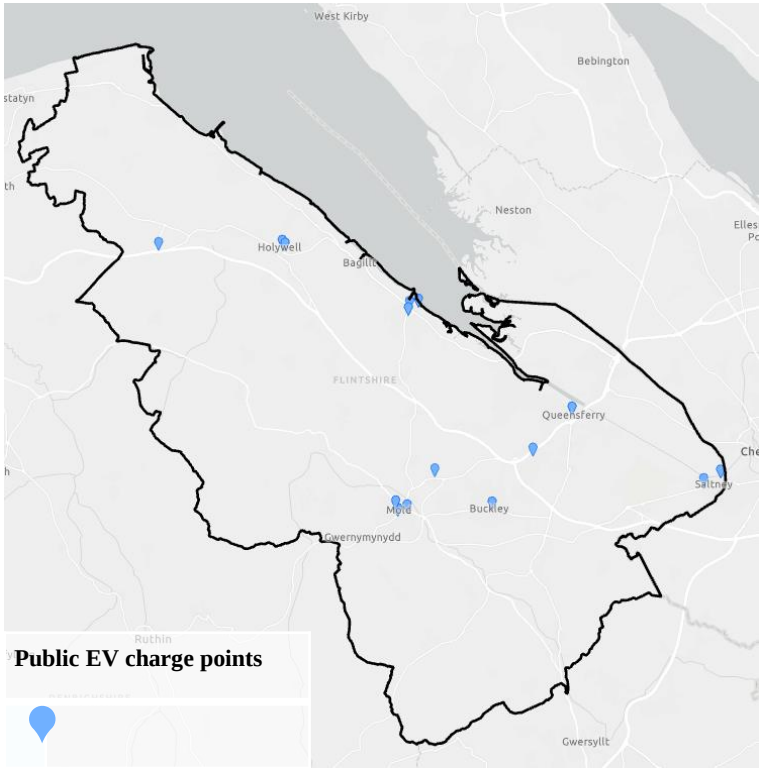


Figure 3.2.16: Public EV chargepoints registered on the National Chargepoint Registry[T16] across Flintshire (date extracted: May 2023)

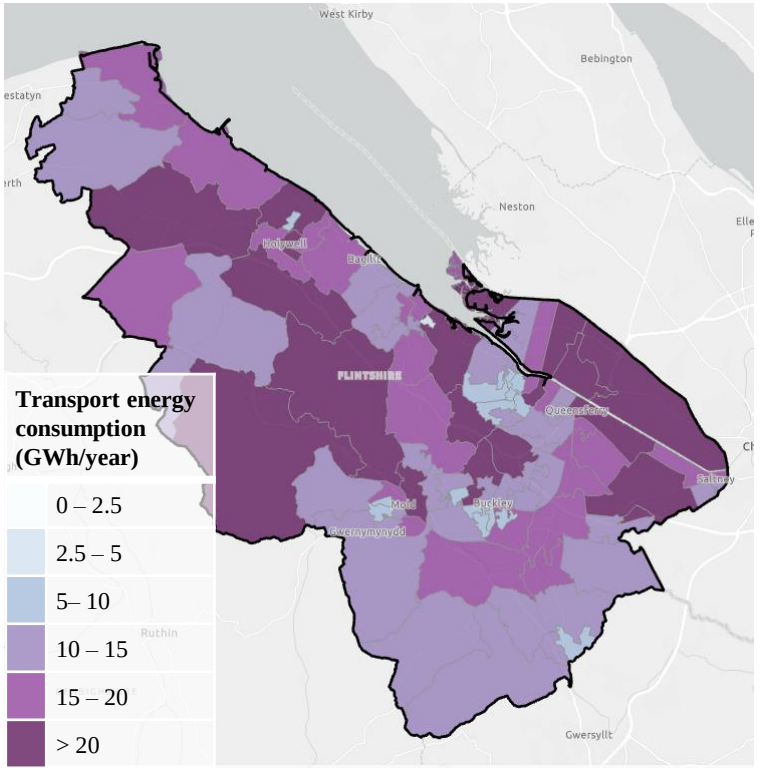


Figure 3.2.17: transport energy consumption (combined total across cars, light goods vehicles (LGV) and heavy goods vehicles (HGV) by LSOA (2019)

3. The current energy system

Analysis – electricity generation in 2023

Currently, Flintshire has the potential to generate a total of 171MW electricity annually. This electricity generation capacity plays a pivotal role in meeting the energy demands of the region's residents, businesses, and industries. Assets over 100MW are not in scope of this LAEP because these are considered national assets.

Onshore wind power: is a prominent renewable energy source harnessed within Flintshire. The region boasts a total 1.8MW of electricity generated annually from wind turbines. Wind energy continues to grow as a reliable and sustainable power source, contributing significantly to reducing carbon emissions. Given local flight zones and areas of outstanding natural beauty, growth of onshore wind within Flintshire is limited.

Solar power: also plays a vital role in the local energy mix. Flintshire harnesses 91.6MW electricity annually from solar panels on rooftops and dedicated solar farms. Solar PV is employed widely in industrial areas for direct use, and this is expected to expand significantly.

In addition to wind and solar, Flintshire utilises various other renewable generation sources, including biomass, energy from waste and biogas facilities. These sources further diversify the energy mix, ensuring reliability and sustainability. To manage increases in renewables and alleviate issues associated with intermittency, several grid-scale battery projects are planned within industrial zones.

In addition to these renewable sources of generation Flintshire generates 35.5MW electricity from non-renewable sources, including gas, and oil. It is anticipated that fossil fuel energy generation will continue to grow as it is a key, cheap resource within industrial zones at the moment.

While Flintshire is a significant contributor to its electricity needs through local generation, it also imports a portion of its electricity to meet the overall demand, totalling 975GWh in 2023. This import ensures a reliable and continuous supply of power.

See overleaf for a map of existing electricity generation in Flintshire.

Tudalen 318

Analysis – electricity generation (ground-mounted)

Rooftop solar PV

As of 2023, there was a total of 11.6MW of rooftop solar PV capacity across Flintshire, roughly equivalent 4% of buildings (if we estimate that there are 75,200 buildings and rooftop solar PV systems are on average, 4kWp).

This map shows where these systems are located. Across Flintshire, the density of rooftop solar PV per substation is roughly consistent, with an average of 2.5-4.0MW connected at each substation. There is a slightly lower capacity in the areas around Flint, Greenfield and Broughton.

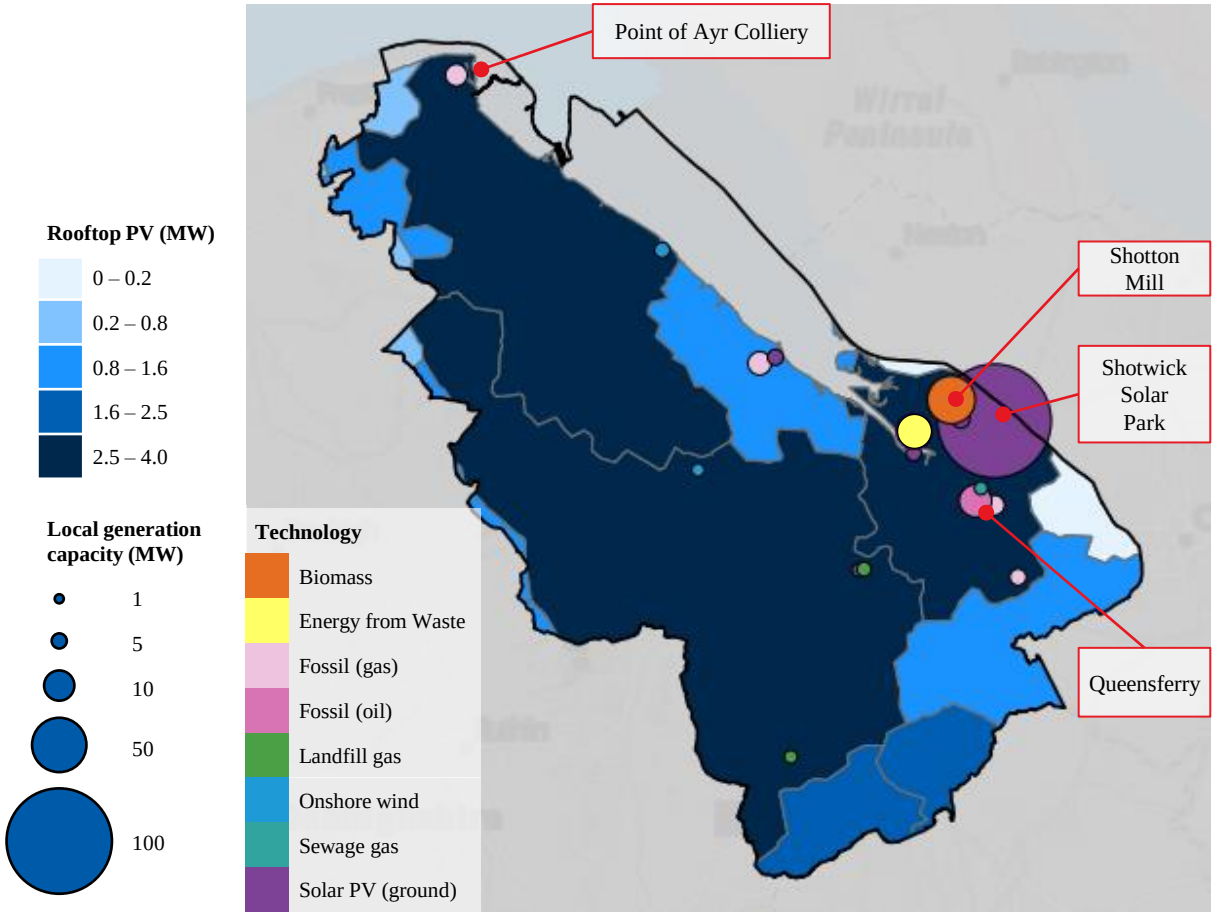


Figure 3.2.16 Local energy generators. Data is based on Energy Generation Wales (2019) and Renewable Energy Generation Database (2019)

Analysis – electricity distribution network

Generation and demand headroom in a Local Authority's electricity distribution network refers to the remaining primary substation capacity at the time of peak generation or demand, crucial for maintaining a stable and reliable power supply to meet the community's needs.

Presently, Flintshire faces challenges due to existing grid limitations, which often lead to delays in new connections and substantial associated expenses. These constraints impact the ability to develop new energy sources and infrastructure, highlighting the need for grid upgrades and enhancements.

To illustrate, the maps in Figures 3.1.19 and 3.1.20 show demand and generation headroom at primary substations in Flintshire. Note that substation and LSAO boundaries do not typically align, and the headroom has been distributed proportionally among LSOAs by area

Demand headroom varies across the region significantly with greater room towards the east of the local authority just outside the heavily industrialised areas.

Generation headroom is minimal across most of the county, with some slightly higher capacity in the northwest.

Tudalen 320

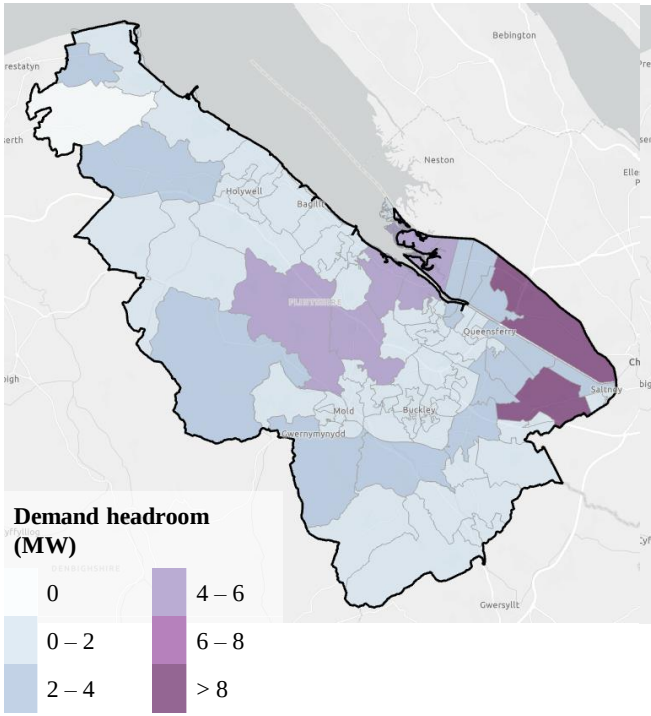


Figure 3.2.17: Electricity demand headroom

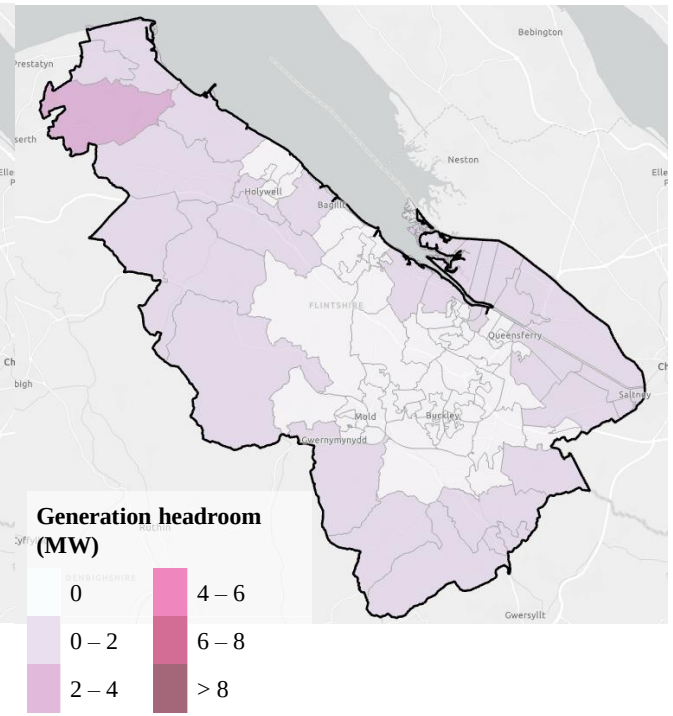


Figure 3.2.18: Electricity generation headroom

Analysis – Off-gas grid buildings (domestic only) shows extent of gas distribution network

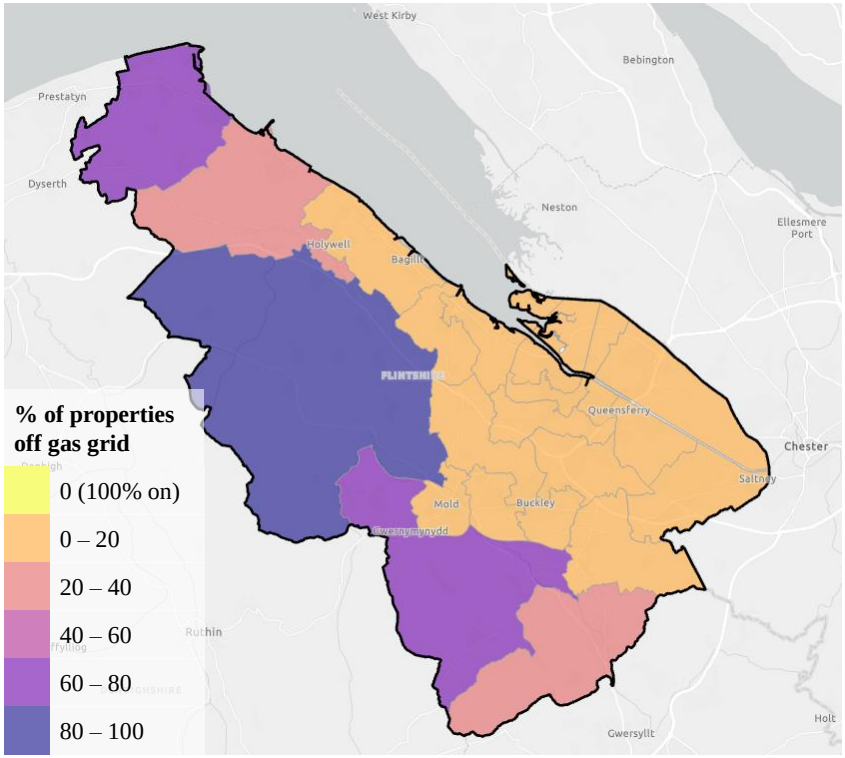


Figure 3.2.19: % of properties that are not connected to the gas distribution network across Flintshire (2023)

18% of properties are not connected to the gas network. This is most prominent in the west and northwest of Flintshire.

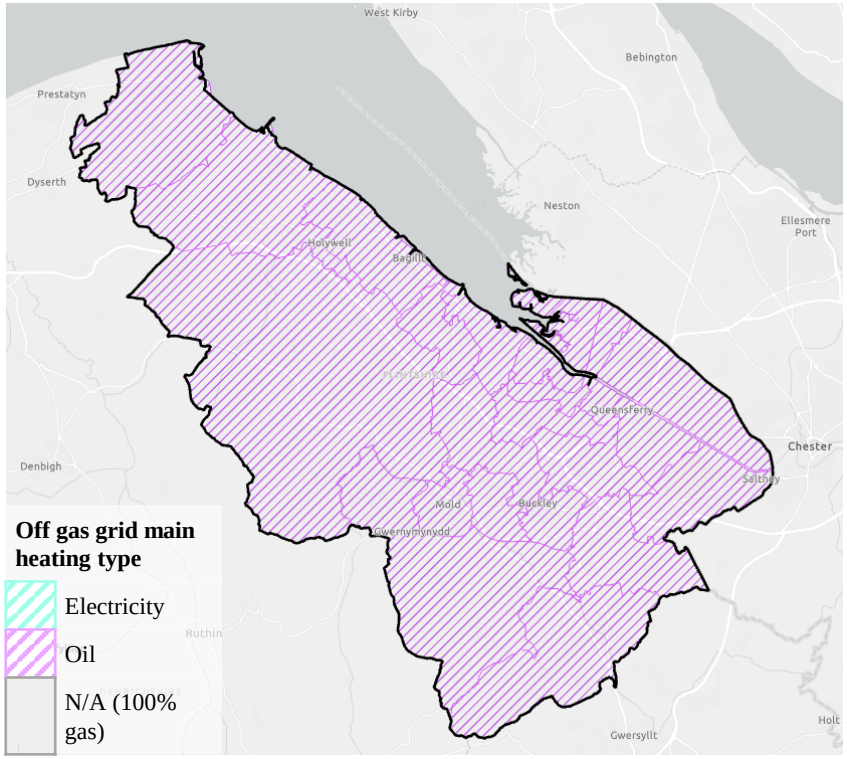


Figure 3.2.20: Main heating type of domestic buildings that are not connected to the gas distribution network across Flintshire (2023)

11% of properties use oil or LPG for heating. There are a small proportion of homes that use direct electric heating (2%). The remainder use biomass, other solid fuels (e.g. coal) or a combination of different fuels.

Sponsors:

Delivery partners:

Technical report

Chapter 4: The future energy system (stages 4-5)

4. The future energy system
Methodology overview

This section is structured as follows:

Scenario analysis

This section presents an overview of the future energy scenarios chosen and how they were agreed with stakeholders. It describes our scenario modelling methodology, including data sources and assumptions and the criteria used to optimise each future energy scenario. We then discuss the key findings from scenario analysis in more detail, exploring the energy system components that constitute each proposed future energy system and what similarities and differences there are between scenarios, and the impact this has on network infrastructure requirements and energy needs.

Deployment modelling

Scenario analysis highlighted energy system components that played a role in all future energy scenarios and could therefore be defined as "low-regret, near-term" energy system components to focus on for deployment. We created a deployment model to understand the deployment profiles for these components, accounting for broader local and regional strategic objectives and national targets that had been discussed in stakeholder workshops. This is described in more detail in this section and in Appendix B7. The outputs helped define the scale of change required to achieve net zero energy system, and to set a level of ambition from which the action plan could be based.

Chapter 4: Future energy system

Scenario analysis

- We defined modelling parameters such as the maximum amount of solar and wind which can be installed in Flintshire.
- We modelled four future energy scenarios scenarios and explored the most cost- and carbon- effective mix of technologies to generate energy to meet future demand.
- We compared the results to identify low-regret energy system components to consider as high priorities for near-term action.

Deployment modelling

- We modelled the rate of deployment for low-regret energy system components, helping us understand by how much we need to ramp up adoption of different technologies over time.
- We estimated the wide benefits of each scenario, looking at the impact of GHG emissions, air quality and employment in the local area.

Chapter 5: Action planning

4. The future energy system
Scenario analysis

Methodology - overview

The process of creating scenarios involves considering different versions of possible futures. Some of these may seem unlikely or even surprising, yet they could still be possible. Other scenarios explore the possible outcomes of choices the world already appears to be making. By exploring multiple scenarios, we can reveal patterns in supply trends, energy sources and renewable technologies that play a part in multiple energy futures and use this to inform the Flintshire's investment decisions and prioritisation when planning for the energy transition.

Scenario analysis is used to explore how different assumptions about the future can impact how a particular desired outcome is achieved. The future for Flintshire County Council's local energy system consists of many different dependencies, making it challenging to predict how it might look in the future. Therefore, we used scenarios to explore how different potential energy futures might influence how a net zero local energy system is achieved. It's important to note that at this stage of LAEP we are not trying to define a preferred future energy system but evaluating a range of potential future energy systems. This identifies certain technologies or demand reduction interventions that are prevalent in multiple energy futures, and those that only appear in one or two, helping us to determine the uncertainty and risk associated with deploying certain technologies or interventions to make informed decisions on a suitable, credible approach to achieving a net zero energy system.

This analysis was presented to stakeholders to support a decision about what ***energy propositions*** Flintshire might focus on as "low-regret, near-term energy propositions" and those that have a higher risk and uncertainty associated with them based on the modelling results. This information was then taken forwards for further consideration alongside broader plan objectives and local and regional strategic priorities to inform Flintshire's routemap and Action Plan.

As part of this analysis, we also tested different sensitivities to understand the impact of uncertainty and certain modelling parameters on the scenario outcomes. The findings are reported in the following section.

What future energy scenarios were chosen?

Using the outcomes of Workshop 2 (Strategic options and priorities workshop), future energy scenarios and their associated assumptions were agreed with the primary stakeholders, ANW representatives and the LAEP technical advisor. To allow for the comparison of results at the national and regional levels, two of the five scenarios were chosen to be tested across all Welsh Local Authorities, and two scenarios were chosen to be tested in all Local Authorities within the region. See Figure 4.0.0 for a description of each scenario and its scope. The final scenario was agreed by Flintshire County Council and was informed by Flintshire County Council's existing principles, strategic objectives and energy priorities.

4. The future energy system
Scenario analysis

Methodology - overview

Do nothing	• A scenario for comparison which considers committed activities, and assumes that current and consulted upon policy goes forward and remains consistent. • This scenario provides a cost counterfactual. • There is no decarbonisation target for this scenario, and we do not use it in optimisation modelling.
National net zero	• Uses the lowest cost and carbon combination of technologies to meet Wales' 2050 net zero target. • Assumes a moderate level of energy demand reduction across the system. • Model is allowed to import and export to the electricity grid, this assumes that the electricity grid is decarbonised and reinforced to allow for the demands, likely to be a combination of offshore wind, hydrogen CCGT, grid-level battery storage, nuclear (these are considered as national assets and outside the scope of the LAEP).
Low demand	• Considers the lowest future energy demand across different sectors. • Explores the impact of energy-reducing initiatives (home fabric improvements) and uptake of active travel and public transport use. • Model finds the lowest cost and carbon combination of technologies to meet predicted future energy demand. • Import and export of electricity as National Net Zero
High demand	• Considers the highest future energy demand across sectors. • Model finds the lowest cost and carbon combination of technologies to meet predicted future energy demand. • Import and export of electricity as National Net Zero
High Hydrogen	• Considers the highest plausible future energy demand across sectors. • Uses a cost- and carbon-optimal range of technologies to meet predicted future energy demand. • Explores hydrogen as a possibility within high temperature industrial processes. • Considers hydrogen for heavy goods vehicles. • Explores the possibility and impact of hydrogen generation and imports.

Figure 4.1.1: Summary of future energy scenarios

4. The future energy system
Scenario analysis

Methodology – modelling parameters

We developed a set of modelling parameters that describe certain characteristics of the future local energy system and how different factors could affect it in the future in each scenario. We set parameters for:

Technologies considered: we identified a list of viable technologies for the model to consider in the optimised future energy scenarios. These technologies were reviewed by primary stakeholders to ensure that they accurately reflected technologies the local area were likely to consider in the future based on the political context. For each technology, we collected key information defining costs, deployment and relationships with other technologies.

Capital and operational costs: we considered costs associated with capital and the operation of the asset over its lifetime as the main parameter for the model to optimise.

Emission factors: emissions factors associated with the operation of the asset over its lifetime were given a weighted cost and considered as part of the optimisation.

We translated the assumptions associated with each future energy scenario into Calliope[T30], an open-source, linear programming tool which was used to solve for the most cost- and carbon-effective future energy system in each scenario.

The methodology used to define these parameters is described in the following section.

Future energy demand profiles: we estimated future energy demand profiles by applying the assumptions made about how energy demand for different energy resources might change in each scenario. See the following pages for more details.

Maximum and minimum capacities for renewable technologies: we used maximum theoretical capacities to make sure the optimisation of supply reflected real-world constraints such as available land. Where there was a project pipeline and/or installed capacity, these were assumed to be built as a minimum capacity.

Geographic boundary: the geographic boundary specified what future energy demand should be included in any given future energy scenario. With each substation being used as the locational points for the model to solve.

Time: we modelled the future local energy system by building an annual profile divided into 8,760 hourly periods. We ran models using 1-hr, 3-hr or 24-hr time periods, to better understand the sensitivities of the results on the time resolution chosen. Where the model was large (i.e. has a lot of substations), we could not always run an hourly model, but over the 150 model runs undertaken on this project we are confident of the impact of the timestep on the model outputs.

Methodology – optimisation

Once the modelling parameters had been set, we then used the Calliope model to optimise the future supply profiles using the "objective functions" of cost and carbon emissions. This instructs the Calliope model to search for the future supply profile that minimises cost and carbon emissions across the hypothetical year of supply and consumption in 2050 for each scenario. The results suggest the most cost- and carbon-optimised generation profile using a mix of low-carbon technologies that could be used to meet the future energy demand profiles estimated in each future energy scenario.

We reviewed the scenarios alongside primary stakeholders and, in some cases, the assumptions were updated based on local preferences. The main adjustments requested were to the maximum theoretical capacities for renewable energy generation, which is discussed in more detail in later sections.

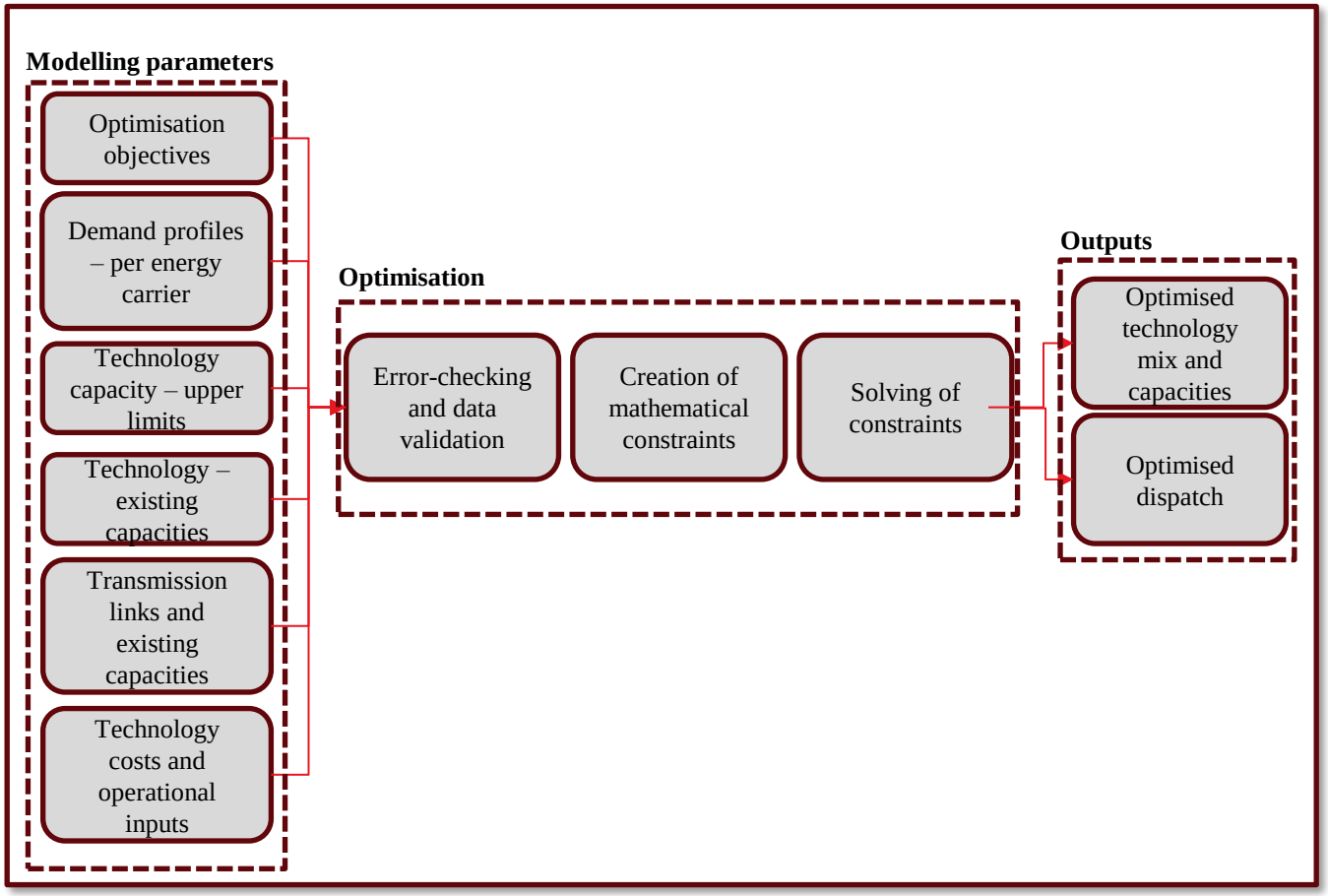


Figure 4.1.2: Optimisation modelling input data and desired outputs

4. The future energy system
Scenario analysis

Methodology - technologies considered

The scope of technologies included in the energy system model are broadly categorised as supply, demand, conversion, transmission, storage.

Figure 4.0.2 overleaf shows the technologies and carriers (energy vectors) that were modelled for Flintshire's LAEP.

For each technology we collected key information defining costs, GHG emissions, deployment and relationships with other technologies. The key parameters collected are summarised in Table 4.0.0 (see Appendix B7 for more details). Alongside the baseline information collated on demands, existing energy assets and potential renewable locations and capacities, this information was loaded into a database. Automated python scripting was used to handle this data and transform it into formatted model inputs in preparation for running the model. This approach ensuring efficiency and consistency, and minimised opportunities for manual errors.

There are challenges to projecting out many of the technological data parameters, and some will carry greater confidence than others. Novel technologies, for example, might have a wider spread of potential costs in 2050 depending on the source consulted. For quality assurance purposes, sources of costs and details of any data transformations taken to normalise all units were stored alongside their values in the database.

Technology data parameters
Technology costs • Capex (£/kW capacity) • Opex (£/kWh output)
Technology emissions • Operational carbon emissions (tCO_2e/kWh)
Technology fundamental parameters • Efficiencies where applicable (%) • Technology lifetime (years)
Technology constraints • Maximum renewable energy technology capacity, where applicable (kW) • Minimum renewable energy technology capacity, from baseline assessment (kW) • Minimum connection capacities between modes for transmission technologies

Table 4.1.1: Technology parameters

4. The future energy system
Scenario analysis

Methodology - technologies considered

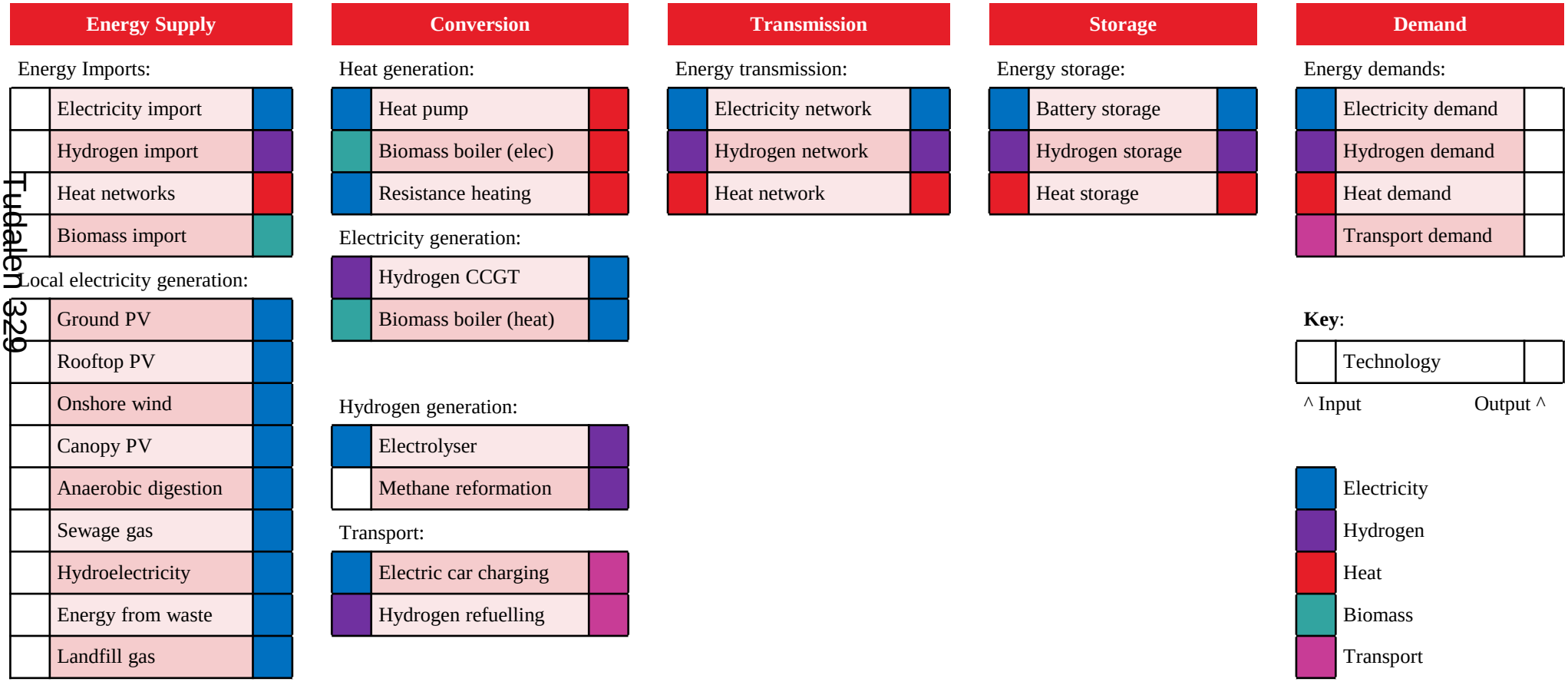


Figure 4.1.3: Technologies included in optimisation modelling

4. The future energy system
Scenario analysis

Methodology - future energy demand for buildings

We produced two scenarios for the buildings sector – high and low demand. The high demand scenario represents the most cost-optimal route to upgrade all buildings to the insulation associated with the current EPC C rating. Similarly, the low demand scenario represents a high-cost route to upgrade all buildings to the insulation associated with the current EPC A rating. The national net zero scenario aligns with the more pragmatic high demand scenario. The local scenario also matches the high demand scenario.

To produce the scenarios, we chose packages of retrofit measures for each of the 27 archetypes in each scenario. The retrofits are summarised in Table 4.0.1 for domestic buildings and in Table 4.0.2 (overleaf) for non-domestic buildings (see Appendix B3 for more detail). Electricity and heat profiles, generated at the archetype level, were reduced in line with RdSAP-modelled changes to building thermal properties and aggregated to modelling zones.

The rate of installations in the near-term considers the targets and initiatives of the Welsh authorities, as well as the major housing associations operating across Wales.

		High demand	Low demand
	Other scenarios this applies to	**National net zero, High hydrogen, High demand**	**Low demand**
DOMESTIC	**Electricity demand**	No change from baseline	5% reduction from smart appliances
	Heat demand	Cost-optimal fabric measures applied to upgrade all buildings below EPC C with insulation measures associated with an EPC C-rated property. 18,300 domestic retrofits will be required.	All buildings below EPC A upgraded with insulation measures associated with an EPC A-rated property. 61,100 domestic retrofits will be required.
	New development build rate	LDP housing targets extrapolated to 2050. 19% increase in number of homes from 2023 to 2050	Average historic build rate applied to 2050. 10% increase in number of homes from 2023 to 2050
	New development energy efficiency	2025 building regulation standard	Net Zero buildings with solar PV and battery storage
	Weather profile	4 days with temperature profiles equivalent to the 'Beast from the East' (extreme weather event in 2018 with -7°C lowest temp) (Appendix B7)	2 days with Beast from the East (-7°C lowest temp) temperature profiles
	Interventions for retrofit considered	See Appendix B7 for details on measures Options dependent on archetype	**High demand interventions**, plus additional measures. See Appendix B7 for more details on measure applied Options dependent on archetype

Table 4.1.2: Assumptions for domestic buildings in each future energy scenario

4. The future energy system
Scenario analysis

Methodology - future energy demand for buildings (continued)

To upgrade buildings to EPC C, the most cost-effective combination of measures was selected e.g., prioritising loft and cavity wall insulations. Appendix B7 describes the types of retrofits and sources of retrofit costs.

For the domestic profiles, SAP modelling was consolidated with smart meter data in the network planner profiling tool developed by Hildebrand which improves the accuracy of profiles by factoring in diversity.

New developments were also added to the 2050 energy system by projecting housing and commercial growth in line with LDP targets for high demand, and historic rates of growth for the low demand scenario.

New domestic and commercial growth were spatially mapped based on the location of existing domestic and commercial properties. Large new developments (>500 homes) were mapped separately to their precise substations.

Limitations

The number of insulation retrofits required is based on the insulation in the current building stock. This method is limited by the coverage of EPC (approx. 60% of buildings) and the archetype approach of grouping similar buildings that may have slightly different levels of insulation.

EPC rating is correlated, but not representative of the efficiency of a building. Therefore, the number of properties receiving retrofit measures does not necessarily correspond to the number of properties below EPC A or EPC C.

The model limits non-domestic archetypes to one profile for each scenario. Energy density ranges is a limitation for all archetypes but particularly for non-domestic archetypes which can vary massively.

		High Demand	Low Demand
	Other scenarios this applies to	**National Net Zero, High hydrogen, High demand**	**Low demand**
NON-DOMESTIC	**Electricity demand**	No change from baseline	5% reduction from smart appliances
	Heat demand	Cost-optimal fabric measures applied to upgrade all buildings with a rating of EPC C and below with insulation measures associated with EPC C-rated properties.	All buildings below EPC A upgraded with insulation measures associated with EC A-rated properties.
	Employment site allocation	LDP employment land allocations/jobs projection (proxy) extrapolated to 2050. 51% increase in commercial floorspace from 2023 to 2050.	LDP employment land allocations/jobs projection (proxy) extrapolated to 2050. -20% decrease in commercial floorspace from 2023 to 2050.
	Weather profile	4 days with temperature profiles equivalent to the 'Beast from the East' (extreme weather event in 2018 with -7°C lowest temp)	2 days with Beast from the East (-7°C lowest temp) temperature profiles
	Interventions for retrofit considered	**Same as domestic**, plus MEV/MVHR ventilation	**Same as domestic**, plus MEV/MVHR ventilation

Table 4.1.3: Assumptions for non-domestic buildings in each future energy scenario

Methodology – future energy demand for transport

The methodology used here closely aligns with the baseline methodology. The key difference is that the output was a year-long hourly demand profile in kWh.

Like the baseline analysis, we used the North Wales Transport Model (NWTM)[T12] to determine transport demand across Flintshire. These models provided the number of trips between two different transport zones (defined by TfW) on an average day. In this data, a trip is defined by the transport zone where a vehicle's journey starts and the transport zone where it ends. Therefore, vehicles which pass through a transport zone without stopping are not counted. We estimated the route distance to be 130% longer than the distance between each area's centre point. This 'route indirectness' factor was based on Arup work from a previous local area energy plan in Wales. We then scaled up that daily mileage value to an annual mileage value and geospatially mapped these values to substation zones.

To determine the proportion of vehicles that converted to either electric or hydrogen, we applied proportions from National Grid's "Leading the Way" 2050 future energy scenario (FES)[T31] percentages to the annual mileage for the baseline. Refer to Table 4.0.3 for electric and hydrogen vehicle percentages per vehicle type.

Then, we applied growth factors for each vehicle type to the baseline annual mileage data obtained from the NWTM to account for modal shifts. The selection of growth factors varied based on the specific scenario considered. Table 4.0.4 presents the growth factors applied to each scenario.

Finally, we applied a transport profile to the annual mileage figure, resulting in an hourly demand profile over the course of the year. This profile was then converted into an hourly demand in kWh using the miles per kWh values specific to different vehicle types.

	High demand, Low demand		High hydrogen	
Vehicle type	**Electric (mileage)**	**Hydrogen (mileage)**	**Electric (mileage)**	**Hydrogen (mileage)**
Cars	100%	0%	94%	6%
Buses	85%	15%	70%	30%
Vans	100%	0%	83%	17%
Heavy Goods Vehicles	86%	14%	45%	55%

Table 4.1.4: Assumptions for vehicle fuel type in each future energy scenario

Methodology – future energy demand for transport (continued)

	High demand	Low demand	High hydrogen
Scenario application	High demand	National net zero, low demand,	High hydrogen
Fuels of vehicles	National Grid's FES (2022) - Leading the Way	National Grid's FES (2022) - Leading the Way	National Grid's FES (2022) – System Transformation
Transport energy demand	Mileage for: Cars – 8% increase Buses – 5% decrease HGVs: 6% increase LGVs: 15% increase All the above changes are from National Grid's FES (2022) - Falling Short scenario.	Mileage for: Cars – 13% decrease from Llwybr Newydd adjusted by LA-specific car dependency factor. The car-dependency factor was developed to reflect that rural areas may achieve less than the nationwide target while urban areas may achieve more. Buses – Increases in proportion with the reduction in car journeys, scaled by the bus share of sustainable transport options and greater average bus occupancy compared to cars. HGVs - Increase by 6% (National FES)(2022) - Leading the Way) LGVs – Increase by 15% (National Grid's FES (2022) - Leading the Way)	Mileage for: Cars - <1% increase Buses - <1% decrease HGVs: 6% increase LGVs: 15% increase All the above changes are from National Grid's (FES) (2022) - System Transformation scenario.

Table 4.1.5: Assumptions for future transport energy demand in each future energy scenario

Tudalen 334

Methodology– future energy demand for industry

The 2020 NAEI (National Atmospheric Emission Inventory) Point Sources database[T20] was used as the primary source. The sites within this dataset were subsequently categorised as using high-grade heat or low-grade heat processes.

For industries using high-grade heat processes, we identified their link to chemical processes. Where this data was accessible, we determined the proportion of emissions attributed to these chemical processes. These emissions were excluded from our calculations as they are deemed out of scope, and unavoidable.

In cases where quantifiable data for non-process operational emissions was made available, we assumed that all such emissions would transition from gas to electricity by 2050, while operational emissions associated with processes would transition from gas to hydrogen by 2050. In cases where quantifiable data for non-process operational emissions was not accessible, we assumed that operational processes accounted for the entirety of the site's emissions, resulting in a complete transition to hydrogen.

For industries using low-grade heat, the only variation in the methodology was the assumption that all operational emissions (process and non-process) would shift from gas to electricity, rather than hydrogen.

Accordingly, we calculated the expected consumption of kilowatt-hours (kWh) of electricity and hydrogen by each site in the year 2050, assuming no growth in emissions. Note that this reflects total fuel consumption, rather than heat or electricity demand at the site Any efficiency improvements were offset by considerations related to growth. This annual value was converted into an hourly timeseries using Arup's industrial usage profiles.

Limitations

Companies that owned the industrial sites in Flintshire were sent an RFI, requesting the sites annual electricity and gas consumption and expected change in fuel consumption for 2050. This was not provided, therefore these assumptions need verification with the owners.

Methodology – maximum potential capacities for renewable generation

The maximum theoretical amount of renewable resource (onshore wind, ground-mounted PV, and rooftop PV) was included in the energy model as the sum of the baseline capacity (discussed previously in Chapter 3) and the 2050 renewable resource (discussed below) for each technology.

2050 renewable resource – onshore wind and ground-mounted PV

The maximum available resource (upper limit of renewable generation capacity) was calculated using local authority-specific renewable and low carbon energy assessments (RLCEA) and/or local development plans (LDP). These areas are shown in Figure 4.0.3. A full breakdown of sources and associated shapefiles used during the mapping exercise is presented in Appendix B5.

Overlapping areas were calculated to ensure capacities were not double-counted.

Where insufficient data was available to estimate solar and wind resources, a Welsh-wide study completed by Arup in 2019[T47], which ultimately fed into the Future Wales: the national plan 2040[T32], was used.

Following the mapping of available resource areas, wind and solar capacity factors (MW/area) were used to estimate available capacity (MW) at the LA- and substation-level.

2050 renewable resource – rooftop PV

Maximum available new resource for rooftop PV capacity was estimated using roof-area at the LA- and substation-level. Further information can be found in Appendix B5.

Pipeline projects

Pipeline projects were compiled using the REPD[T23] and ECR[TN24] datasets. Where relevant, Local Authority projects which have had planning permission granted (not necessarily an accepted grid connection) were included in the dataset.

We did not directly include the capacity of the pipeline projects in the energy modelling process, as the pipeline capacities did not influence either the minimum or maximum capacities allowed in the energy models. However, the pipeline projects were included in the deployment modelling process.

Seasonality and daily fluctuations

To capture fluctuations in solar and wind power, hourly resource profiles were used for wind speed[T45] and solar irradiance[T46]. Both profiles were based on conditions at the centre of a local authority. For wind speed, the hourly profile was based on a height of 80 metres and used the MERRA-2 atmospheric model. For solar irradiance, the hourly profile assumed an optimal slope and azimuth, and used the PVGIS-SARAH2 radiation database.

Tudalen 335

Methodology – maximum potential capacities for renewable generation

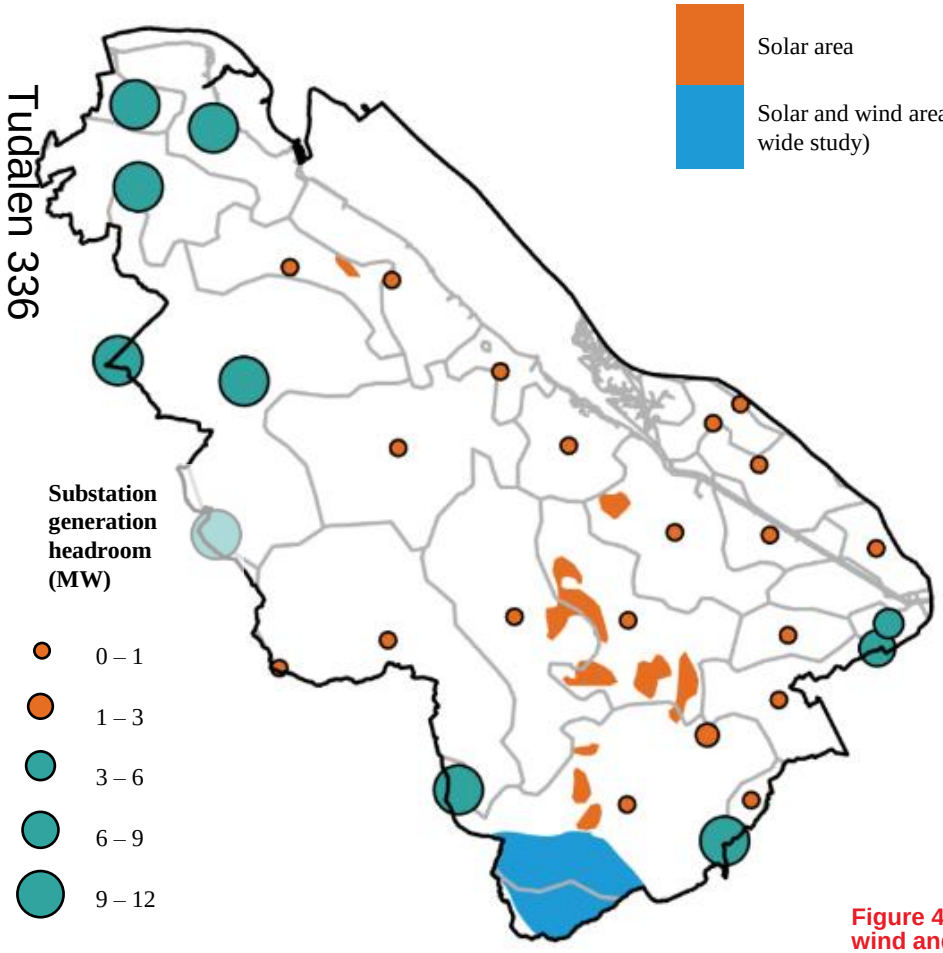


Figure 4.1.4: Areas suitable for wind and solar development

Figure 4.1.4 shows the location of different land packages that could be suitable for ground-mounted solar PV, onshore wind or both, and the generation capacity that is available in each substation zone. This overlay helps to highlight the locations where there is renewable potential and where there is available capacity, which would make conditions more favourable for development. This is discussed in more detail in Chapter 5: action planning, where we introduce the different "priority focus zones" across Flintshire that are ranked highly based on defined criteria for different low carbon technologies, including ground-mounted solar PV and onshore wind.

	Maximum theoretical capacity (MW)	Equivalent land area (km²)
Ground-mounted solar PV	565	10.6
Onshore wind	2	0.2

4. The future energy system
Scenario analysis

Methodology – electricity infrastructure

The electricity distribution network was structured into three distinct levels:

1. Grid-level: This level operated at an extra high voltage of 132kV.
2. Primary-level: This level operated at a high voltage of 33kV.
3. Consumer-level: This level operated at a low voltage of 11kV.

To transition between these levels, two types of transformers were used; grid transformers (located at grid substations) and primary transformers (located at primary substations). Figure 4.0.4 illustrates the flow of electricity between these substations in the model.

Each modelling zone was connected to a primary substation and grid substation, as well as a pseudo-substation.

Primary substation

Each modelling zone was part of a primary substation service area. The capacity of the primary substation[x] was split proportionally between its modelling zones by area. For modelling purposes, the portion of the primary substation capacity allocated to a zone was located at the zone centroid.

Grid substation

To facilitate grid import, each zone was connected to a grid substation, either directly or via other primary substations, via the following:

1. We plotted the locations of grid substations. For each primary substation service area which had a grid substation physically located within it, each constituent zone was allocated a grid substation in the model.
2. Modelling zones were interconnected with other zones that shared the same grid substation.
3. Finally, any zone not yet connected to a grid substation directly was linked to the closest connected zone, based on the Pythagorean distance between their centroids.

Pseudo-substation

We assigned each modelling zone an additional pseudo-substation, a theoretical primary substation with unlimited capacity. In conjunction with costs per kW (rules of thumb provided by the DNOs; real-world costs are likely to differ depending on the network), this enabled capacity expansion (with associated cost considerations) when required.

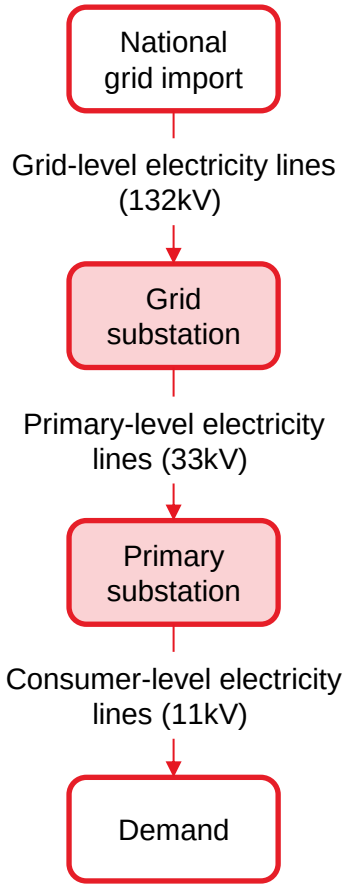


Figure 4.1.5: Modelled electricity flow for each zone

4. The future energy system
Scenario analysis

Methodology – gas infrastructure

We assumed that in all future energy scenarios for 2050, there is no longer a demand for gas, coal and other fossil fuels, as this demand has been replaced by renewable forms of energy. Gas blending was also excluded because we modelled the 2050 scenario, and we assumed the network will be fully hydrogen at this point.

Hydrogen demand is modelled at the same level of granularity as other supply technologies and therefore "modelling zones" align to the substation zones used to model electricity infrastructure and supply.

We set assumptions about future hydrogen demand (for combustion) which has been described in earlier sections. There is a high level of uncertainty around where hydrogen will be produced and how it will be supplied in 2050, and as a result, is left undefined in the future energy scenarios. This means that any hydrogen demand can be met by hydrogen from electrolysis within the system or from a "hydrogen import" which could be blue or green hydrogen either within or external from the LA using the existing gas network.

We calculated the conversion of the baseline gas flow rates into hydrogen capacity.

We then established modelling zones by mapping PRI nodes with specific zones, allowing for the allocation of import and export activities based on the pipes entering and exiting each modelling zone. We used optimisation modelling to find the most cost and carbon-effective way to meet this future demand.

Exclusions

We excluded decommissioning of the gas networks from our modelling. While decommissioning will play a large role in the total cost of the hydrogen transition - current estimates for the average cost in Great Britain suggest a magnitude of £1k/household[T33] to £2.3k/household[T34]- it is still an area of great cost uncertainty[T33], especially since the data available is not specific to Flintshire or Wales.

	Low hydrogen	High hydrogen
Scenario application	National net zero, Low demand, High demand	High hydrogen
Industry	High-grade heat met by hydrogen (low-grade heat met by electricity)	High- and low-grade heat met by hydrogen
Transport	Proportion of vans and HGVs use hydrogen	Proportion of vans and HGVs use hydrogen
Domestic / commercial heat	Hydrogen not considered for domestic/commercial heat	Hydrogen not considered for domestic/commercial heat

Table 4..1.6: Summary of assumptions related to hydrogen demand applied to future energy scenarios

Methodology – heat networks

What are heat networks?

Heat networks are one of the options for supplying heat to buildings in The future local energy system. Heat networks supply heat to buildings through hot water pipes buried in the ground from a centralised heat source. Centralised heat sources in decarbonised heat networks may be heat pumps (boosting heat from sources like air, ground, water, or waste heat), or hydrogen boilers.

Heat networks offer benefits such as reducing electricity infrastructure requirements and costs by enabling use of higher temperature heat sources at specific locations, which increase heat pump co-efficient of performance (COP), and offering large thermal stores, which can shift the timing of heat pump usage. Large centralised plants in heat networks can also offer economies of scale. However, networks can be very complex projects to deliver, and network pipework is highly expensive to build, meaning that they require high heat demand density to offer lower cost heating than alternatives like decentralised heat pumps.

How were heat networks modelled?

To determine which buildings should be supplied by heat networks rather than decentralised heat pumps in a future, optimised energy system, Arup used its proprietary HeatNet tool to assess where networks could offer a lower levelised cost of heat (LCoH) than decentralised heat pumps. The tool builds a digital representation of the local road network and uses a specialised algorithm to evaluate the combination of pipework routes and connected heat loads that maximises the amount of connected demand while minimising pipework length and maintaining a LCoH lower than the value for decentralised ASHPs. The LCoH is evaluated through a built-in discounted cashflow model. See Appendix B7 for the model's techno-economic inputs.

We integrated the HeatNet results into the wider analysis by allowing the heat networks to displace the equivalent capacity of heat pumps selected by the Calliope optimisation at each substation. This was carried through capacities and energy analysis but was not carried through to grid upgrade requirements. Thus, the grid upgrade requirements presented herein can be seen as a worst-case scenario, as heat networks (often able to use higher-temperature heat sources and consequently often more efficient than decentralised heat pumps) may lighten the electrical demand.

Tudalen 338

Methodology – heat networks

Mapping heat sources

To capture the full potential of heat networks, location-specific waste heat sources, their temperature and their supply potential were mapped across Flintshire for including in the model. Figure 4.0.5 shows the waste heat sources identified in Flintshire. This includes waste heat generated by national assets, since the waste heat is a locally available resource. In addition to these sources, hydrogen boilers were made available to the model at industrial sites expected to transition to hydrogen in the future, and unlimited 'location agnostic' heat pumps (i.e. plant that can be installed largely regardless of location – like ASHPs) with lower COPs were made available without requiring networks to route to specific locations.

Tudalen 340

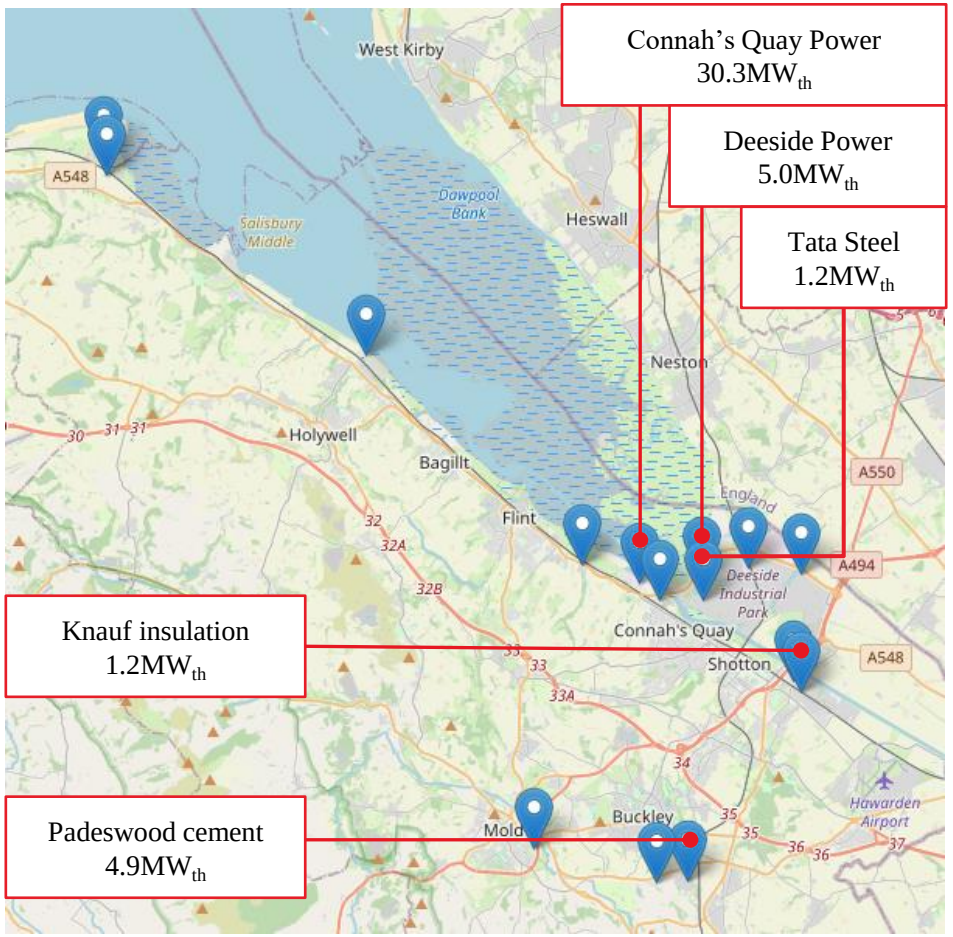


Figure 4.1.6: Heat sources identified, with top five sites named and capturable heat output noted in MW

Sponsors:

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Technical report

Chapter 4: The future energy system (stages 4-5)

Analysis

4. The future energy system
Analysis

National Net Zero scenario – annual energy flows (GWh, 2050)

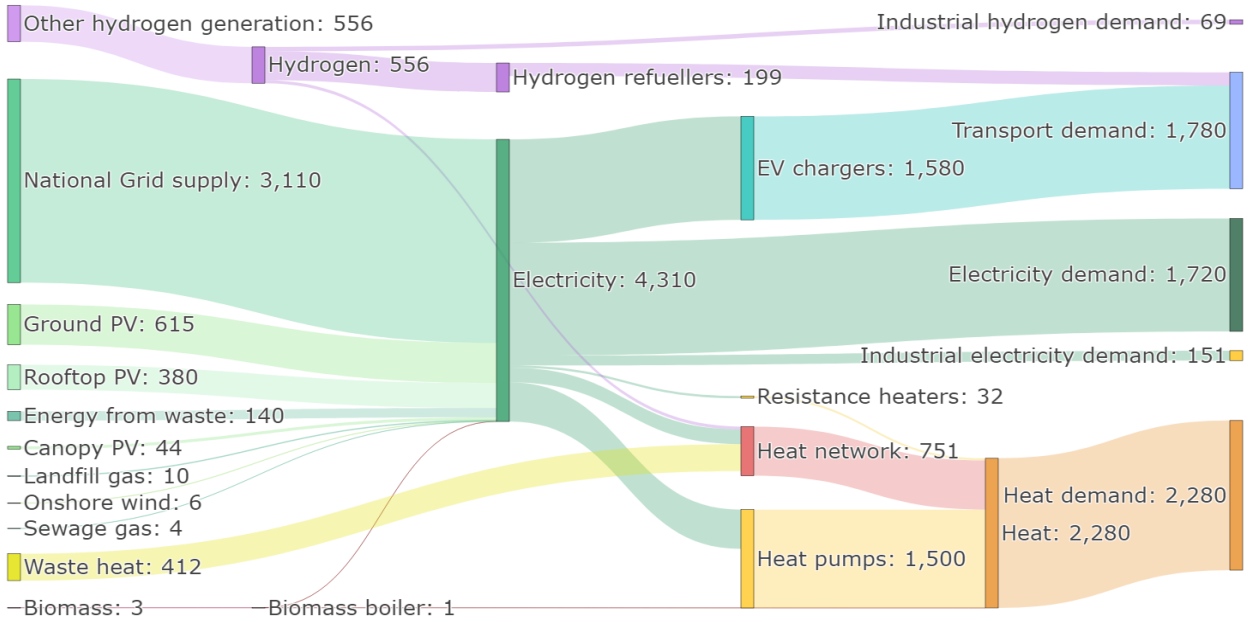
Figure 4.1.0 is an output from our modelling and shows a potential future energy system for Flintshire under the National Net Zero scenario. This energy system results from modelling to create the most cost and carbon optimal system. We ran the model for four scenarios to support our decision making. This optimisation modelling informs the deployment pathways as well as the action plan. The National Net Zero scenario (shown below) aligns with trends in both the High and Low Demand scenarios, as shown in the comparison presented in Figure 4.0.0. Note that this Sankey diagram does not present the final plan for Flintshire's future energy system.

Hydrogen generation /import expected to be required for some transport and industry demand

Electricity supply from the national grid could increase threefold as electricity becomes the primary vector for heat and transport demand

Local renewable generation could provide 28% of electricity, driven by growth of all forms of solar PV and energy from waste

Waste heat is a by-product of industrial processes



Some industrial heat processes are expected to be met through hydrogen use

The transport sector could be almost fully electrified, with some contribution from hydrogen refuellers

Heat demand could grow 25%+ and be met entirely through heat pumps and waste heat delivered through heat networks. ~50% less input energy supply is required (compared to 2019) to provide the increased amount of heat demand in 2050

Figure 4.2.1: Annotated Sankey diagram showing energy flows under the National Net Zero scenario (GWh in 2050)

4. The future energy system
Analysis

Low Demand scenario – annual energy flows (GWh, 2050)

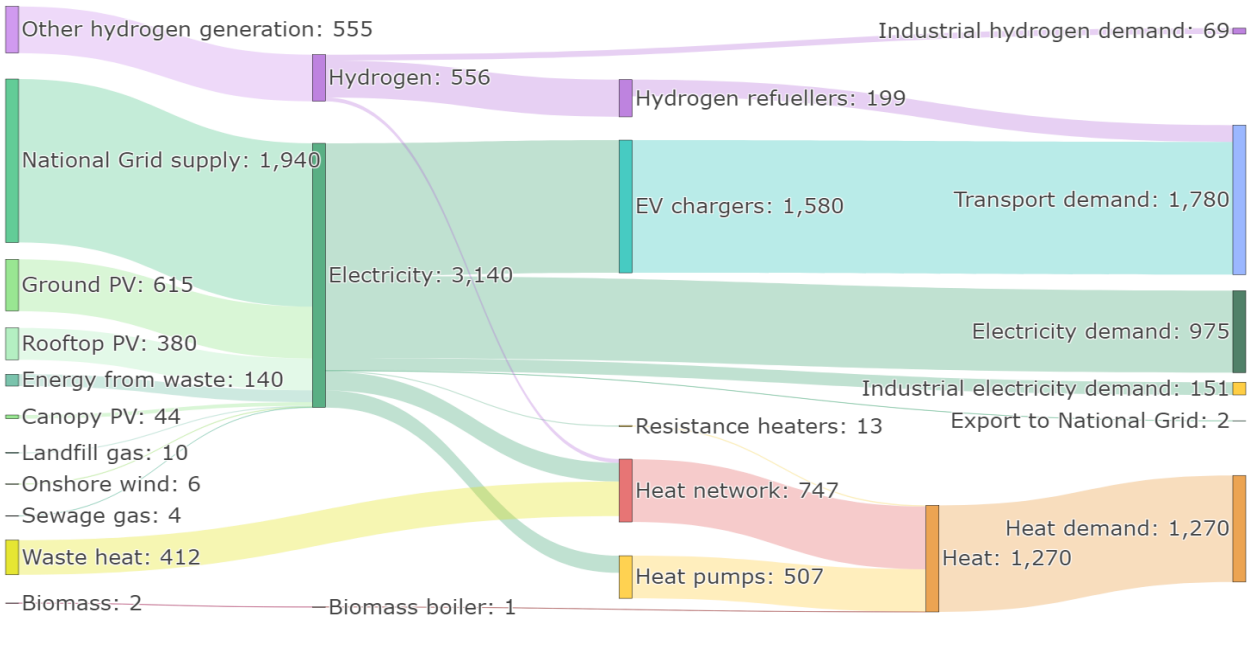
Figure 4.1.1 is an output from our modelling and shows a potential future energy system for Flintshire under the Low Demand scenario. This energy system results from modelling to create the most cost and carbon optimal system. We ran the model for four scenarios to support our decision making. This optimisation modelling informs the deployment pathways as well as the action plan. Note that this Sankey diagram does not present the final plan for Flintshire's future energy system.

Hydrogen generation /import expected to be required for some transport and industry demand

Electricity supply from the national grid could double as electricity becomes the primary vector for heat and transport demand

Local renewable generation could provide 38% of electricity, driven by growth of all forms of solar PV and energy from waste

Waste heat is a by-product of industrial processes



Some industrial heat processes are expected to be met through hydrogen use

The transport sector could be almost fully electrified, with some contribution from hydrogen refuellers

Heat demand could shrink by ~30% and be met entirely through heat pumps and waste heat delivered through heat networks. ~70% less input energy supply is required (compared to 2019) to provide the amount of heat demand in 2050

Figure 4.2.2: Annotated Sankey diagram showing energy flows under the Low Demand scenario (GWh in 2050)

4. The future energy system
Analysis

High Demand scenario – annual energy flows (GWh, 2050)

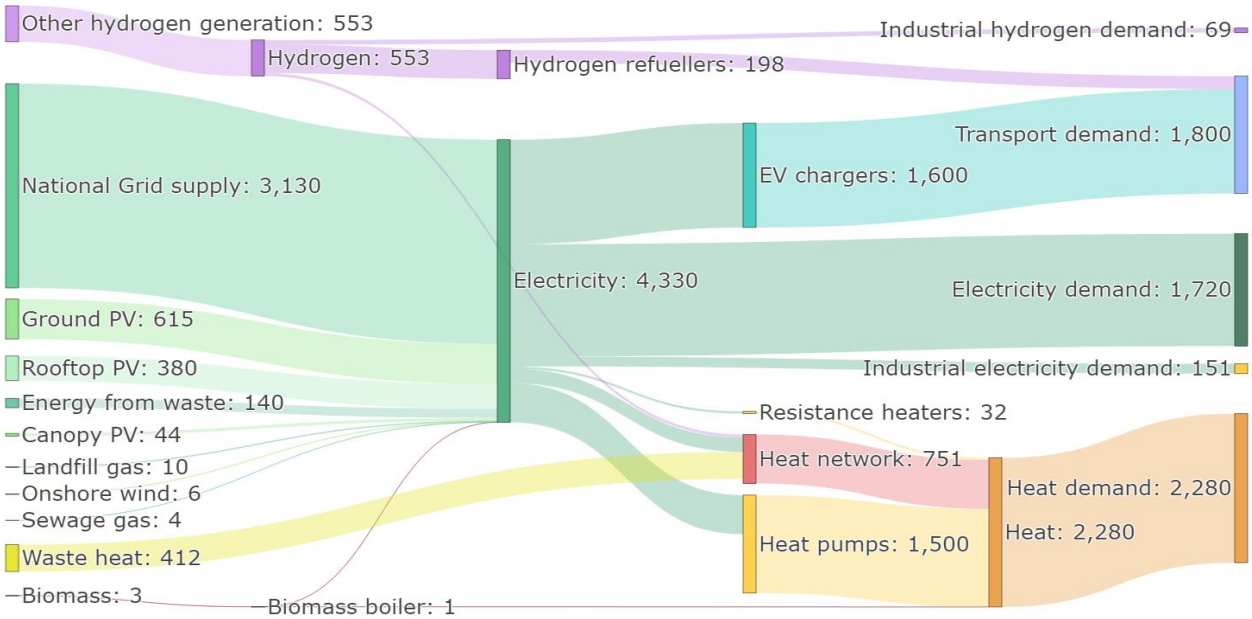
Figure 4.1.2 is an output from our modelling and shows a potential future energy system for Flintshire under the High Demand scenario. This energy system results from modelling to create the most cost and carbon optimal system. We ran the model for four scenarios to support our decision making. This optimisation modelling informs the deployment pathways as well as the action plan. Note that this Sankey diagram does not present the final plan for Flintshire's future energy system.

Hydrogen generation /import expected to be required for some transport and industry demand

Electricity supply from the national grid could increase threefold as electricity becomes the primary vector for heat and transport demand

Local renewable generation could provide 28% of electricity, driven by growth of all forms of solar PV and energy from waste

Waste heat is a by-product of industrial processes



Some industrial heat processes are expected to be met through hydrogen use

The transport sector could be almost fully electrified, with some contribution from hydrogen refuellers

Heat demand could grow 25%+ and be met entirely through heat pumps and waste heat delivered through heat networks. ~50% less input energy supply is required (compared to 2019) to provide the increased amount of heat demand in 2050

Figure 4.2.3: Annotated Sankey diagram showing energy flows under the High Demand scenario (GWh in 2050)

4. The future energy system
Analysis

High Hydrogen scenario – annual energy flows (GWh, 2050)

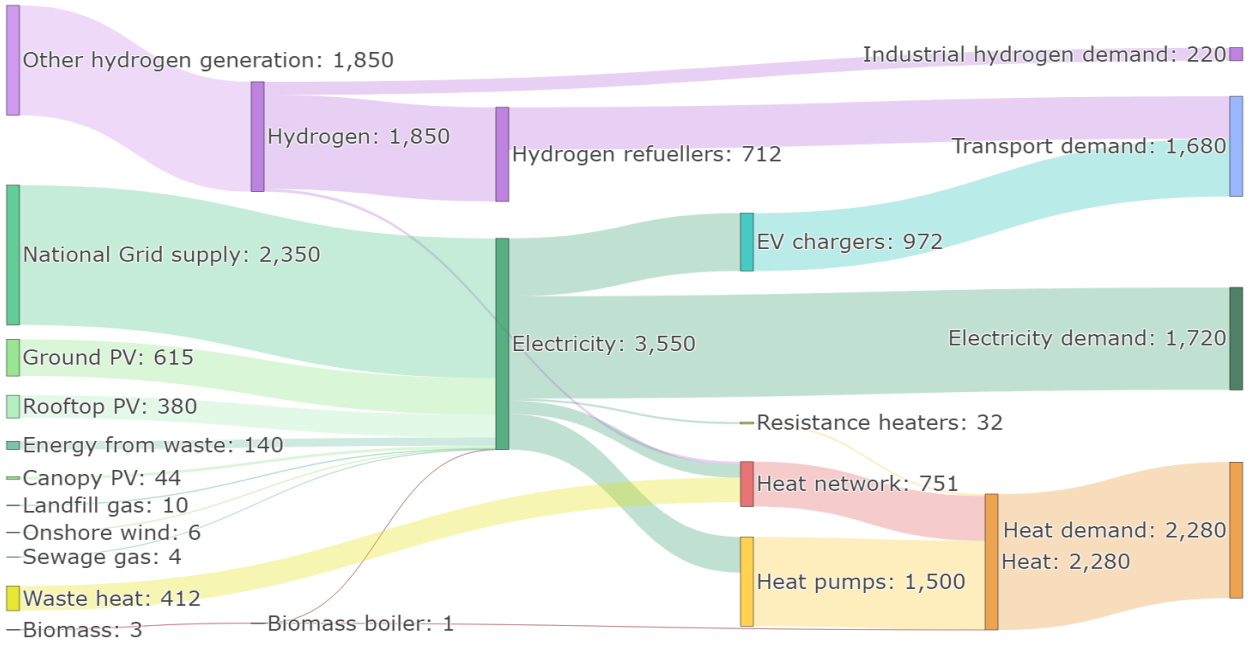
Figure 4.1.3 is an output from our modelling and shows a potential future energy system for Flintshire under the High Hydrogen scenario. This energy system results from modelling to create the most cost and carbon optimal system. We ran the model for four scenarios to support our decision making. This optimisation modelling informs the deployment pathways as well as the action plan. The High Hydrogen scenario (shown below) aligns with trends in the High Demand scenarios, as shown in the comparison presented in Figure 4.0.0. Note that this Sankey diagram does not present the final plan for Flintshire's future energy system.

Hydrogen generation/ import expected to increase significantly with a 3-4 times amount of supply than in any other scenario.

Electricity supply from the national grid could double as electricity becomes the primary vector for heat

Local renewable generation could provide 34% of electricity, driven by growth of all forms of solar PV and energy from waste

Waste heat is a by-product of industrial processes



Both industry and transport expected have a greater demand met through hydrogen supply. 42% of transport demand met through hydrogen refuellers.

The transport sector is likely to be electrified for passenger vehicles and LGVs

Heat demand could grow 25%+ and be met entirely through heat pumps and waste heat delivered through heat networks. ~50% less input energy supply is required (compared to 2019) to provide the increased amount of heat demand in 2050

Figure 4.2.4: Annotated Sankey diagram showing energy flows under the High Hydrogen scenario (GWh in 2050)

4. The future energy system
Analysis

Comparing future energy scenarios

Table 4.1.0 provides an overview of the variations in energy components observed in the optimisation modelling results across future energy scenarios, benchmarked against the baseline results.

Optimisation modelling shows ground-mounted, rooftop solar and onshore wind generation consistently increasing across all scenarios; contributing to meeting both Flintshire's energy demand but also exporting in times of surplus to the National Grid, and serving broader energy needs. In contrast, biomass generation sees a decline across all scenarios, likely due to a reduced dependency resulting from the enhanced output of solar and wind farms. Hydrogen is incorporated into the energy mix in all scenarios, sustaining Flintshire's industrial and transport demands.

Transport demand decarbonises, primarily due to the supply of electricity through EV charge points. Hydrogen also contributes to this demand, albeit to a lesser extent.

Heat demand is predominantly catered for by heat pumps, a trend that is consistent across all scenarios. While heat networks and other technologies contribute to this demand, their usage is comparatively less.

Energy system components	Baseline (GWh)	National Net Zero (GWh)	High Demand (GWh)	Low Demand (GWh)	High Hydrogen (GWh)
Ground-mounted PV	77	615 ↑			
Rooftop PV	11	380 ↑			
Onshore wind	6	6 →			
Sewage gas	1	4 ↑			
Biomass	715	3 ↓		2 ↓	3 ↓
Hydrogen import	0	556 ↑	553 ↑	555 ↑	1,850 ↑
Import from Grid	975	3,110 ↑	3,130 ↑	1,940 ↑	2,350 ↑
EV chargers	3	1,580 ↑	1,600 ↑	1,580 ↑	972 ↑
Refuellers	0	199 ↑	198 ↑	199 ↑	712 ↑
Heat pumps	15	1,500 ↑		507 ↑	1,500 ↑
Heat networks	0	751 ↑		747 ↑	751 ↑
Resistance heaters	40	32 ↓		13 ↓	32 ↓
Biomass boilers	356	1 ↓			

Table 4.2.1: Comparison across the scenarios

4. The future energy system
Analysis

Electricity generation and consumption

Figure 4.2.5 shows monthly averages for one year for optimised generation and consumption of electricity to show what balancing could look like in the High Demand scenario.

A future electrical energy system will look somewhat different from today. On the consumption side there will be much greater demand for electricity for transport, ancillary demand and industry. As heat pumps become the primary heat source, heat demand will require electrical energy and this introduces an element of seasonality to the consumption profile - 138GWh in July vs 154GWh in January.

The seasonal electricity consumption profile will be directly out of phase with increased local renewable generation provided by solar PV (fewer sunshine hours in the winter). As such, the winter months will require a much greater proportion of electricity imported from the national grid – 418GWh in January vs 151GWh in July.

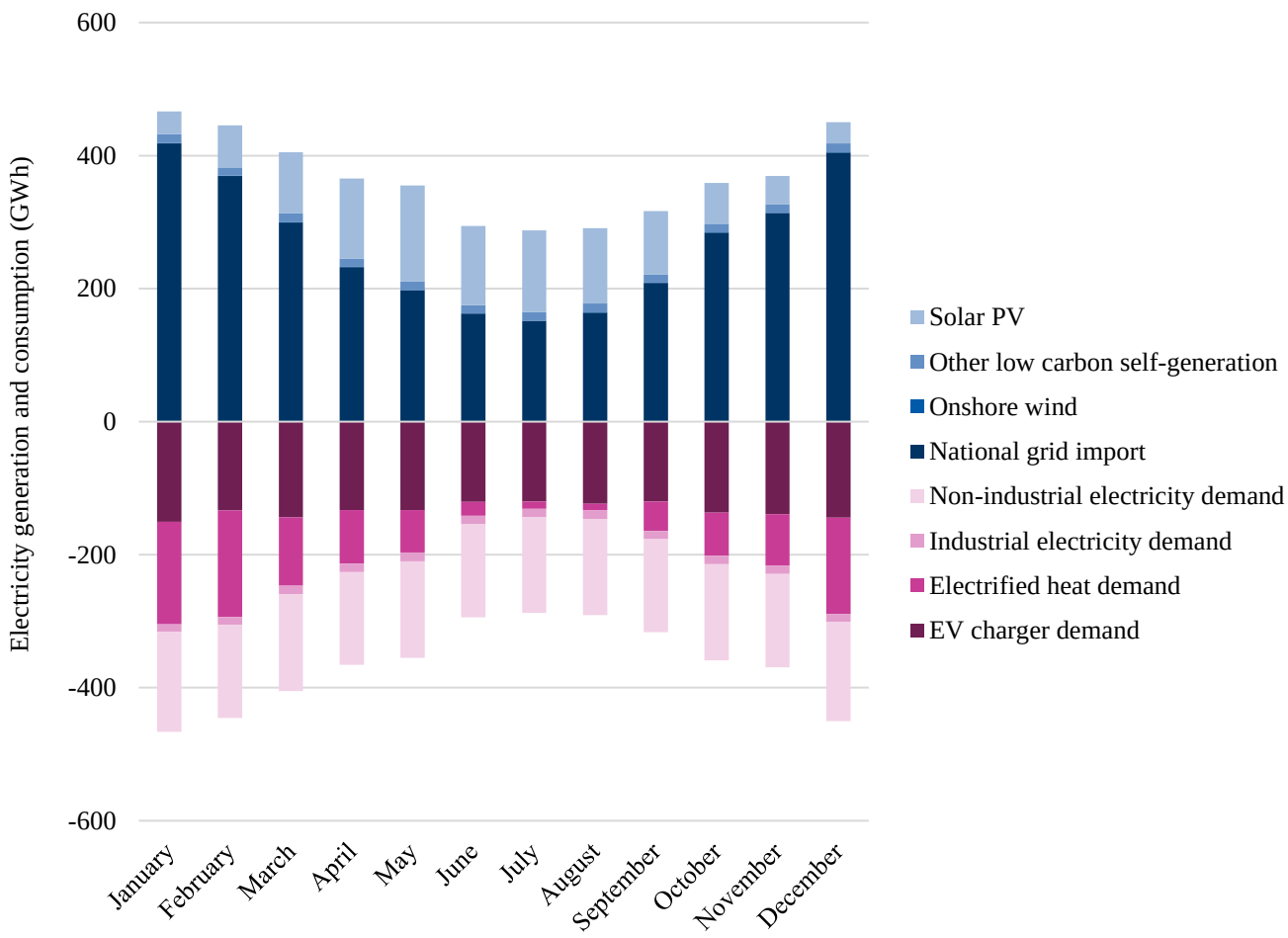


Figure 4.2.5: Monthly electricity generation and consumption in the High Demand scenario

Comparing future energy scenarios - Buildings

Figure 4.2.6 shows the different technologies that are deployed to meet heat demand in homes and commercial properties in 2050, compared to 2023. In 2023, gas boilers and oil/LPG boilers were the most common heating technology installed. In all scenarios, all gas boilers have been replaced by heat pumps with a small number of resistance heaters. Heating systems are generally set up with thermal stores which can help to reduce peak demand by storing heat when there is less demand on the electricity grid and release it when there is high demand. Storage also reduces GHG emissions and costs by making sure energy is used when it's cheaper and when there is a higher proportion of renewables on the grid. This result is likely due to the high efficiency of heat pumps (generates on average, 3kWh of heat for every 1kWh of electricity used) compared to other technologies, and a lower capital cost.

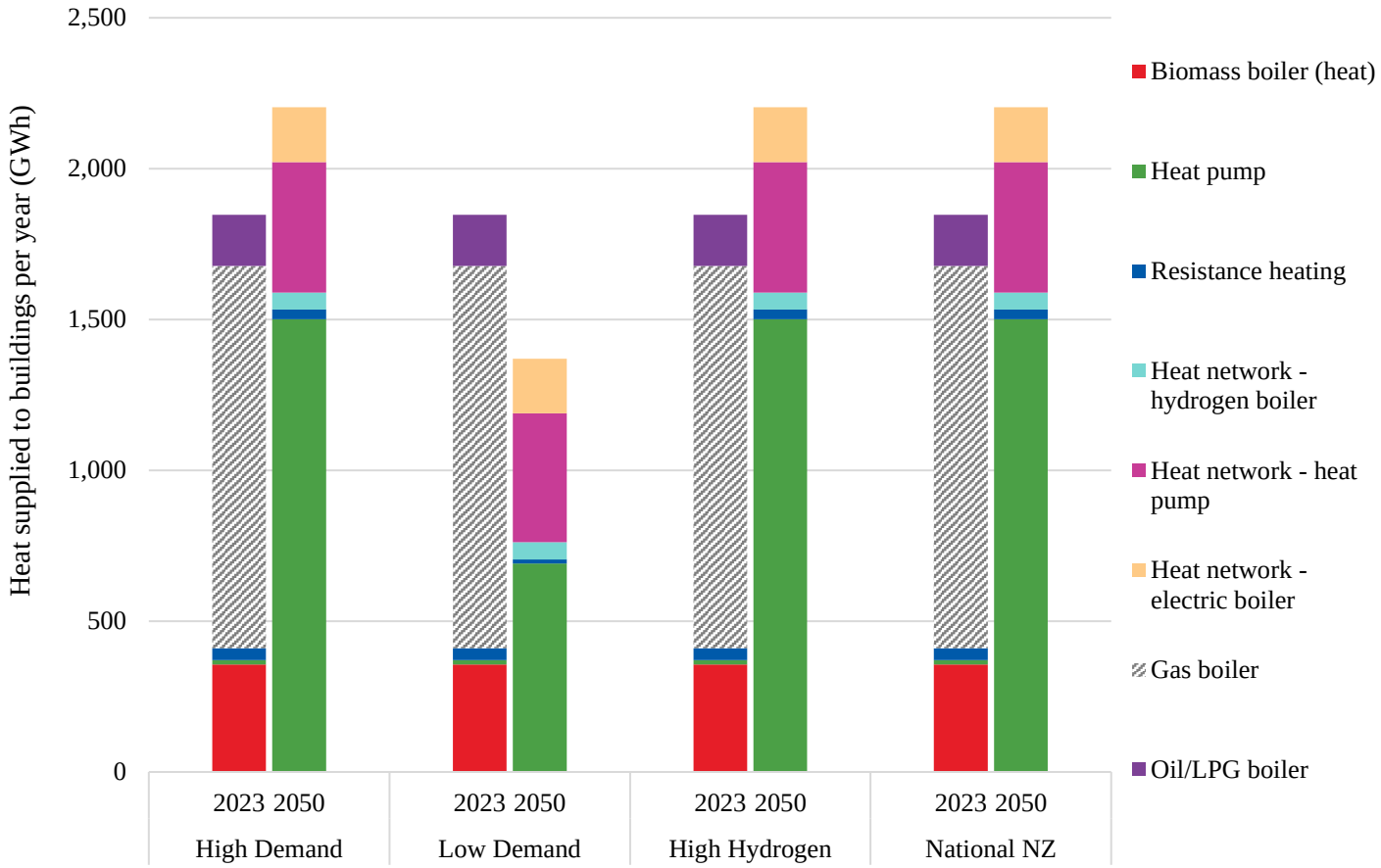


Figure 4.2.6: Proportion of heat supplied to buildings by technology in 2050 for each scenario

4. The future energy system
Analysis

Comparing future energy scenarios - Buildings

Table 4.2.2 shows the total number of energy efficiency measures completed between 2023 and 2050 and their relative proportions in each scenario. In the High Demand scenario, our approach considers the most cost-effective package of retrofit measures for each archetype to reach heat loss measurements associated with an EPC C-rated home or building. This means that in the High Demand scenario, cavity wall, loft, and sometimes floor insulation is fitted, but more expensive measures such as solid wall insulation and triple glazing are not. In the Low Demand scenario, all practical measures are installed where possible regardless of cost, which is why we see deployment of solid wall insulation and triple glazing, as well as an increase in the deployment of floor insulation measures.

Metric	Unit	Baseline	High demand	Low demand
Existing homes	#	71,236		
Domestic - cavity Wall insulation	#		3,732	3,732
	% of total homes		5%	5%
Domestic - floor insulation	#		5,480	56,952
	% of total homes		8%	80%
Domestic - roof insulation	#		12,831	12,831
	% of total homes		18%	18.%
Domestic - solid wall insulation	#			14,579
	% of total homes		0%	20%
Domestic - triple glazing	#			61,128
	% of total homes		0%	86%

Table 4.2.2: Proportion of homes with insulation measures

Comparing future energy scenarios - Buildings

The following five maps (overleaf) show where insulation measures (cavity wall, solid wall, floor, loft and triple glazing) could be deployed in the Low Demand scenario, aggregated to substation zone. The measures deployed depend on how technically viable it is to deploy each one in different housing archetypes. Scenario modelling explores what deployment of these measures looks like in 2050, in two scenarios:

High Demand: Cost-optimal fabric measures applied to upgrade all buildings with a rating of EPC C and below with insulation measures associated with EPC C ratings.

Low Demand: best practice insulation upgrades to improve the heat loss value to the typical efficiency of an EPC C/A.

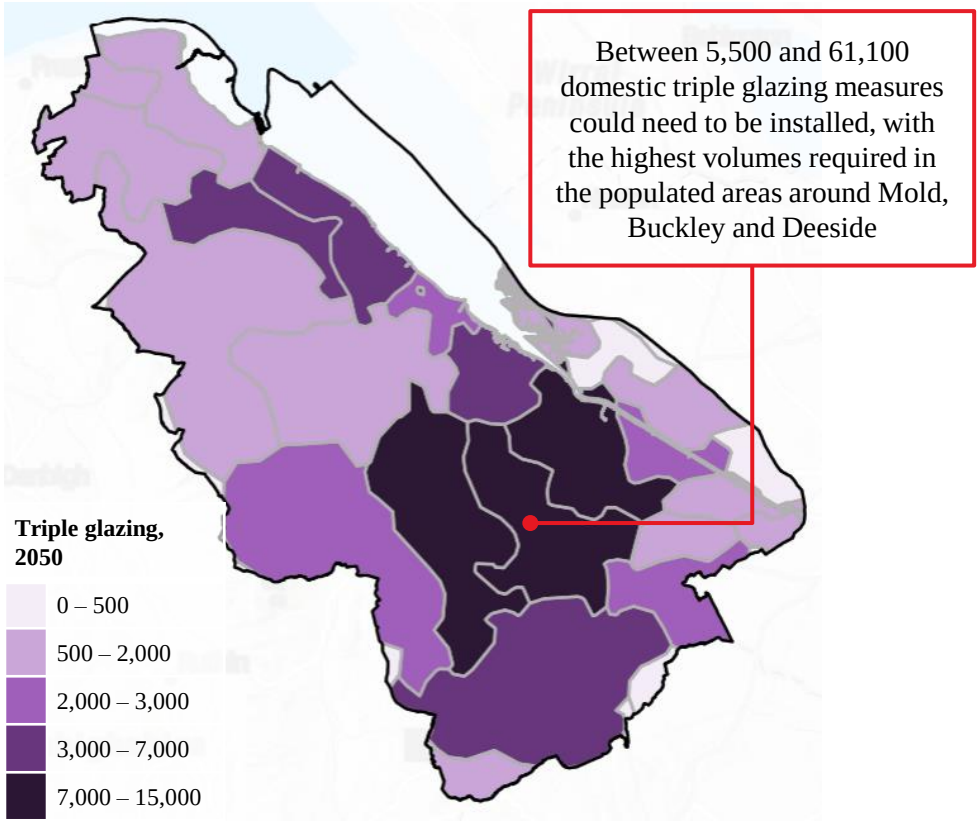


Figure 4.2.7: Map showing the number of additional triple glazing fittings completed by 2050 by substation zone in the Low Demand scenario

Comparing future energy scenarios - Buildings

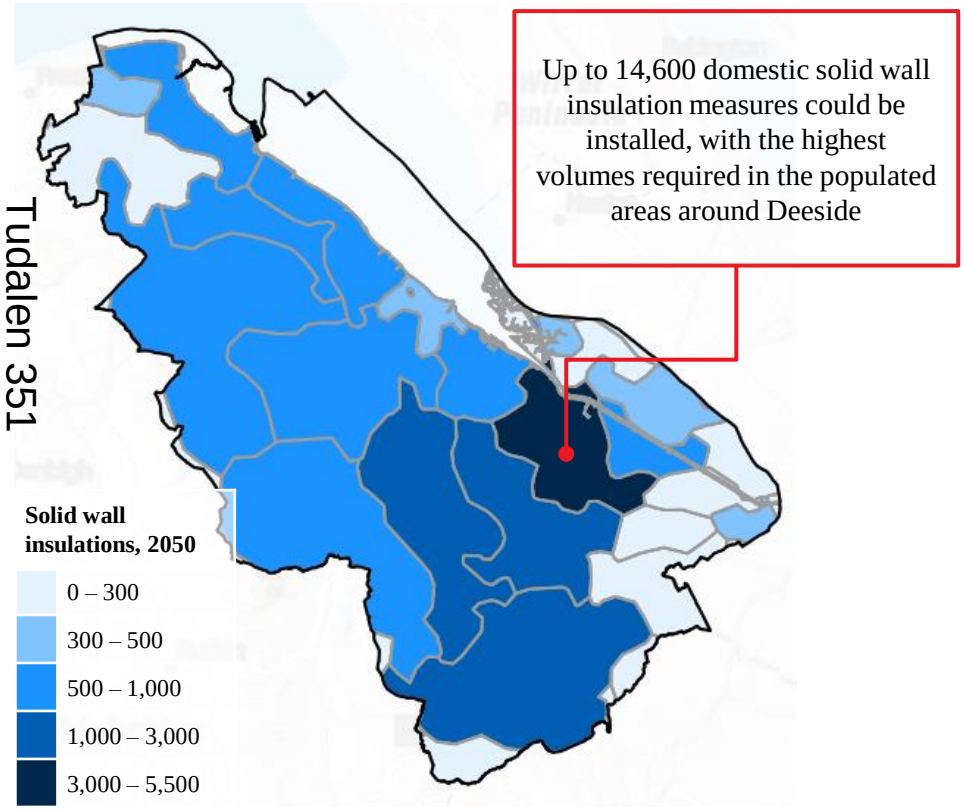


Figure 4.2.8: Map showing the number of solid wall insulation measures fitted by 2050 by substation zone in the Low Demand scenario

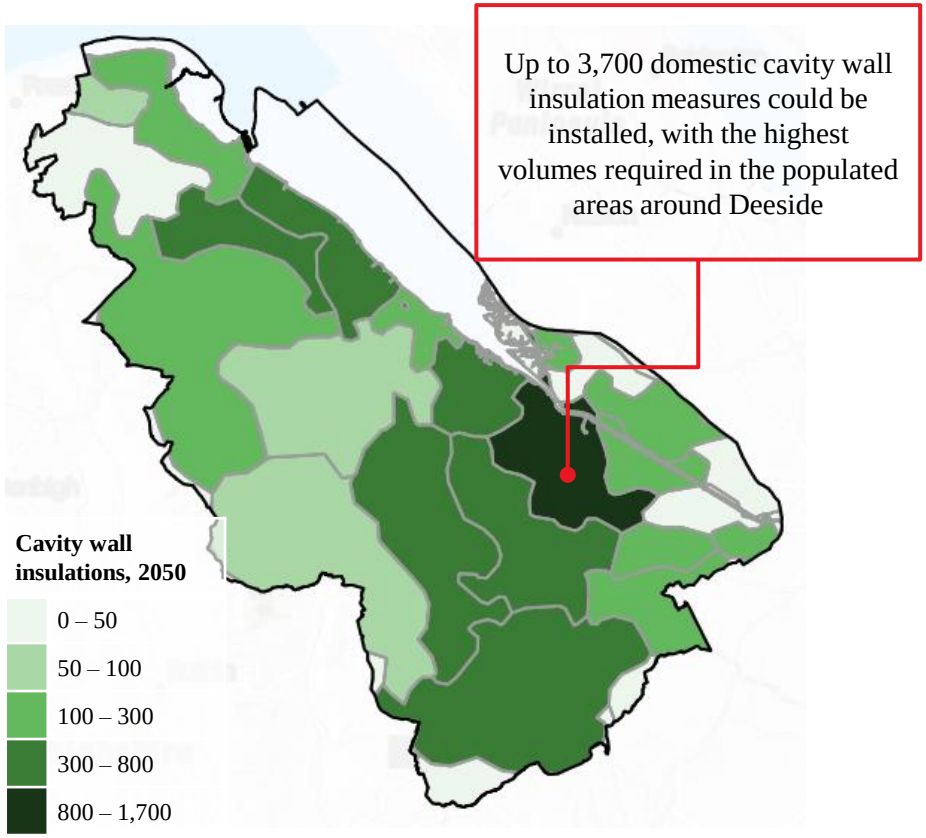


Figure 4.2.9: Map showing the number of additional cavity wall insulation measures fitted by 2050 by substation zone in the Low Demand scenario

Comparing future energy scenarios - Buildings

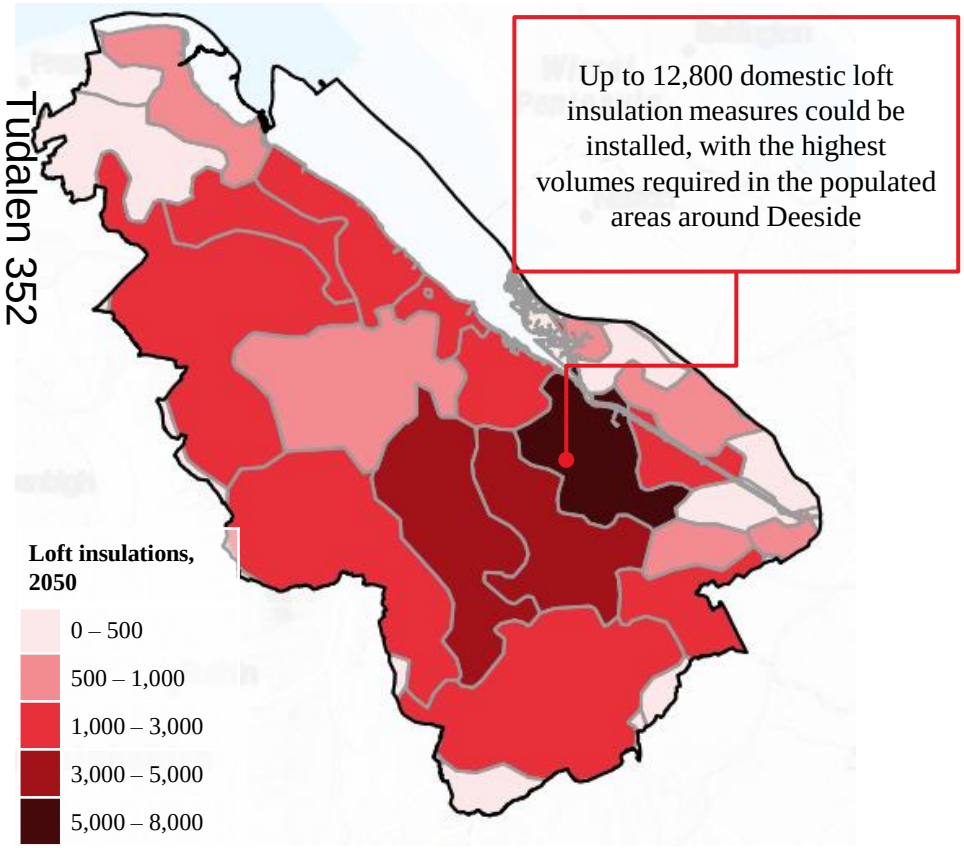


Figure 4.2.10: Map showing the number of additional loft insulation measures fitted by 2050 by substation zone in the Low Demand scenario

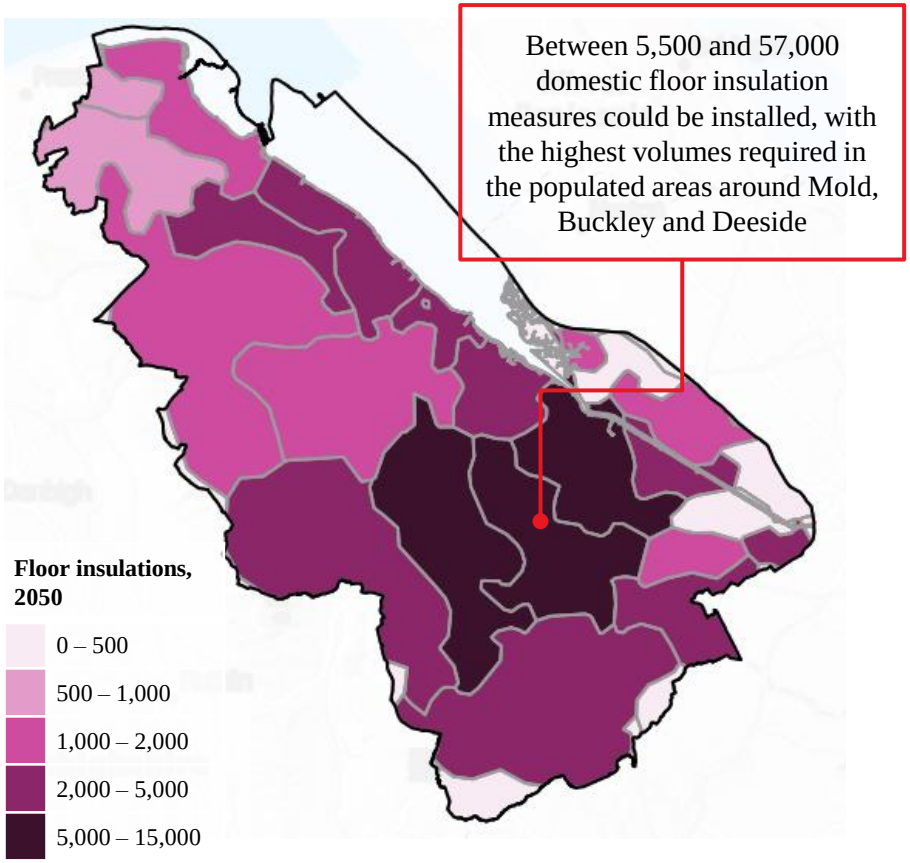


Figure 4.2.11: Map showing the number of additional floor insulation measures fitted by 2050 by substation zone in the Low Demand scenario

Comparing future energy scenarios - Heat networks

This section will analyse potential heat networks in the LA, under high demand scenario.

Potential heat network opportunity areas have been identified where heat networks may be able to deliver heating at lower cost than individual air source heat pumps (ASHPs).

Unsurprisingly, there are numerous potential waste heat providers across the county. These have been highlighted with the blue markings in Figure 4.1.12, and align with the industry and commercial hotspots. This essentially forms a linear network stretching from Saltney in the South to Greenfield in the North with a branch covering the Deeside industrial zone and a separate branch catering for Buckley and Mold. Potential offtakers have been highlighted in yellow, orange and red (depending on the size off the heat offtaker). The offtakers are a mix of commercial, public sector and domestic buildings.

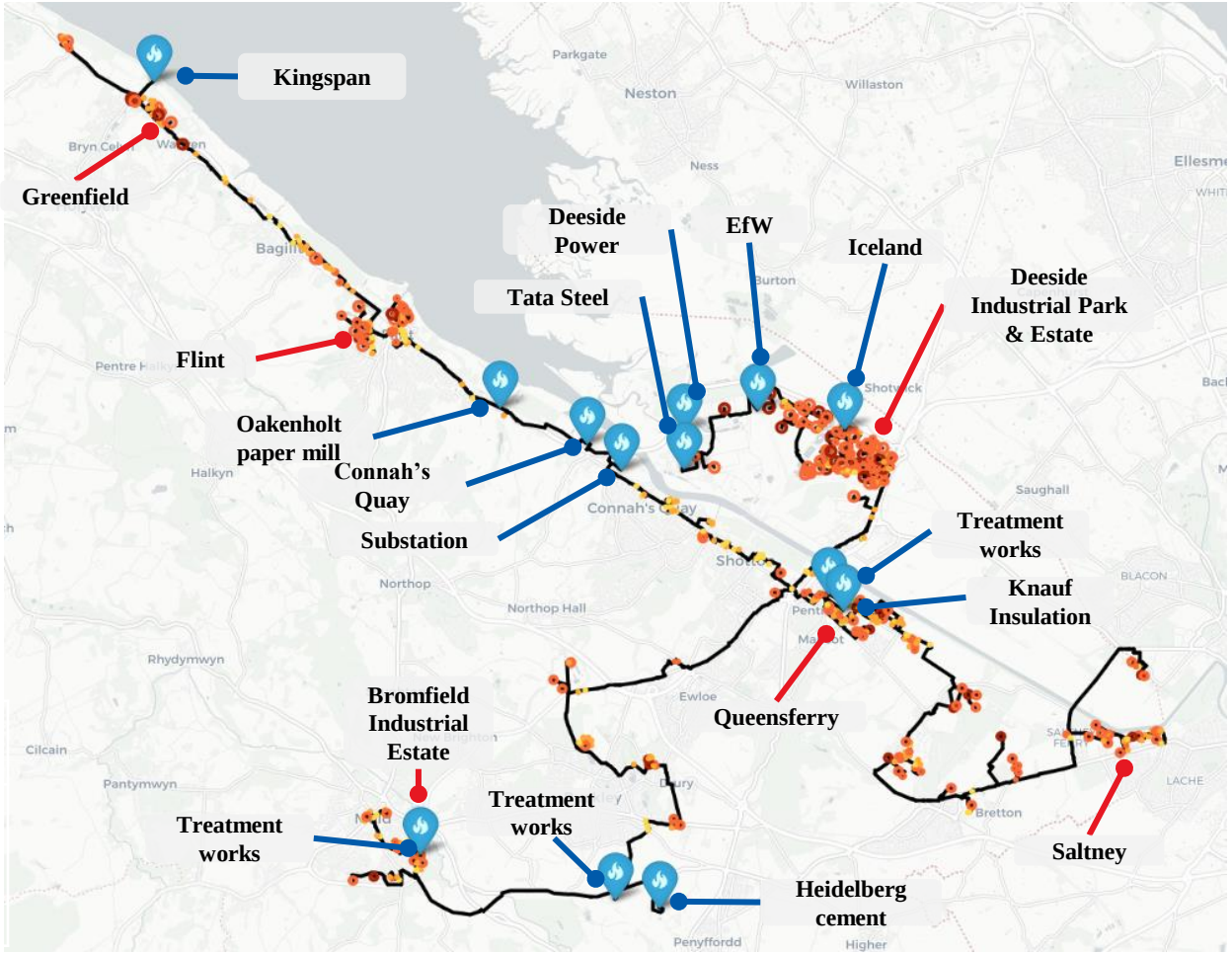


Figure 4.2.12: Map of identified zones for heat network potential in a high demand scenario

Comparing future energy scenarios - Transport

Figure 4.1.12 shows the total number of vehicle miles covered in one year by vehicle type and scenario.

- Car mileage could decrease by 1% in the Low demand scenario and increases by 6% in the High demand scenario based on National Grid's Future Energy Scenarios. This reflects the assumption that people choose to take public transport or use active travel where possible, rather than using their car for all journeys taken.

  Across the three scenarios, 71-88% of mileage is covered by electric vehicles and 12-29% by hydrogen vehicles. These are mostly hydrogen HGVs and buses.
- There are several factors that could influence a greater uptake of hydrogen HGVs:
  - Hydrogen refuelling can be done in 3-8 minutes, compared to at least 60 minutes needed for rapid charging, or overnight for standard charging.
  - Hydrogen HGVs are projected to have up to 50% range advantage over battery electric models (800km against 1,200km).
  - If the uptake of hydrogen HGVs is driven by wider factors such as their range and ease of recharging, and hydrogen becomes widespread in the future, then a significant proportion of HGVs could be powered by hydrogen.

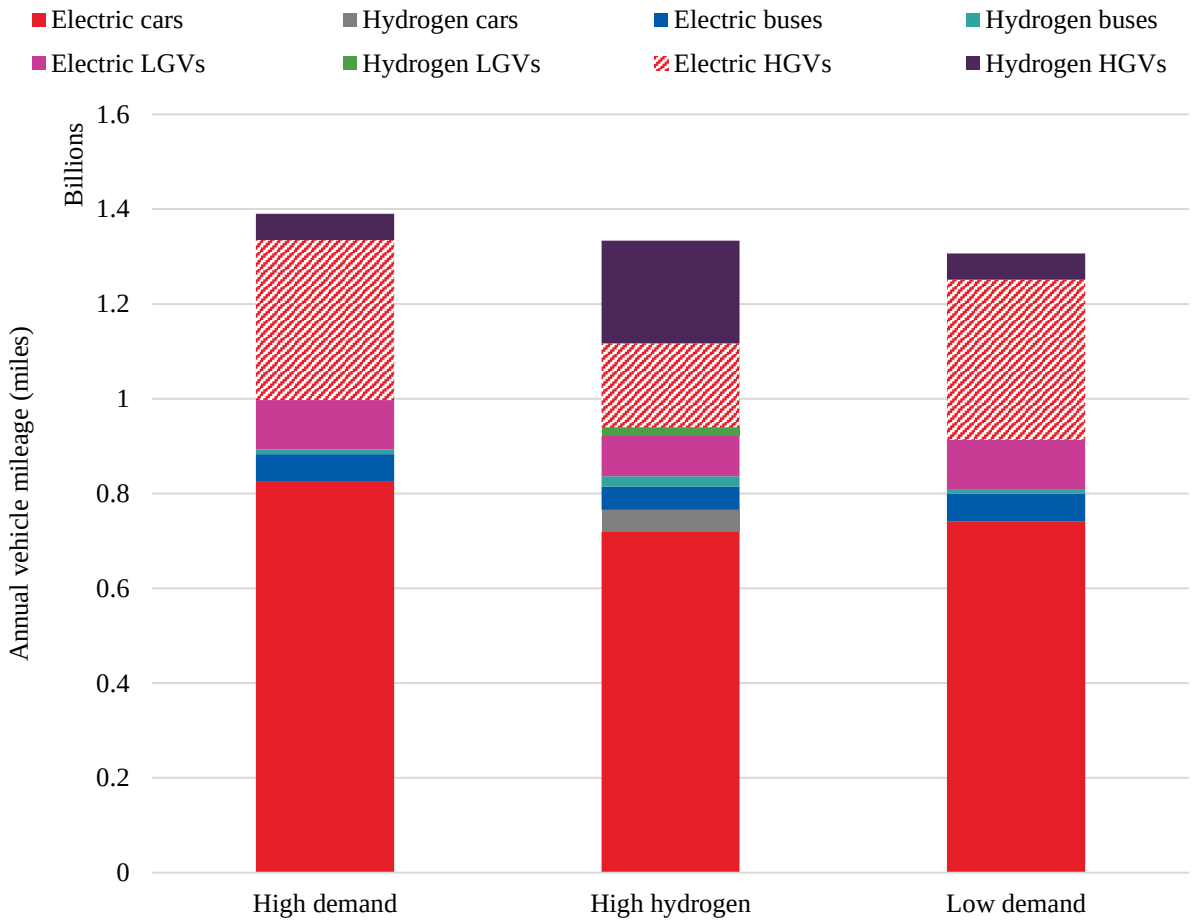


Figure 4.2.13: Total annual vehicle miles by scenario and vehicle type

Comparing future energy scenarios - Onshore renewables (electricity generators)

Our modelling points to an extensive build out of ground solar PV and rooftop solar PV as the most cost- and carbon- effective way to meet projected energy demands. Across all scenarios, all the land identified as potentially suitable for ground PV was used.

Onshore wind is limited within Flintshire due to restrictions from flight paths over the county, as well as areas of outstanding natural beauty. We, therefore, don't see a build out at all of onshore wind from the current baseline levels.

Solar carports, batteries and energy from waste pick up the small remainder of potential 2050 energy generation.

We see a reduction in the number of different generation technologies being deployed as fossil fuel powered generators are phased out.

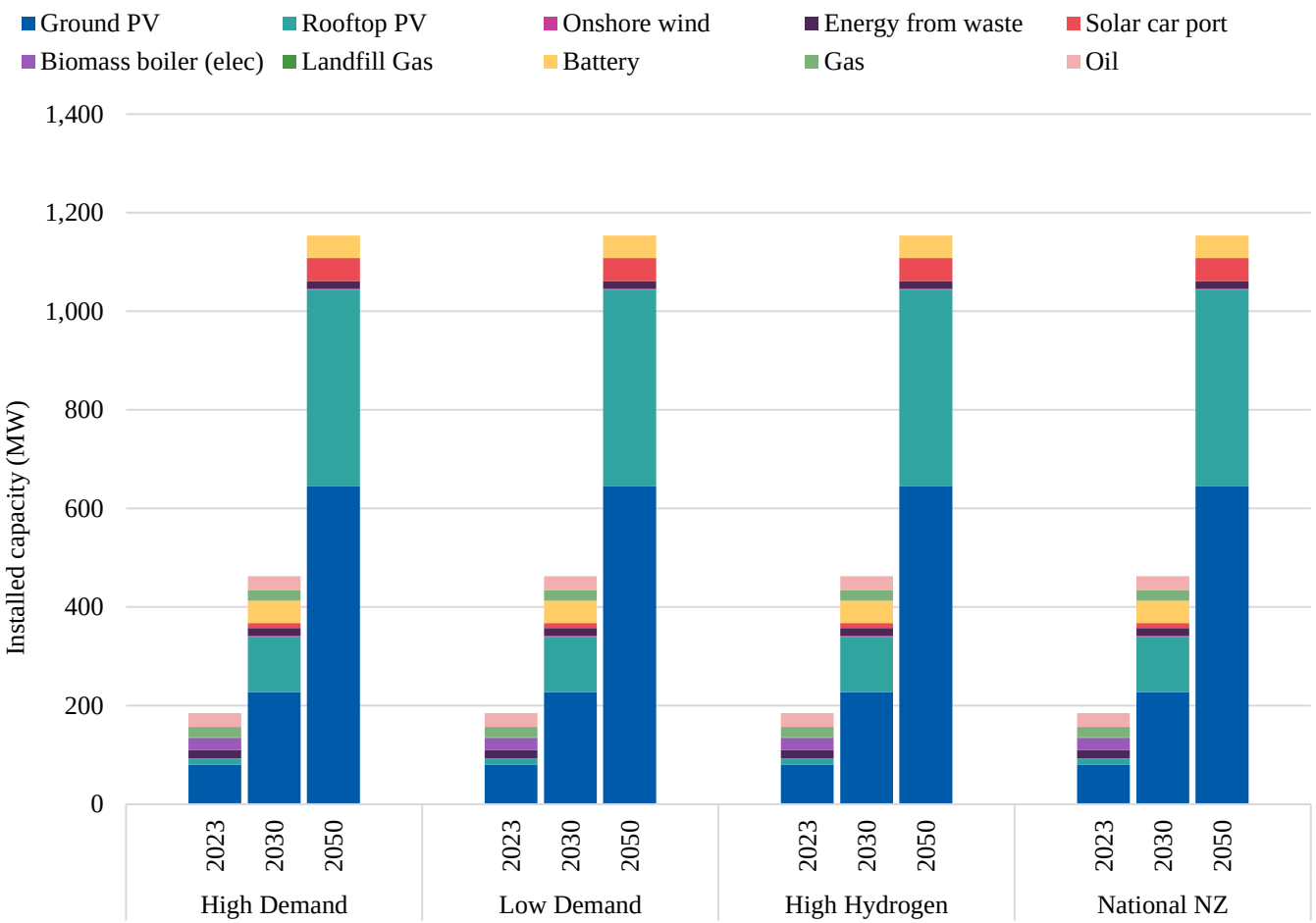


Figure 4.2.14: future capacity of onshore renewables in each scenario

Comparing future energy scenarios - Onshore renewables (electricity generators)

Table 4.1.2 details the maximum theoretical capacity of various generating technologies, taking into account land type and other constraints. Also shown, is the percentage of the theoretical maximum that the modelling suggests needs to be built in order to cover the 2050 energy demands.

It is anticipated that all technologies will either need to be built out to their theoretical maximum or be retired.

In practice, we know that achieving the levels of deployment indicated in the scenarios is ambitious and is beyond the rates of deployment we see today. This is further explored in the renewable energy proposition in Chapter 5: Action planning.

Renewable technology	Baseline capacity (MW) (2023)	Total theoretical capacity across scenarios in 2050 (MW)	Additional capacity indicated across scenarios (MW)	Percentage of total maximum theoretical capacity across scenarios (%)
Ground-mounted solar PV	80	565	645	100%
Rooftop solar PV	12	387	399	100%
Onshore wind	2	2	2	100%
Canopy Solar PV	0	46	46	100%
Biomass boiler (elec)	0	25	25	100%
Energy from waste	16	16	0	100%
Battery	0	45	45	100%
Sewage gas	0.2	0	-	n/a
Landfill gas	1	0	-	n/a

Table 4.2.3: Existing and maximum future capacity of onshore renewables

Tudalen 356

Comparing future energy scenarios - electricity infrastructure - upgrades

The model optimises each future energy system by considering the most cost- and carbon-optimal supply profile to meet demand in each substation zone, solving this problem for three hour intervals over the course of one year. In some cases, the marginal cost of upgrading and connecting an additional unit of capacity to the substation is less than the marginal cost of installing an additional unit of battery or thermal storage capacity to reduce peak demand enough that the upgrade wouldn't be needed. Figure 4.1.14 shows the degree of upgrades required in the High Demand scenario, which explores a future scenario where electricity demand is high because of limited rollout of demand reduction measures and consumer behaviour changes.

28 of the 30 primary substations across Flintshire are likely to require some form of upgrade. The level of upgrade could vary from 0.5MW at some substations to over 90MW at others. 80% of the upgrade in capacity across all 30 primary substations, will be needed from the following 11 primary substations:

1. Connah's Quay (91 MW)
2. Buckley (63 MW)
3. Greenfield (50 MW)
4. Bromfield (43 MW)
5. Deeside Industrial Park (43 MW)
6. Queenferry (38 MW)
7. Flint (30 MW)
8. Caergwrle (25 MW)
9. Shotwick (21 MW)
10. North Wales Paper (20 MW)
11. Holway Road (19 MW)

This modelling considers up to the primary substation; there will be further upgrades required to the 11kV network out from the substations which is not included within the modelling.

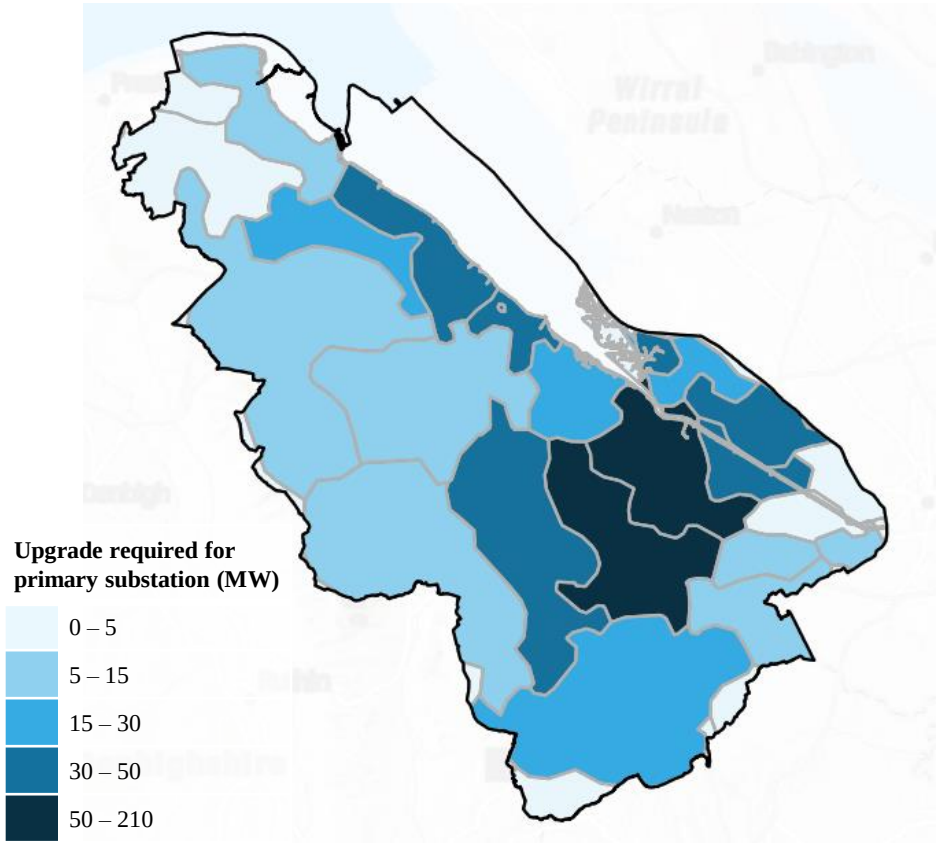


Figure 4.2.15: Map of electricity network upgrades in the high demand scenarios

Tudalen 357

4. The future energy system
Analysis

Uncertainties and limitations

There are numerous uncertainties that may impact the future local energy system between now and 2050. These uncertainties could influence the CAPEX, OPEX, and carbon emissions associated with delivering the future local energy system.

It is important to acknowledge these uncertainties in the LAEP to ensure that it is adaptable, and resilient to any negative impacts uncertainties could lead to.

This analysis also highlights how the modelling associated with the LAEP are not designed to be used in isolation, and should be combined with other evidence, as they cannot cover all potential future outcomes.

Table 4.1.3 (overleaf) summarises the impact of key sensitivities and uncertainties on the future energy system scenarios.

4. The future energy system

Analysis

Uncertainties and limitations

Uncertainty	GHG emissions	CAPEX	OPEX	Other notes
Lower uptake / roll-out of renewables	↑	↓	↑	If there is a lower roll out of solar or wind, the model maximises other renewables up to their maximum capacities and then imports electricity from the national grid.
Lower uptake / roll-out of retrofits	↑	↓	↑	Higher consumer bills and more capex spent on deploying heat pumps, likely to result in poor consumer perception.
Lower uptake / roll-out of heat pumps	↑	↓	?	More chance of hydrogen scenario. OPEX changes would depend on future costs of electricity, gas (and potentially hydrogen).
Lower uptake / roll-out of demand side management	↑	↑	↑	Higher energy infrastructure costs. Greater cost to consumers..
Lower uptake of EVs	↑	↓	?	OPEX changes would depend on future costs of diesel/petrol and electricity.
Higher uptake of hydrogen	↓	?	↑	Higher uptake of hydrogen could facilitate a faster transition to net zero, with less pressure on the electricity network.
Increased grid electricity import prices	?	?	↑	Likely to drive more demand side management in area– if this occurs, carbon emissions and infrastructure investments would reduce. However, increase grid electricity prices might also slow down electrification and decarbonisation.
Reduced gas prices	↑	?	↓	Less people switch to heat pumps, more chance of hydrogen scenario CAPEX impact would depend on cost of heat pumps vs hydrogen boilers.
Increased CAPEX for electrical reinforcement	↑	↑	↑	Could slow down electrification, with impact on overall GHG emissions. Could increase cost of electricity for consumers.
More extreme weather	?	↑	↑	More extreme cold days mean higher heat pump capacities would be required. More hot summer days could lead to increased cooling, with increase in OPEX. Overall emissions remain similar if annual average temperatures are unvaried.

Table 4.2.4: Impact of key sensitivities on the future local energy system

Trends from optimisation model runs

Having run over 150 models across multiple Local Authority areas, we observed several trends. Where it has not been possible to undertake modelling at a 1-hour timestep, we can estimate what the expected impact would be. We have also observed how the system changes when we remove the electricity import. The diagram in Figure 4.1.15 demonstrates what we have found over the multiple model runs that we have undertaken.

What does the model always do?

- Maximises onshore renewables (solar PV and wind
- Chooses heat pumps as the dominant heating technology
- Chooses to meet 10% of transport demand using hydrogen, and 90% with electricity
- Imports electricity to meet demand where renewable energy generation is not available
- Export surplus electricity generated

How does the timestep influence the system?

- If we use a more granular time resolution for modelling (e.g. 24-hour to 1-hour timesteps):
  - The size of the electricity system increases
  - Thermal storage increases
  - The model sometimes chooses to add battery storage

What does the model do if electricity imports are restricted?

- Increases any renewables that haven't already reached their theoretical maximum capacity
- Builds hydrogen CCGT to meet electricity demand when renewable energy generation is not available
- Prioritises electrolysers to generate hydrogen but sometimes chooses a combination of electrolysers and hydrogen imports to meet hydrogen demand.

Figure 4.2.16: Trends from optimisation model runs

Sponsors:

Delivery partners:

Technical report

Chapter 4: The future energy system (stages 4-5)

Deployment modelling

Methodology

We developed a deployment model to determine the rate at which specific technologies could be deployed between the baseline year and 2050. Exploring how quickly different solutions could be deployed and comparing this to the pace of change required helps us gauge what is achievable and what else is needed to facilitate the changes required. The model can also help us break down the changes required into appropriate time periods and provides a way to monitor progress.

The deployment pathways for each energy system component describes the technological changes required over time. From this, we were able to compare how GHG emissions would change over time against national emissions reduction targets and indicate the capital investment requirements between the baseline year and 2050.

Figure 4.2.0 shows how assumptions were applied to near-term and long-term deployment trajectories. Near-term indicates the period for which local and national policy can be applied which is generally 2023-2030 but can vary depending on technology.

Table 4.2.0 summarises the data sources used to inform deployment rates for different technologies that were assessed in our optimisation modelling. A full list of technologies deployed, their metrics, and relevant policies can be found in Appendix B7.

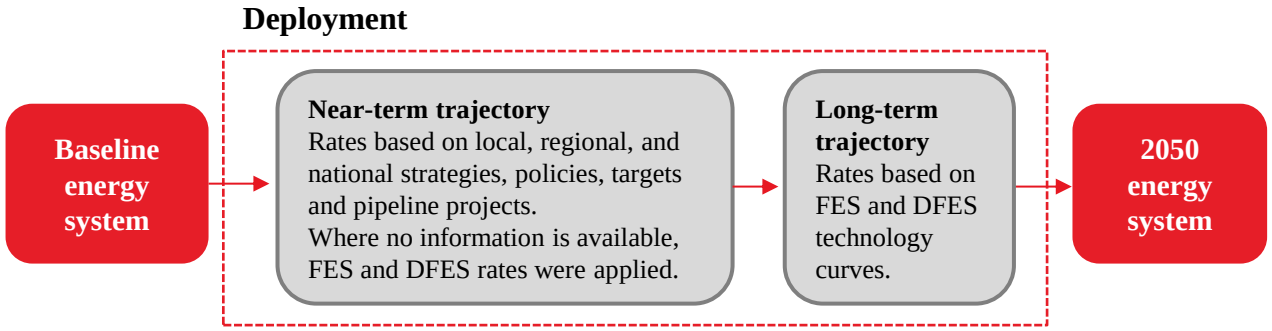


Figure 4.2.0: Deployment model overview of assumptions used to determine rates

Data source	Description
National Grid's Future Energy Scenarios (FES)[T31]	FES are a range of forecasted net zero technology trajectories to 2050 for the electricity system in Great Britain. They consider national policies and ambitions for an extensive list of supply and demand technologies at the distribution level.
Distribution Future Energy Scenarios (DFES)[TN34]	DFES projects the FES technologies at a more granular resolution (primary and secondary substation zones).
National policies and ambitions review	A review of national strategies to do with the energy system was carried out to support the deployment modelling. E.g. no new gas boilers or fossil vehicles by 2035.
Local authority strategies and plans e.g. local development plans (LDP)	A review of local strategies and plans was carried out to support the deployment modelling. E.g. transport strategies containing a target number of chargepoints for an area.
Stakeholder engagement	Information captured in Welsh LAEP programme workshops.

Table 4.3.1: Summary of data sources used to inform deployment modelling

4. The future energy system
Deployment modelling

Impact on total energy demand (GWh)

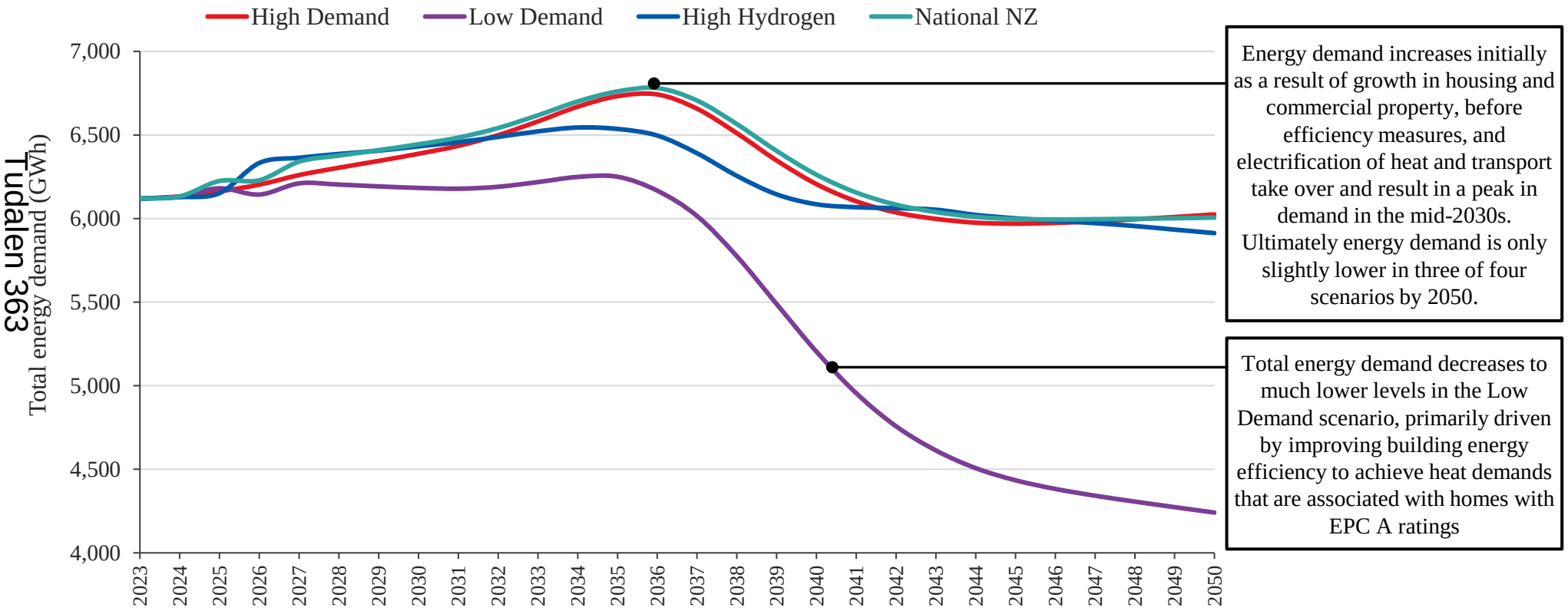


Figure 4.3.1: Change in total energy demand by scenario (GWh)

Energy demand from buildings (GWh)

Buildings energy demand increases overall because the evidence assumes an increase in the number of homes and commercial buildings between now and 2050. However, the average heat demand decreases from approximately 13,000 to 11,000 kWh_{heat}/home and commercial buildings 100 to 77 kWh_{heat}/m^2.

Tudalen 364

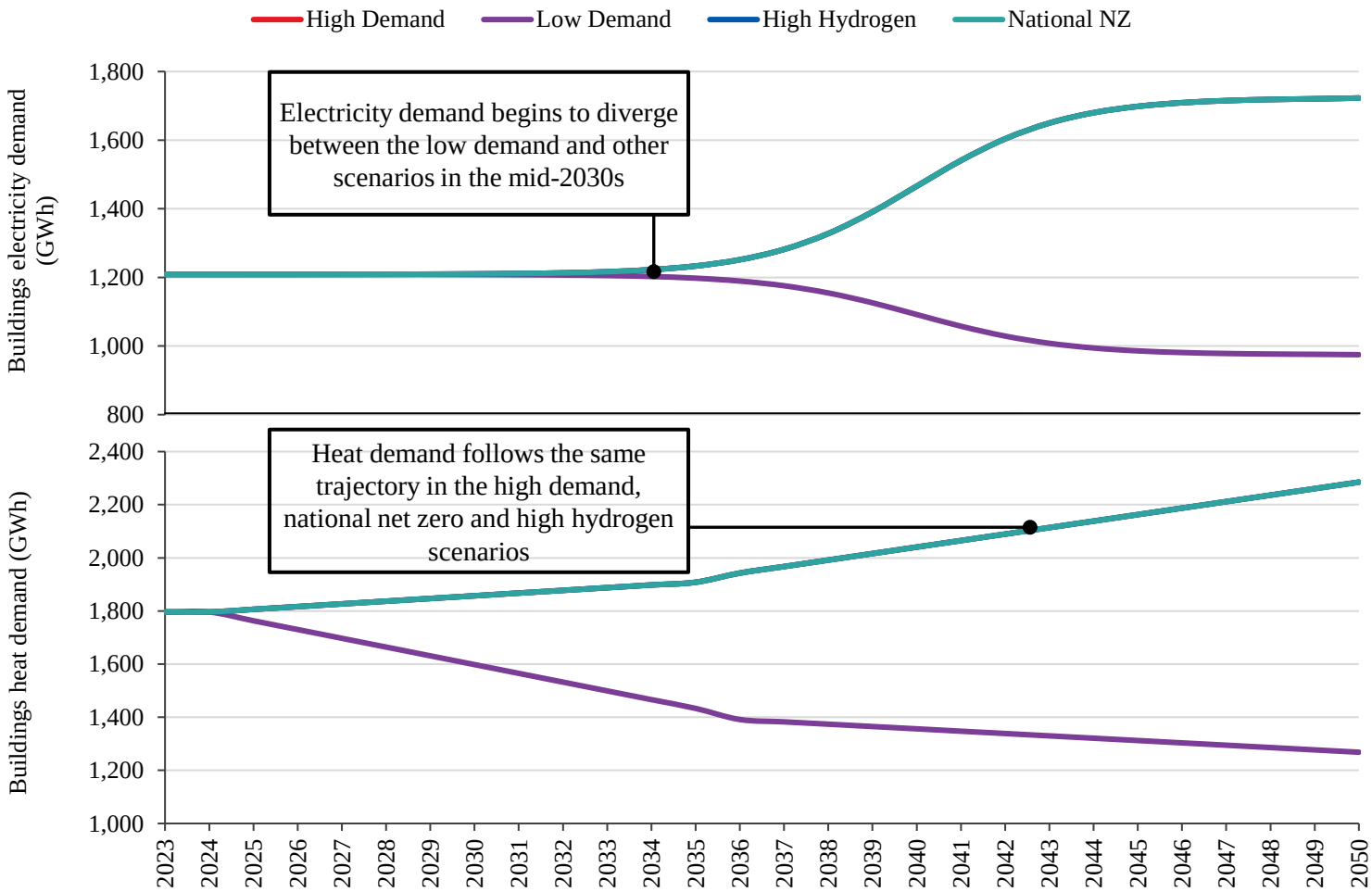


Figure 4.3.2: Projected electricity and heat demand for buildings in each scenario

Energy demand from transport (GWh)

The high demand scenario sees the greatest switching to electric vehicles early on, and therefore the greatest reduction in energy demand. However, as the levels of vehicle electrification increases in the low demand and national net zero scenarios the energy demand trajectories begin to align.

The high hydrogen scenario ultimately sees the greatest reduction in energy demand thanks to the greater efficiencies of hydrogen fuelled HGVs compared to electric.

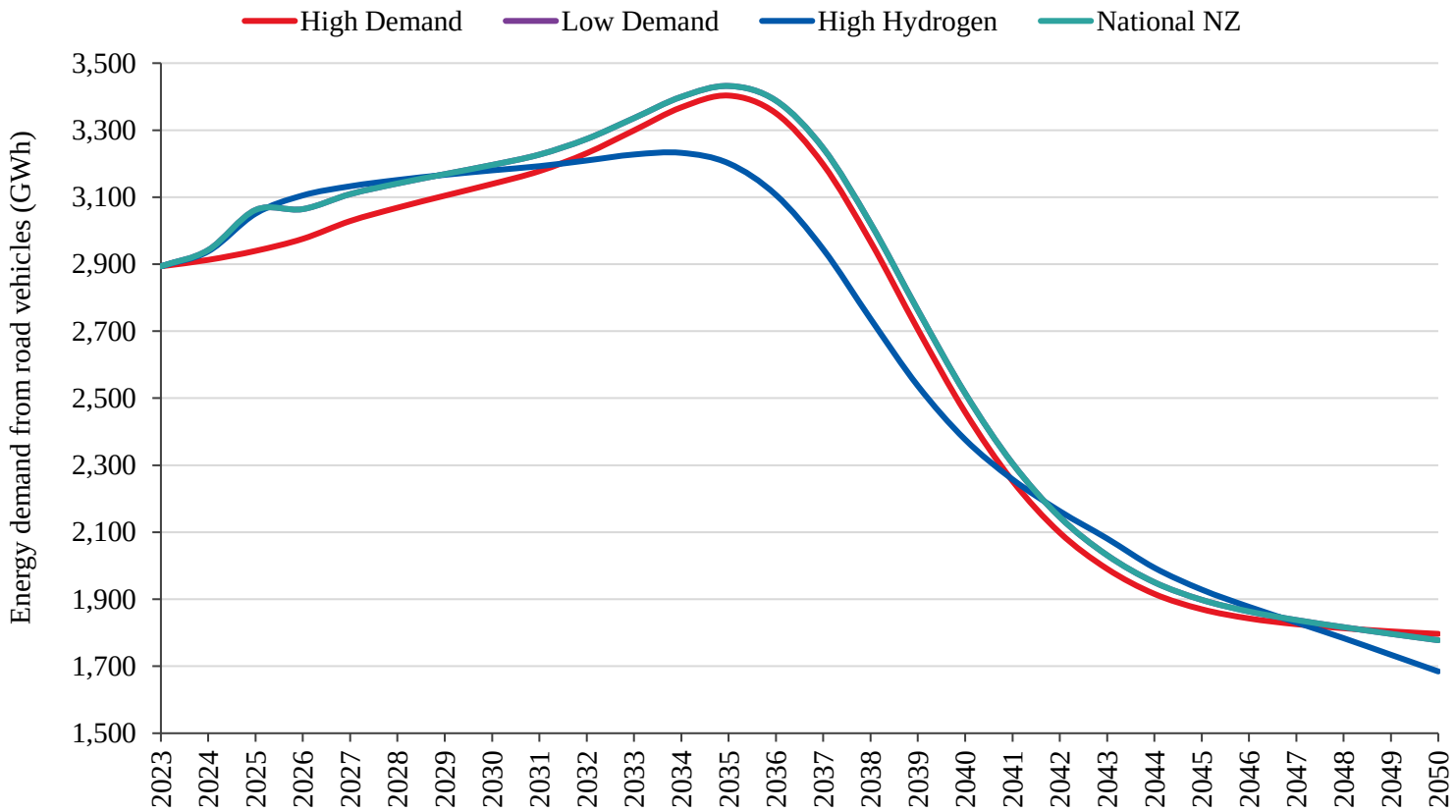


Figure 4.3.3: Projected energy demand from road vehicles by scenario

Summary of deployment for low-regret energy system components

Our deployment model helps us to think about where we are now and where we need to get to, providing a starting point to frame the challenge and for more detailed analysis. We have included theoretical pathways which have a high degree of uncertainty as there are many variable factors and unknowns. The deployment modelling can't take into account every factor, some of the things that will impact deployment include:

1) Technological advance and innovation
2) Supply chains and how they develop
3) Large scale activity to decarbonise infrastructure at other levels: regional, UK and beyond.

*According to the National Charge Point Registry[M43] as of May 2023. Refers to individual charge points, and assuming 4kWp per charge point

**Assuming 4kWp per roof

***Renewable generation capacity is shown for technologies where current installed capacity is >5MW

	Measure	2023	By 2030	By 2050
	Additional homes with insulation measures (#)	13,00 homes with EPC A-C (35%)	Up to 25,000 homes retrofitted	Up to 61,100 homes retrofitted
	Buildings with heat pumps installed (#)	700	Up to 14,600	Up to 95,300
	EV charge points (#)*	220	Up to 8,430	Up to 63,840
	Buildings with rooftop solar PV (#)**	2,900 (12 MW)	28,000 (112 MW)	99,700 (399 MW)
	Ground-mounted solar PV capacity (MW)	80 MW	228 MW	645 MW
	Other renewable capacity (MW)***	44 MW	73 MW	110 MW

Table 4.3.2: Summary of deployment of various technologies between 2023, 2030 and 2050

Impact on GHG emissions

Figure 4.2.4 compares projected GHG emissions for each future energy scenario (see Chapter 4. The future energy system (methodology) for a description of scenarios). The "Do Nothing" scenario assumes that Flintshire continues operating as it is today, with no further action beyond what is already current mandatory UK and Wales GHG emission reduction targets. However, this does not reach the net zero target. Any change can largely be attributed to the forecasted decarbonisation of the electricity grid. By considering external factors such as committed policy and other decision points, the deployment pathways for each scenario help us to prioritise actions that we might deliver in the next five years. It also highlights the systemic changes that will be needed to achieve the scale and pace of change that is indicated.

Scenario	2030	2040	2050
Welsh Gov targets	-63%	-89%	-100%
National Net Zero	-33%	-77%	-96%
High Demand	-34%	-78%	-96%
High Hydrogen	-34%	-72%	-95%
Low Demand	-35%	-77%	-97%
Do Nothing	-32%	-33%	-33%

Table 4.3.3: % GHG emissions reduction for each scenario compared to the Welsh Government emissions reduction targets

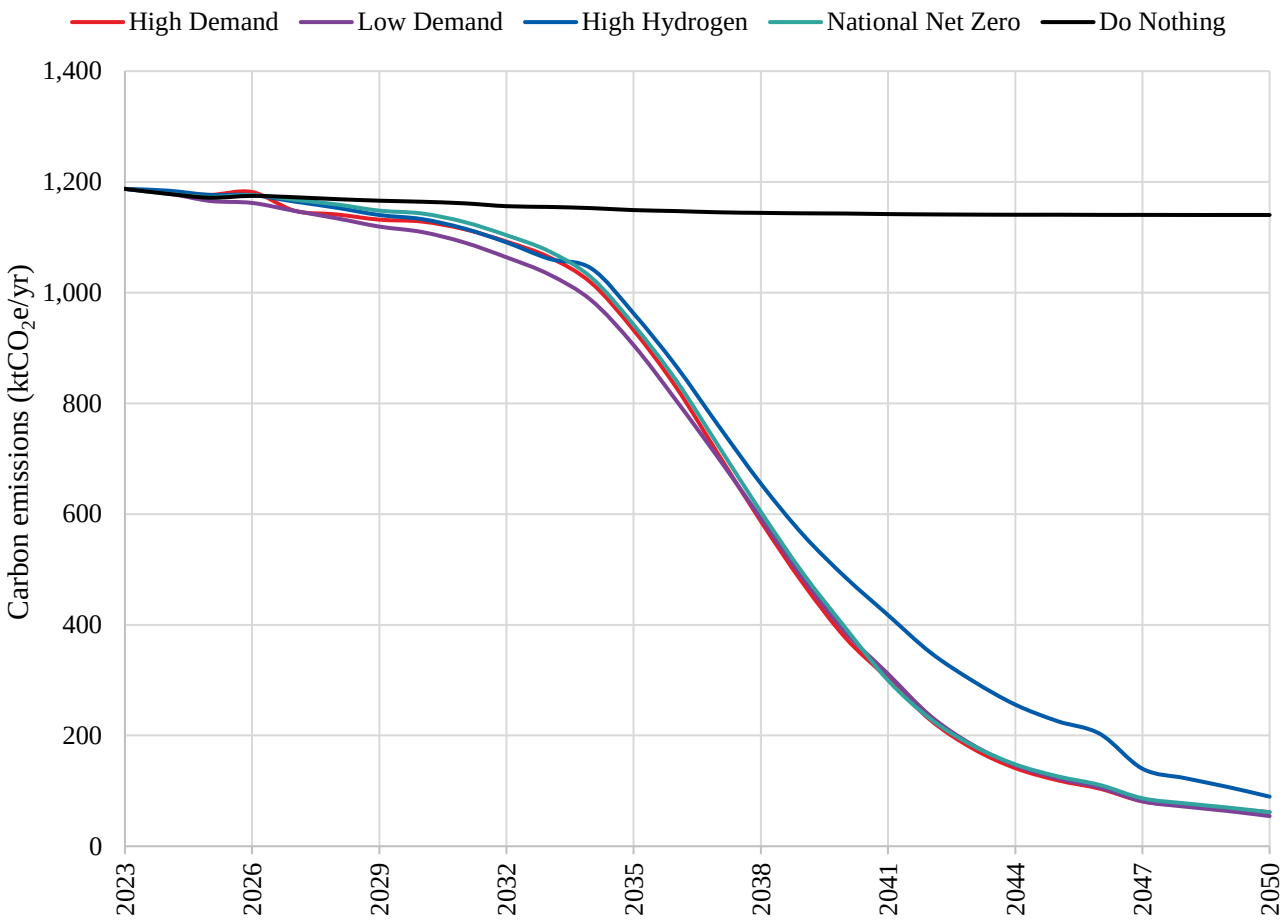


Figure 4.3.4: GHG emissions (ktCO2e) over time for each scenario compared to the Do Nothing scenario

4. The future energy system
Deployment modelling

Impact on employment

Reducing the amount of energy we use and using renewable energy can have wider benefits so it is important that they are understood to support decisions that impact the future of the energy system. The benefits realised can be economic, social and environmental. For example, for every £1 invested in energy efficiency measures, the NHS can save £0.42 (amounting to annual savings of £1.4 billion in England alone)[T35].

Employment impacts

Investments in local energy systems can be expected to have employment benefits by providing local, skilled jobs. These will include direct jobs from construction and operational phases of the development[T36].

Method

We conducted a literature review to extract relevant indicators to estimate the employment impacts derived from investment in different decarbonisation measures such as energy efficiency improvements, installing heat pumps and EV chargepoints or constructing a solar farm. We have selected indicators that reflect jobs created in the local area to assess the local benefits associated with each scenario, and, where possible, excluded impacts associated with employment that are likely to be felt beyond the local area. This means that "indirect" employment impacts, or jobs created within the supply chain to support a particular project (e.g. for a wind farm, this could be jobs supplying or manufacturing the blades for wind turbines) are not considered.

Our assessment considers jobs that might be displaced in other parts of the economy owing to an investment in energy efficiency or renewable energy. For example, investment in renewable energy might displace jobs in other parts of the power sector such as those associated with power generation from gas-fired plant. Where possible, indicators from surveys or studies completed for projects in Wales have been used so that the employment impacts reflect the economic conditions in Wales as closely as possible.

Results

Table 4.2.3 are presented in Full-Time Equivalent (FTE) so that employment impacts can be measured for the lifetime of the project or plant and duration. For example, a job that lasts 1 year for a project where plant lifetime is 10 years would count at 1*1*0.1 = 0.1FTEs over the duration of the project.

Both cumulative gross jobs added, and net additional jobs have been estimated. Net additional jobs are estimated by subtracting the gross jobs by the 'Do Nothing' scenario to net off jobs created if the money were invested in similar ways to what it is today.

Metric	Do Nothing	National Net Zero	High Demand	Low Demand	High Hydrogen
Energy change (GWh, relative to 2023)	0	-113 (-2%)	-94 (-2%)	-1,878 (-31%)	-206 (-3%)
Employment impacts between 2023-2050 relative to Do Nothing scenario (net FTE)	0	7,178	7,194	7,325	8,760

Table 4.3.4: Summary of economic impacts for each scenario: employment impacts and air quality activity costs. Figures shown relate to the period 2023 – 2050. Air quality activity costs are presented using 2022 prices and are not discounted

Impact on air quality

The energy system can also impact air quality, which in turn impacts human health, productivity, wellbeing and the environment. Accordingly, understanding the impacts to air quality is important when planning future policy or programmes of work.

Method

We used the Green Book supplementary guidance for air quality[T50] activity costs from primary fuel use and the transport sector to estimate the air quality cost for each year (2023 to 2050) for each scenario. Activity costs simplify evaluating the effects of air pollution by estimating the value of changes to air quality per unit of fuel consumed. Table 4.2.4 provides a summary of the activity costs used in 2023 for the fuel types included in this analysis. The activity cost for electricity was assumed to vary over time; the costs for all other fuels were assumed to remain constant. Appendix B8 provides additional details on the derivation and assumptions for each of these costs. Air quality activity costs are presented using 2022 prices and are not discounted.

The Green Book does not include air quality impacts of landfill gas, organic matter, sewage gas, or hydrogen. We assumed that these fuels have the same air quality impact as natural gas.

Fuel	Air quality cost (2022 p/kWh)
Electricity	0.15
Natural gas	0.16
Landfill gas	0.16
Organic matter	0.16
Sewage gas	0.16
Hydrogen	0.16
Biomass	4.70
Coal	3.74
Oil/LPG	1.25
Diesel	1.33
Petrol	0.17

Table 4.3.5: Air quality activity cost factors

Impact on air quality

Results

Activity costs presented in Table 4.3.6 show estimates for the impact of air pollution in each future energy scenario, compared to the Do Nothing scenario.

The costs associated with poorer air quality (for example, this could be health impacts such as mortality and morbidity effects, environmental impacts such as ecosystem damage, and economic effects such as productivity because of poor health) are less in all future energy scenarios that we modelled.

The greatest economic savings from improving air quality are produced in the National Net Zero scenario.

Metric	Do Nothing	National Net Zero	High Demand	Low Demand	High Hydrogen
Cumulative air quality activity costs between 2023-2050 (£'million) (2022 prices)	£0	£1,200m	£1,177m	£1,198m	£1,170m
Change in greenhouse gas (GHG) emissions (ktCO2e, relative to 2023)	-47	-1,126	-1,125	-1,133	-1,097

Table 4.3.6: Summary of economic impacts for each scenario: employment impacts and air quality activity costs. Figures shown relate to the period 2023 – 2050. Air quality activity costs are presented using 2022 prices and are not discounted

4. The future energy system
Deployment modelling

Investment requirements

High levels of investment will be required to achieve the scale of change required to achieve a net zero energy system. Table 4.2.6 overleaf shows the estimated capital investment (CAPEX) required to build out the critical system components for net zero, that were identified in our scenario analysis. These costs are presented as absolute figures and should be weighted against a suitable counterfactual to understand the additional investment required.

This table shows the parties responsible for these investments and key interdependencies.

The total capital investment requirements between now and 2030 are estimated to be from **£3 billion to £10 billion**, which is mostly invested in building retrofit and energy efficiency, heat decarbonisation and rooftop solar PV.

Some of these priority intervention areas will also have additional operational expenditure (OPEX) requirements. For example, heat electrification might result in higher operational costs for consumers. The final capital and operational costs of the energy system are also subject to potential changes in supply, policy, and consumer perception.

We haven't estimated investment requirements where there is a high level of uncertainty in costs:

- Electricity network reinforcement costs will depend on the extent of network upgrades which will be needed across the LV, HV and EHV networks, requiring more detailed analysis.
- Costs for gas infrastructure have not been included due to the high uncertainty around the scale of the gas network in 2050

Tudalen 374

4. The future energy system
Deployment modelling

Investment requirements

	Indicative CAPEX (£m) to 2050	Basis for CAPEX estimate	Party responsible for CAPEX	Dependencies on other investments
1. Maximise energy efficiency of buildings	£320 – 4,540m	Cost of deep retrofit interventions	Local authority, housing associations, building developers, public	Supply chain
2. Ground-mounted solar PV	£240m	Equipment costs	Local authority, housing associations, building developers, public, renewable energy providers	Electricity network
3. Maximise rooftop PV	£430m	Build out of rooftop PV	Local authority (owned buildings), housing associations, building developers, public, renewable energy providers	Electricity network, potential structural costs
4. Decarbonise transport	£140 - 290m	Build out of EV chargers	Local authority, building developers, public	Electricity network
5. Decarbonise heat	£885 – 1,050m	Heat pump build out costs, heat network decarbonisation cost	Local authority, housing associations, building developers, public, heat network developers	Electricity network, energy efficiency
6. Electricity network reinforcement	£90m	Electricity network reinforcement costs will depend on the extent of network upgrades which will be needed across the LV, HV and EHV networks, requiring a more detailed analysis by the DNO.		
Project costs (incl contingency, prelims, professional and development costs etc) could be 50% of capital costs above				

Table 4.3.7: Indicative investment requirements

Technical report

Chapter 5: Action planning (stages 6-7)

5. Action planning

Overview

Figure 5.0.0 shows the process followed to develop the complete LAEP and routemap to transition the local energy system in Flintshire.

Energy propositions

Identifying priority focus zones

We discussed what energy system components were common in all scenarios and asked stakeholders what they felt should be prioritised in the near-term. We considered this alongside other technical and social factors (e.g. generation and demand headroom) to prioritise focus zones where they might be deployed.

Creating energy propositions

After reviewing and discussing these results and revisiting what we learnt from scenario analysis and deployment modelling with stakeholders, **five energy propositions** were agreed. These form the strategic foundation for Flintshire's LAEP and consolidate the evidence to describe what, how and where to prioritise the deployment of these energy system components.

Creating the plan

Enabling actions

Using input from stakeholders, highlighted overleaf, we created a routemap and action plan to drive the local energy system transition in Flintshire, which includes what needs to happen and what key stakeholders will do to contribute to delivery of the LAEP. This routemap and action plan can be found in the LAEP Main Report.

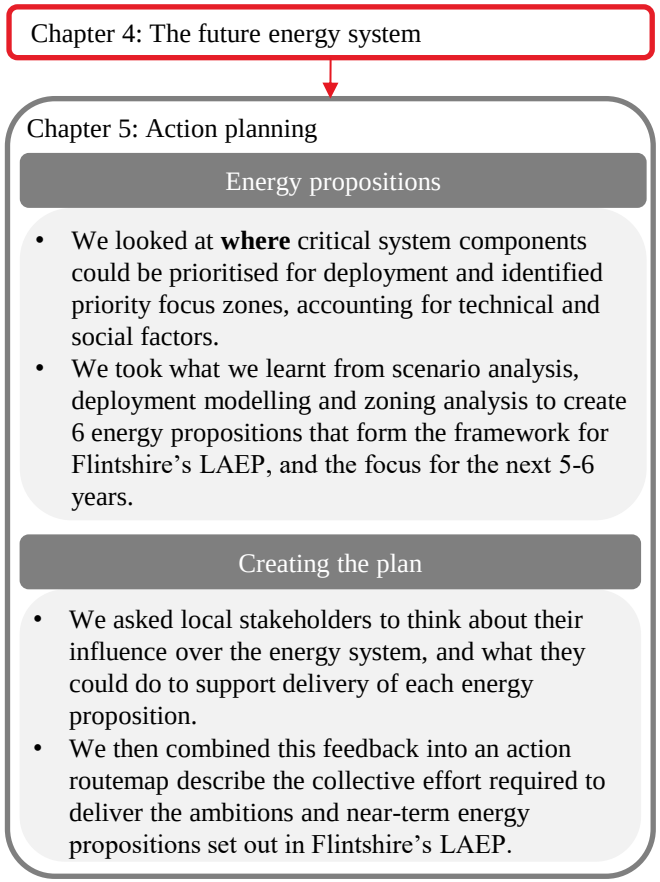


Figure 5.1.1: Overview of the approach taken to develop the near-term recommendations for the LAEP

5. Action planning
Energy propositions

Identifying priority focus zones

Prioritising energy system components

Table 5.1.1 shows our approach to prioritise low-regrets energy system components in Flintshire to take forwards when identifying priority focus zones for their deployment. We consulted primary and secondary stakeholders across the county and asked:

- Is the energy system component deployed in all scenarios?
- Is this component a strategic priority identified by stakeholders during engagement?
- Does this energy system component align with the wider objectives that have been set for Flintshire's LAEP (described in Figure 5.0.1)?
- Is this energy system component identified as a priority area in North Wales's energy strategy?

We combined this feedback with insights from scenario modelling to develop Flintshire's energy propositions, which are the framework for Flintshire's LAEP. Flintshire's energy propositions focus on areas of the energy system that contribute significantly to the area-wide emissions and have been identified as a priority zone for change in the near term. Energy propositions are a combination of energy system components chosen as a priority to drive change in a particular part of the energy system, that have an indicative timeframe for deployment and magnitude. For example, an energy proposition that includes onshore wind as a critical energy system component will specify what capacity is needed and by when, as well as indicative investment requirements to achieve it.

	Outcome certain / clear	Outcome less certain / clear
Short term (0-5 years)	Onshore wind Rooftop PV EV chargers (public, private and commercial) Ground mounted PV Anaerobic digestion	EV chargers (domestic) Retrofit Biomass boilers Exporting to grid
Longer term	National grid supply Electrical network infrastructure Battery storage Heat pumps Blending hydrogen in to gas grid Small scale electrolysers	Heat networks Hydrogen infrastructure Electrolysers Hydrogen imports from abroad Tidal lagoons Active travel shift Energy from waste Hydrogen for heating

Table 5.1.1: Summary of feedback from workshop 5 (pathway prioritisation) – "prioritising energy system components"

5. Action planning
Energy propositions

Flintshire's energy propositions in more detail

Scaling zero carbon buildings

Supporting and deploying energy efficiency measures across the county to reduce energy demand and costs.

Ensuring buildings are safe, healthy and low carbon in operation and design.

Decarbonising transport

Enabling the rollout of ultra low/zero carbon vehicles across the county and transitioning to a zero carbon council fleet.

Promoting active and sustainable travel within the region.

Increasing local renewable generation

Investigating opportunities for local and community ownership of renewables, providing low cost, clean energy to residents.

Supporting future green business

Encouraging and supporting businesses to adopt low carbon measures and reduce energy costs.

Create an attractive environment for sustainable businesses to make base in Flintshire.

Maturing hydrogen in industry

Exploring the potential for hydrogen within particular sectors and understand the infrastructure requirements for implementation.

Reinforce and transition energy networks

Grid reinforcement will be required to accommodate the shift towards electric vehicles and heating.

Even in a low hydrogen scenario the gas grid will require repurposing for hydrogen within some applications.

Figure 5.1.2: Summary of energy propositions

5. Action planning
Energy propositions

Identifying priority focus zones

Our "plan on a page" indicates the location and scale of recommended near-term changes required across Flintshire. The map highlights nine modelling zones identified as priority focus zones for the low-regret energy system components included in Flintshire's energy propositions: heat pumps, EV chargers, rooftop PV, ground-mounted PV, onshore wind, and insulation retrofits. To prioritise where each low-regret energy system component should be deployed, each modelling zone was ranked using two or more of the considerations in Table 5.0.0, each weighted by the percentage indicated. A modelling zone was only considered for prioritisation if it was greater than 8% of its primary substation service area[x7].

- **Off-gas homes** – prioritise zones with higher baseline proportion of off-gas housing. These homes will be the most challenging to transition to hydrogen and therefore are the most likely no-regrets targets for conversion to heat pumps.
- **Socioeconomics** - prioritise zones with higher baseline rates of deprivation (lower WIMD score).
- **Property ownership** - prioritise zones with the highest baseline percentage of social housing.
- **Substation generation headroom** – prioritise zones with the most baseline generation headroom available.
- **Listed buildings** – prioritise zones with the least number of currently listed buildings.
- **Domestic energy efficiency** – prioritise zones with the highest baseline percentage of homes with an EPC rating of D or below.
- **Built additional substation capacity** - prioritises zones where the least upgrades are required in the high demand scenario, since heat electrification is typically a major contributor to grid upgrade requirements (which may be back-logged by several years).
- **Built EV charging capacity** – prioritise zones with the most EV charging built in the high demand scenario.
- **Built additional capacity of each local generation technology** (rooftop PV, ground-mounted PV, or onshore wind) – prioritise zones where the most additional new capacity is built between the baseline and 2050 high demand scenario.

In the map (overleaf), green areas show zones identified as a priority focus zone for at least one energy system component. The callouts indicate the total scale of change required by 2030, according to the deployment model analysis, and indicate either the total capacity (MW) to be installed or the number of homes requiring retrofit and the associated investment figures.

Data	Heat pumps	EV chargers	Local generation	Insulation retrofits
Off-gas homes[T7]	25%	-	-	-
Socioeconomics[T28]	25%	30%	-	20%
Property ownership[T7]	25%	-	-	20%
Substation generation headroom[TN6]	-	-	50%	-
Listed buildings[T4]	-	-	-	5%
Domestic energy efficiency[T7]	-	-	-	35%
Built additional substation capacity	25%	40%	-	20%
Built EV charging capacity	-	30%	-	-
Built additional capacity of each local generation technology	-	-	50%	-

Table 5.1.2: Input data and relative weighting factors used in "plan on a page" calculations

5. Action planning

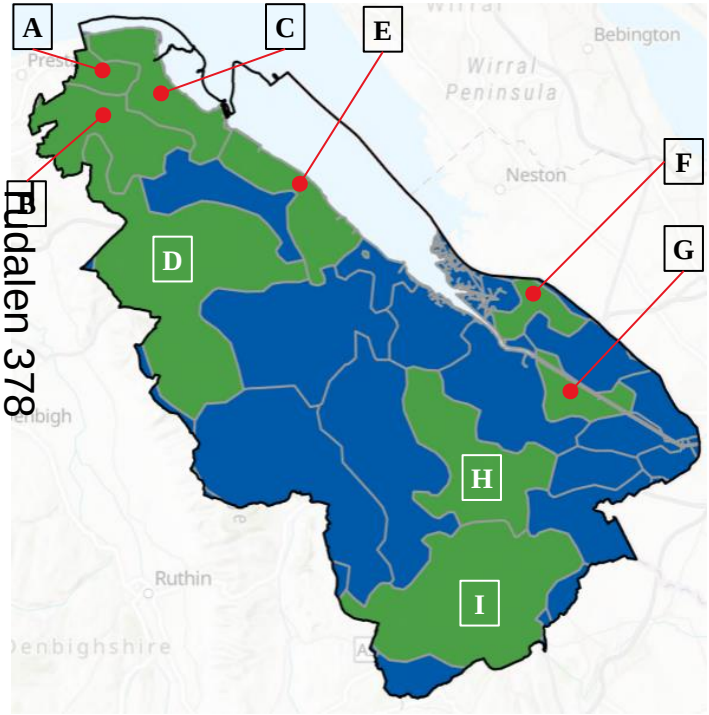


Figure 5.1.3: Flintshire's spatial representation of opportunities, including 2030 ambition and investment (million £) – in Low and High scenarios. Zone boundaries are the modelling zone boundaries.

To support the transformation of the energy system, pilot projects may be useful. The map (left) highlights areas that could provide a useful focus for these pilots. Figure 5.0.3 identifies zones with particularly favourable conditions for specific energy components, making them ideal locations for pilot studies. The summary tables detail key figures for each zone by 2030: **(i)** pilot ambition, **(ii)** required investment for each pilot and **(iii)** total investment for all deployment in the zone, including all energy components and electricity network infrastructure interventions. Ranges show the minimum and maximum results from each future energy scenario. Note: intervention should still be carried out in 'Progress' zones to transition the local area to Net Zero.

	(i)	(ii)	(iii)
A	**Church lane, Prestatyn**		
	140-300 homes	£1.3-23.1m	£3-24m
B	**Graig Fawr**		
	280-480 kW	£210-360k	£3-28m
C	**Point of Ayr Colliery**		
	570-990 kW	£425-740k	£5-36m
	1 MW	£1.1m	
D	**Holywell**		
	1.1 MW	£1.3m	£9-69m

	(i)	(ii)	(iii)
E	**Greenfield**		
	370-1,070 homes	£3.4-63.4m	£19-77m
F	**Shotwick**		
	1 MW	£865k	£18m
G	**Queensferry**		
	2 MW	£1.6m	£21-64m
H	**Buckley**		
	75 MW	£32.5m	£67-268m
I	**Caergwrle**		
	2.5 MW	£15.2m	£31-141m

5. Action planning

Plan on a page (as seen in main report)

Plan on a page

To support transformation of the energy system, pilot projects may be useful. The map below highlights areas that could provide a useful focus for these pilots.

Figure 0.4 identifies zones with particularly favourable conditions for specific energy components, making them ideal locations for pilot studies. The summary boxes detail the location, opportunity type, potential capacity, required investment for each component, and total investment necessary for both energy component installation and electricity network infrastructure in each zone by 2030. Ranges have been calculated by taking the minimum and maximum results from each future energy scenarios modelled.

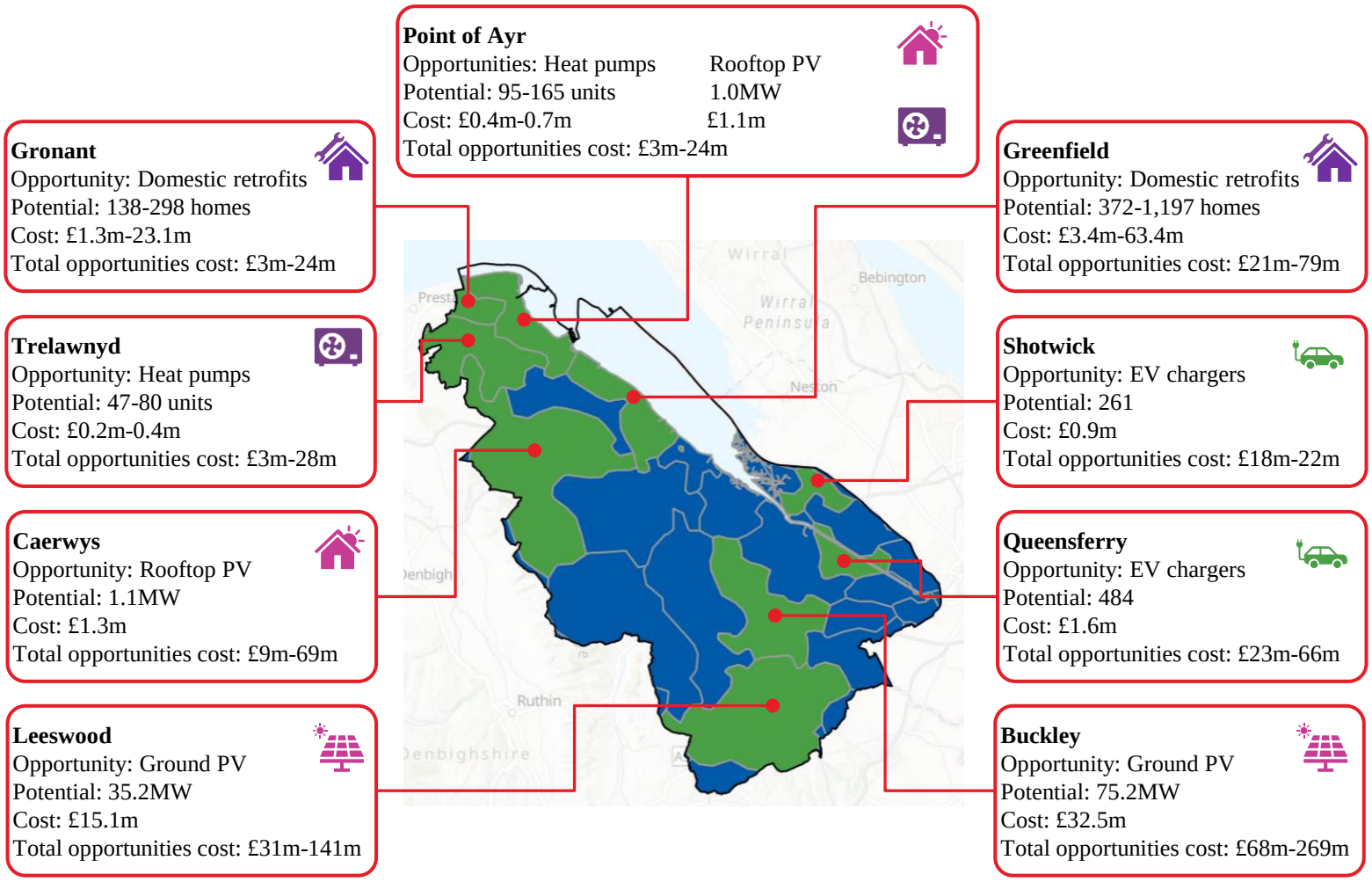


Figure 5.1.4: Flintshire's spatial representation of opportunities, including 2030 ambition and investment (million £) – in High and Low Demand scenarios. Zone boundaries are defined by primary substation service areas

5. Action planning
Scaling zero carbon buildings

Introduction

National policy indicates a "fabric, worst and low carbon first approach to improve the energy efficiency of the least thermally efficient low-income households in Wales"[T38]. In Flintshire, most homes will need insulation retrofit (discussed here) and heat pump installation (discussed overleaf).

Focus zones for insulation retrofit

We used several factors (Table 5.0.0) to compare each modelling zone's favourability for near-term insulation retrofits. Figure 5.0.4 illustrates the results; the highest-scoring zones are included in Figure 5.0.3 as priority focus areas.

For reference, the zones which are focus zones for heat pump installation (discussed further overleaf) are also highlighted in Figure 5.0.5. In the "fabric first" approach, insulation retrofits would precede heat pump retrofits. Care should be taken in these areas to coordinate insulation and heat pump retrofits as needed.

Areas around Prestatyn and Greenfield have been identified as focus zones owing to their higher percentage of domestic properties that fall within areas with a higher index of multiple deprivation. There are approx. 4,900 homes in these substation zones.

Areas, such as Flint, with a higher proportion of properties with EPC A-C ratings are less favourable for insulation retrofits. There are approx. 6,700 homes in this substation zone.

Industrial and commercial zones with few domestic properties are considered less favourable for insulation measures. There are approx. zero homes in this substation zone.

The relative uniformity of focus zone rankings across the county indicates that insulation retrofits need to be considered in most properties.

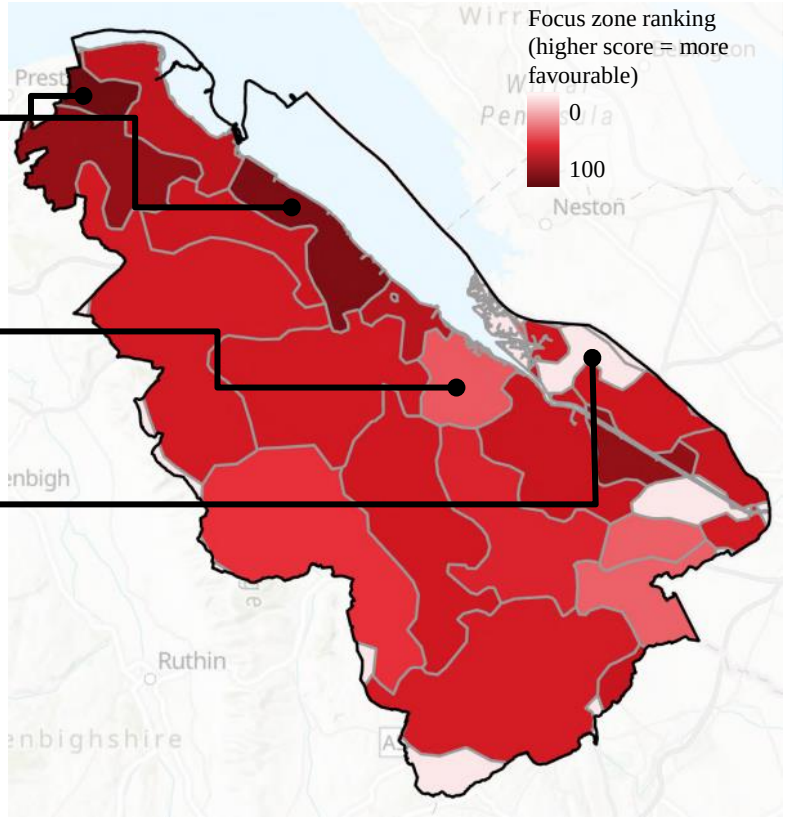


Figure 5.1.5: Focus zone rankings for domestic insulation retrofits by modelling zone

Now: **31,200 homes** rated EPC D or below

By 2030: **Up to 25,000 homes** retrofitted

By 2050: **Up to 61,100 homes** retrofitted

5. Action planning
Scaling zero carbon buildings

Introduction

Focus zones for heat pump retrofit

Electrifying building heat (e.g. via heat pumps) could play a dominant role in decarbonising the buildings sector. We used several factors (Table 5.0.0) to compare each modelling zone's favourability for near-term heat pump retrofits. Figure 5.0.5 illustrates the results; the highest-scoring zones are included in Figure 5.0.3 as priority focus areas.

For comparison, Figure 5.0.6 shows the fraction of homes in Flintshire currently not served by the gas network. These homes could be low-regrets options for retrofits since they will be the most challenging to serve via a future hydrogen network. The most favourable zones for heat pump installations are therefore areas around Caerwys, Nannerch and Trelawnyd in the West and North West. There are approximately 5,700 homes in these substation areas.

For reference, the zones which are focus zones for insulation retrofits, discussed previously, are also highlighted in Figure 5.0.4.

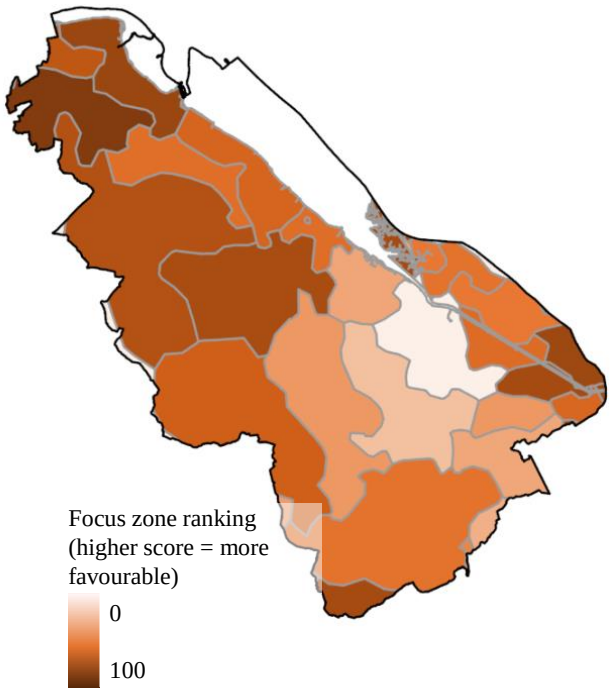


Figure 5.1.6: Focus zone rankings for heat pump installations across Flintshire by modelling zone

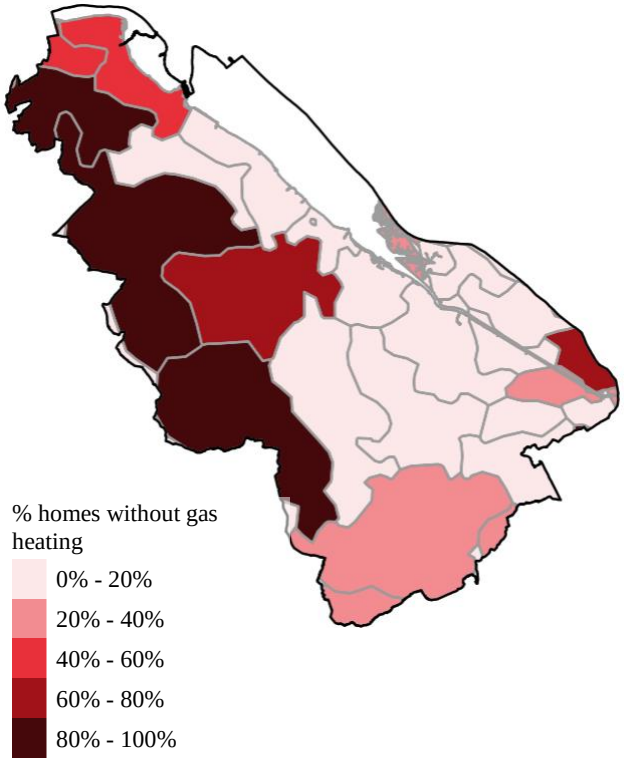
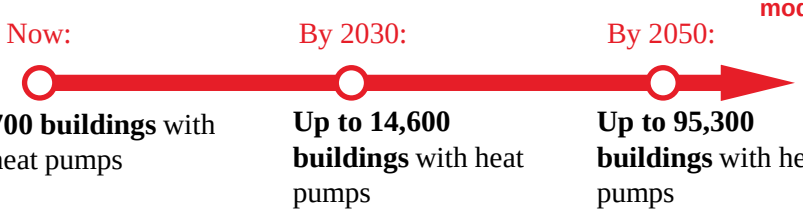


Figure 5.1.7: Baseline fraction of homes without gas heating in Flintshire



5. Action planning
Scaling zero carbon buildings

Investment requirements

The deployment model estimates the capital investment required for insulation retrofits and heat pumps. These are discussed separately below, along with potential funding opportunities.

Investment requirements for insulation retrofit

The upfront investment for insulation retrofit varies depending on the package of insulation measures appropriate for each archetype and the desired level of energy efficiency. In the High Demand scenario, the cost of retrofit can vary between £7,200 - £22,200 per household and £49,000 – £147,700 per commercial property. In the Low Demand scenario, the cost of retrofit between £47,250 - £101,500 per property and £89,250 - £381,800 per commercial property.

Investment requirements for heat pumps

On average, the upfront cost for a heat pump is estimated at £4,500[T42]. For most homeowners, the cost of equipment is a significant barrier to installation, which has contributed to a slow uptake across the UK[T43]

Investment requirements for heat pumps

On average, the upfront cost for one rooftop solar PV panel (4kW) is £4,400[T52].

Funding opportunities

Consider who is going to pay here, for instance, the LA might consider tackling social housing first because of grants, private rented is forced to get a particular EPC, how can we support them. How is the owner occupier supported – UK gov grants for specific income groups/EPCs for retrofit measures and heat pumps.

There are different funding sources that could be explored to support delivery of these interventions:

- Social housing grants
- Private rented properties can be eligible for the GBIS (Great British Insulation Scheme) and landlords are also required to get their properties to EPC C by 2030
- For owner-occupied housing – GBIS is limited, and uptake is low (throughout Great Britain there were only 1,000 installations in November 2023)
- The boiler upgrade scheme (BUS) is also available for eligible properties for up to 45kWth air and ground source heat pumps providing £7.5k of funding per property.
- Bulk purchasing schemes through the council can be attractive to increase uptake of solar PV, insulation and batteries. Many councils have trialled these programmes, so lessons learnt should be available
- Alternative funding such as Retrofit credits via the HACT scheme are available for social housing organisations, these are carbon credits related to the reductions and social value from the retrofit scheme which are sold to provide the investment funding.

Energy system component(s)	Investment (£m) in retrofit and heat electrification between 2023 and 2050
Retrofit (domestic)	£200 – 4,090m
Retrofit (non-domestic)	£125 – 450m
Heat pump	£885 – 1,050m
Heat networks	£370m

Table 5.1.3: Investment costs for the Scaling zero carbon buildings proposition for 2050

5. Action planning
Decarbonising transport

Introduction

The transport proposition for Flintshire covers active travel, public transport, feeds off the transport strategy for Flintshire, EV infrastructure on publicly-owned land. These are the things in the direct control of the Local Authority.

The transport proposition for Flintshire prioritises a reduction in car use as much as is possible through improved provision of active travel routes and public transport. Flintshire is a mix of large towns and some more sparsely populated areas, which means that private car usage is likely to play a role in the future of the local transport system, as is shown in our modelling. Therefore, the priority will also be to support the transition to electric vehicles through the provision of convenient, accessible chargepoint infrastructure, starting with opportunities on publicly-owned land.

Active travel and public transport

We used the transport hierarchy in our modelling which follows Welsh policy of 13% conversion to active travel. Most bus services are commercially operated in the County leaving limited influence for the Council to shape the service, such as setting fares and choosing vehicles. However, the Active Travel (Wales) Act 2013[TL05] places a duty on the Council to promote the use of active travel through means such as maintaining and expanding the active travel network and actively communicating information about the network.

5. Action planning
Decarbonising transport

Focus zones for EV chargers

EV chargers will be required across the local authority, with a fairly constant level of favourability across the county.

Areas with higher demand headroom, such as Deeside industrial estate and Shotwick, have been highlighted as more favourable.

Deeside has been flagged as a less favourable zone due to low levels of demand headroom and lower grading against the Welsh Index of Multiple Deprivation

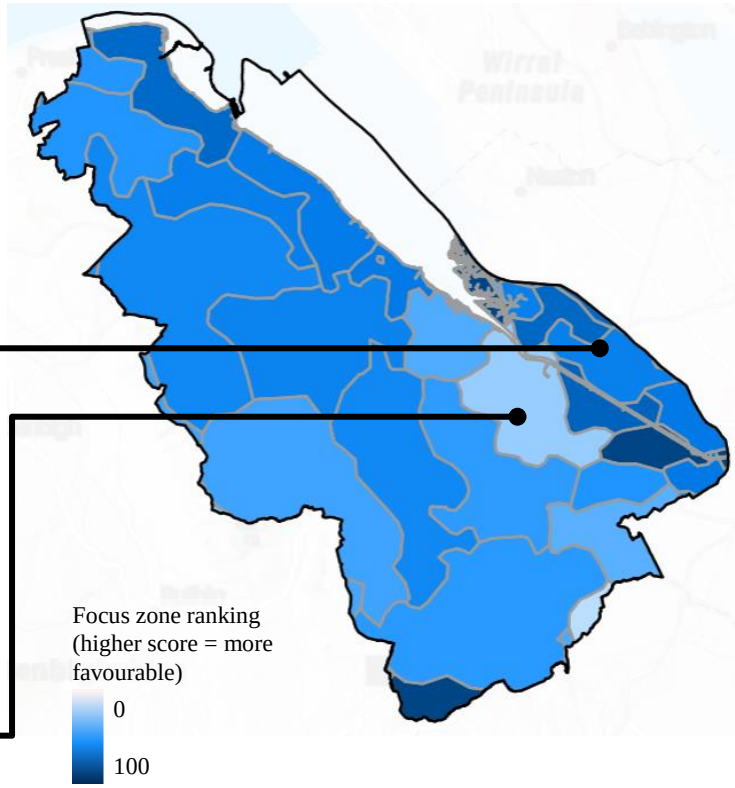


Figure 5.1.8: Focus zone rankings for EV chargers by modelling zone

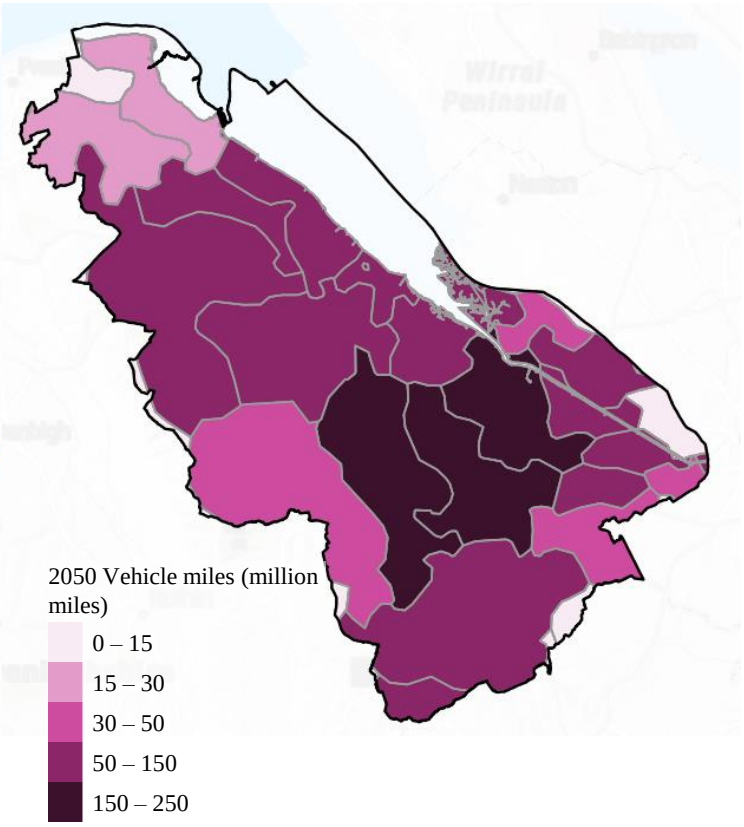


Figure 5.1.9: Future car mileage in 2050 by substation zone

5. Action planning
Decarbonising transport

EV charging infrastructure

Predicted EV charge point deployment from Wales' EV Charging Strategy[T44] is that by 2030, there are over 50,000 EV chargers in Flintshire, of which:

- 0.5% are rapid (43kW)
- 7.1% are fast (14.5kW)
- 92.4% are slow chargers (3kW)

Note that these numbers from Wales's EV Charging Strategy are likely to be amended imminently, reflecting a slower initial rate of deployment.

Our modelling indicates that by 2030, up to 8,400 chargers will need to be deployed to meet future transport demand (shown in Figure 5.0.7).

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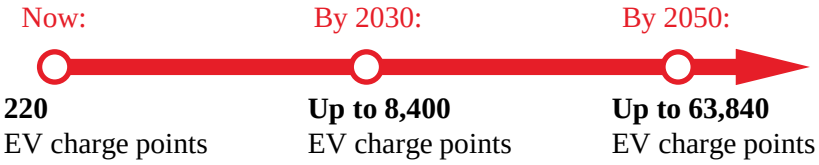


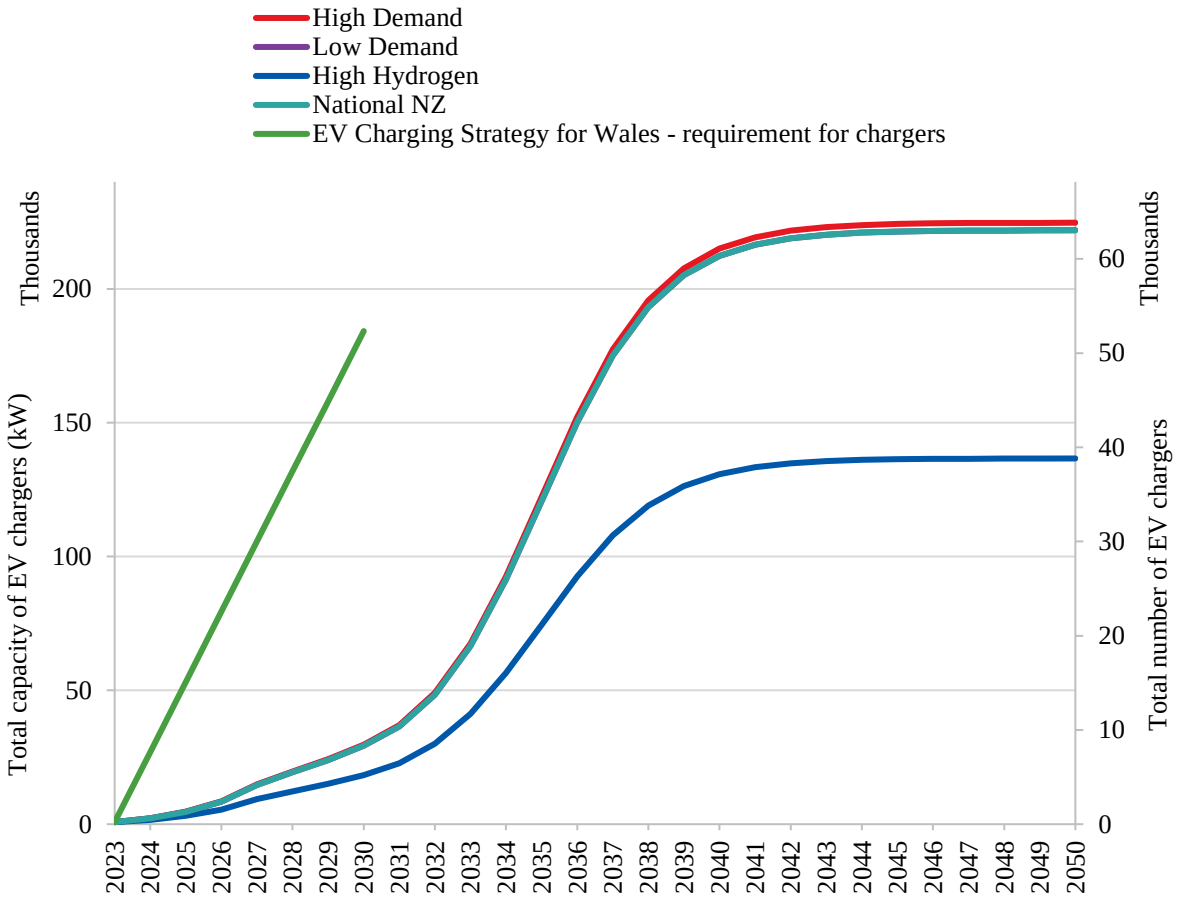


Figure 5.1.10: Capacity and EV chargepoint deployment over time

Focus zones for public transport and EV chargepoints

Electric vehicle ownership is expected to increase based on national policy and legislation that requires a phase-out of new combustion engine vehicle sales by 2035 under the zero emissions vehicles mandate[T48].

We used several factors (Table 5.0.0) to compare each modelling zone's favourability for near-term installation of EV chargers. Figure 5.0.8 illustrates the results; the highest-scoring zones are included in Figure 5.0.3 as priority focus areas.

To support the development of an efficient, cost-effective EV charging network, further analysis of off-street parking availability, transport patterns and locations of 'destinations' for destination public charging will be required to refine the strategic placement of EV chargers. For example, considering charging hubs in areas with limited off-street parking, or at locations regularly visited by residents such as supermarket car parks.

The maps shown in Figure 5.0.8 and 5.0.9 (overleaf) show focus zones and projected vehicle mileage to prioritise for public EV charging infrastructure.

Priority focus zones are identified by assessing electricity demand headroom (40% weighting), Welsh Index of Multiple Deprivation (30% weighting) and the deployment of EV charging capacity (30% weighting) from scenario analysis.

This shows strategic areas for the development of EV charging infrastructure.

Investment requirements

The investment required for EV chargers could be about £290m by 2050. There are various UK government grants for renters, flat owners, houses with on-street parking, as well as workplace charging schemes.

Energy system component(s)	Investment (£m) in retrofit and heat electrification between 2023 and 2050
EV chargers	£140 - 290m

Table 5.1.4: Investment costs for the Decarbonising transport proposition for 2050

5. Action planning

Increasing local renewable generation

Focus zones for local electricity generation

To support Flintshire in getting to net zero, renewables are shown in the scenario analysis to reach the maximum in every model run for this Local Authority.

In the future, the maximum theoretical amount of wind energy isn't expected to be any different to the baseline due to constraints from land use, protected areas and flight paths. We have overlaid this map with the generation headroom, renewables should be prioritised where there is generation headroom in the short-term. Where there is no capacity in the grid for renewables, see the energy networks proposition.

Whilst we recognise this scale of build out to be ambitious, we suggest that the shaded orange areas on the map would be priority locations for the development of solar PV infrastructure.

We suggest that the shaded blue areas on the map would be the possible areas for the development of solar and wind infrastructure. However, in our modelling we have favoured solar PV in these locations due to the lower capital costs.

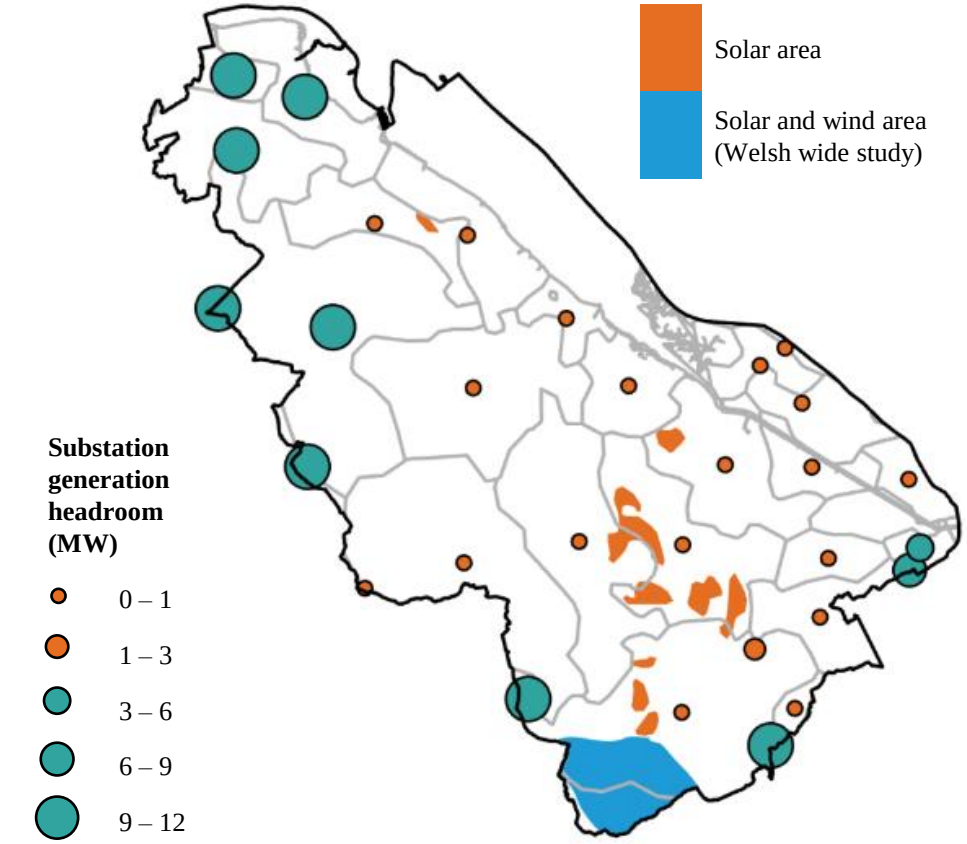


Figure 5.1.11: Areas suitable for wind and ground-mounted solar PV development in Flintshire and substation generation headroom (MW)

5. Action planning
Increasing local renewable generation

Focus zones for local electricity generation

Areas in the Northwest of Flintshire have been highlighted as more favourable locations for rooftop solar panel installations due to the higher generation headroom available.

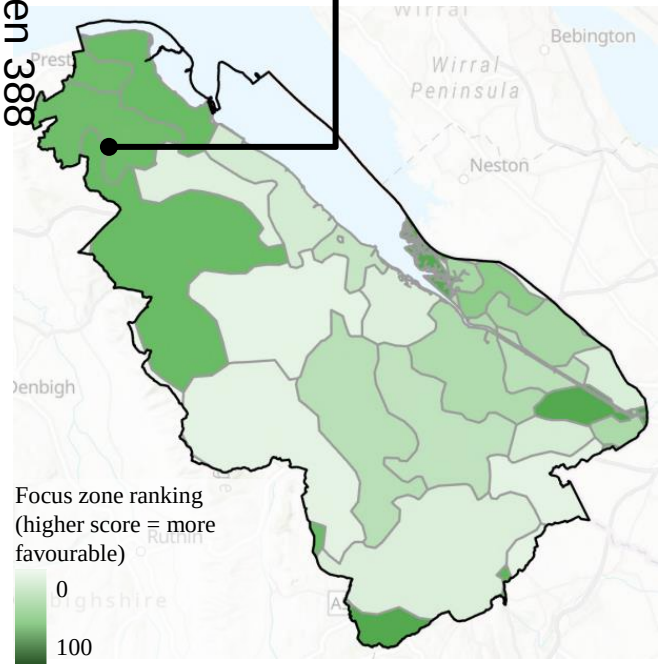


Figure 5.1.12: Focus zone rankings for rooftop solar PV by modelling zone

Buckley has been highlighted as a more favourable location for ground-mounted solar PV based on results from renewable energy assessments, substation upgrades will be required, however.

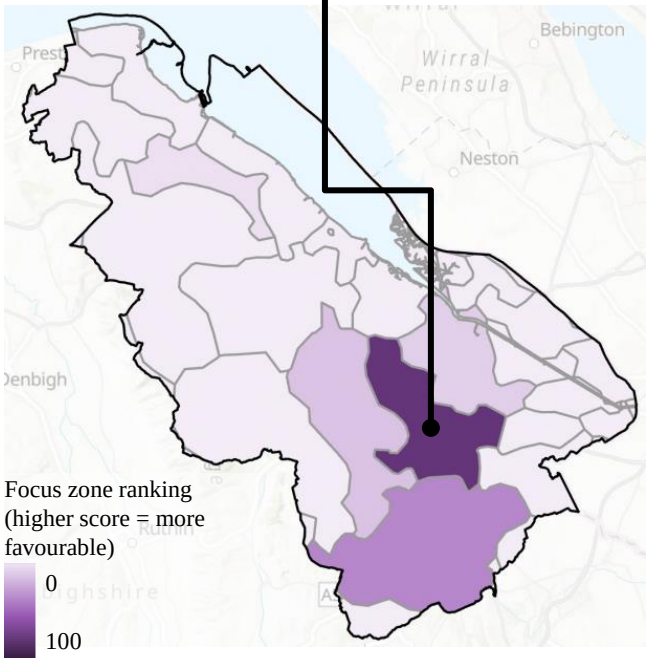


Figure 5.1.13: Focus zone rankings for ground-mounted solar PV by modelling zone

No additional onshore wind generation is suggested for Flintshire.

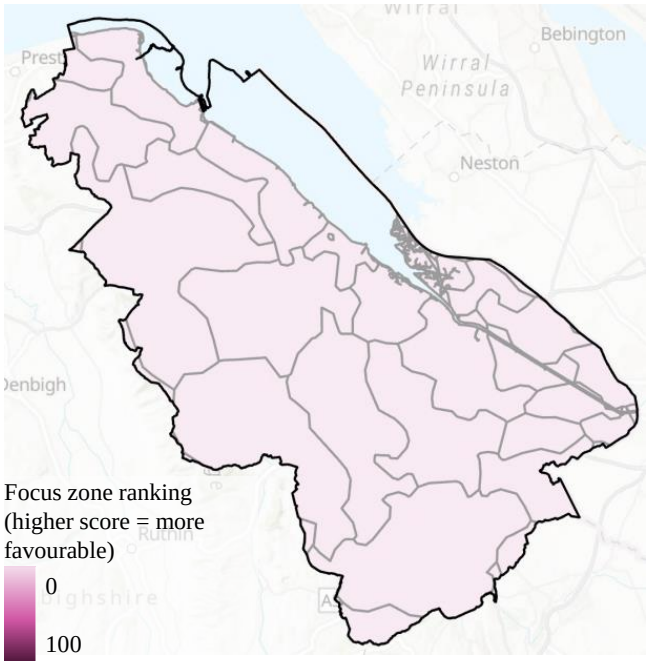


Figure 5.1.14: Focus zone rankings for onshore wind by modelling zone

5. Action planning
Increasing local renewable generation

Focus zones for local electricity generation

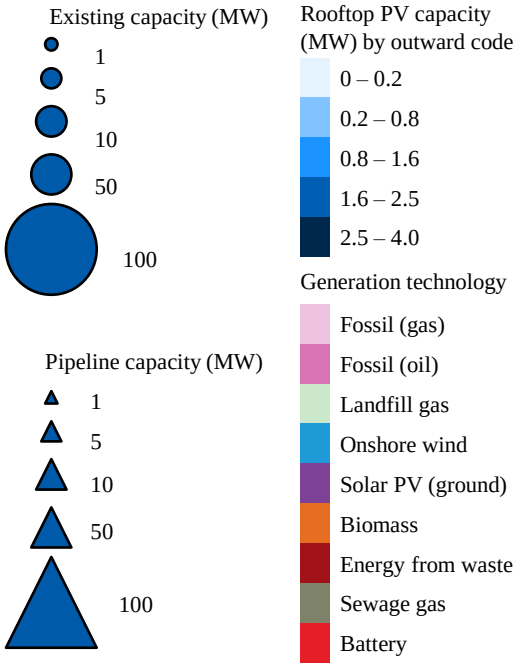
Figure 5.1.15 shows all electricity generation projects in the pipeline. There are plans to develop large scale solar PV and battery projects in the Queensferry area, with a smaller such project also in the pipeline for the Saltney area. The 2050 results suggest that all these projects could be built in any scenario, since the projected capacities in each scenario exceed the combined theoretical capacity of projects in the pipeline.

Investment requirements

The deployment model estimates the capital investment required for rooftop solar, ground-mounted solar and onshore wind. These are shown in Figure 5.1.4.

Energy system component(s)	Investment (£m) in renewables between 2023 and 2050
Rooftop solar PV	£425m
Ground-mounted solar PV	£240m
Onshore wind	£0m

Table 5.1.5: Investment costs for the Decarbonising transport proposition for 2050



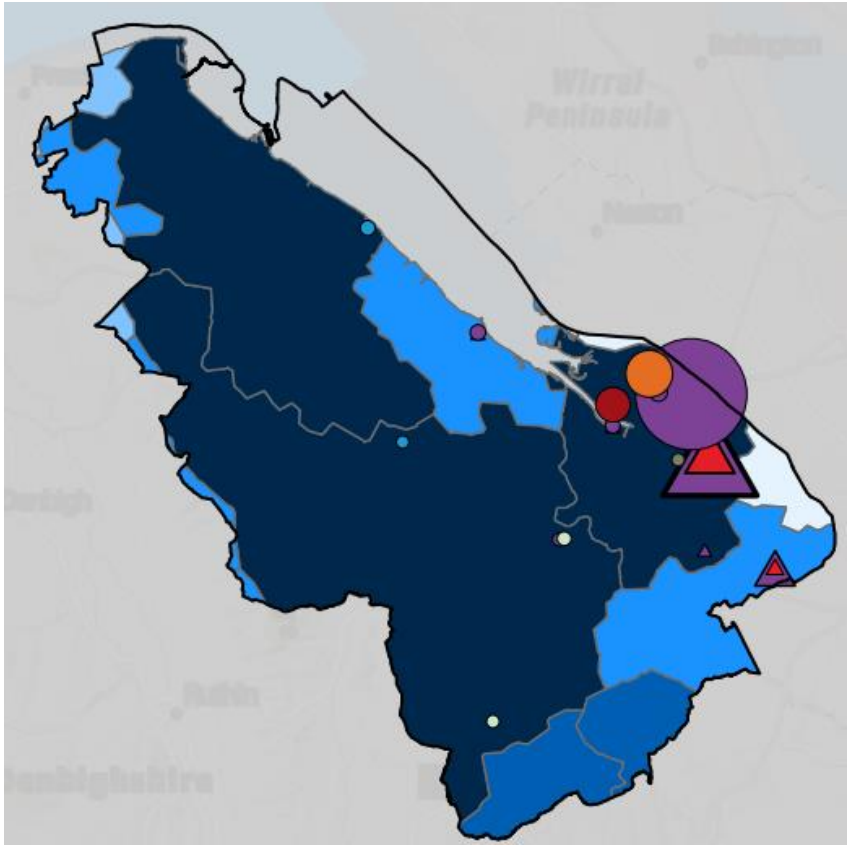


Figure 5.1.15: Electricity generation projects in the pipeline and baseline rooftop solar PV by outward code, investment requirements for priority focus zones for onshore wind and ground-mounted solar PV

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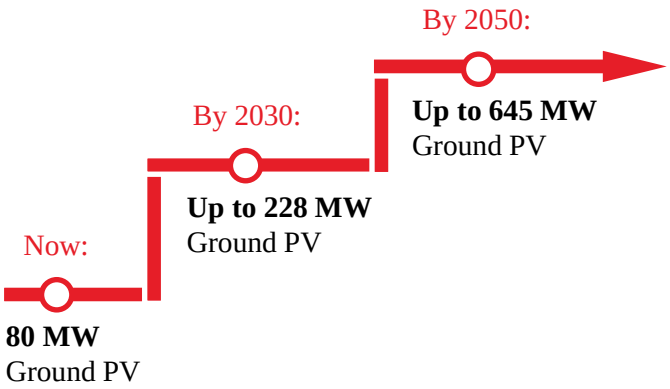
5. Action planning
Increasing local renewable generation

Introduction

All scenarios show a shift to electrified heating and transport, which could increase the need to harness renewable electricity sources to meet increasing electricity demand. Figure 5.1.10 shows the range of possible deployment of ground-mounted solar and onshore wind across the scenarios in Flintshire.

Flintshire's Renewable Energy Assessment (2019)[x] was used to understand the amount of land suitable for ground-mounted solar PV and onshore wind. All scenarios indicated an additional 538 MW of ground-mounted solar PV would be needed to meet future energy demand. This maximises the theoretical potential for ground-mounted solar PV in Flintshire.



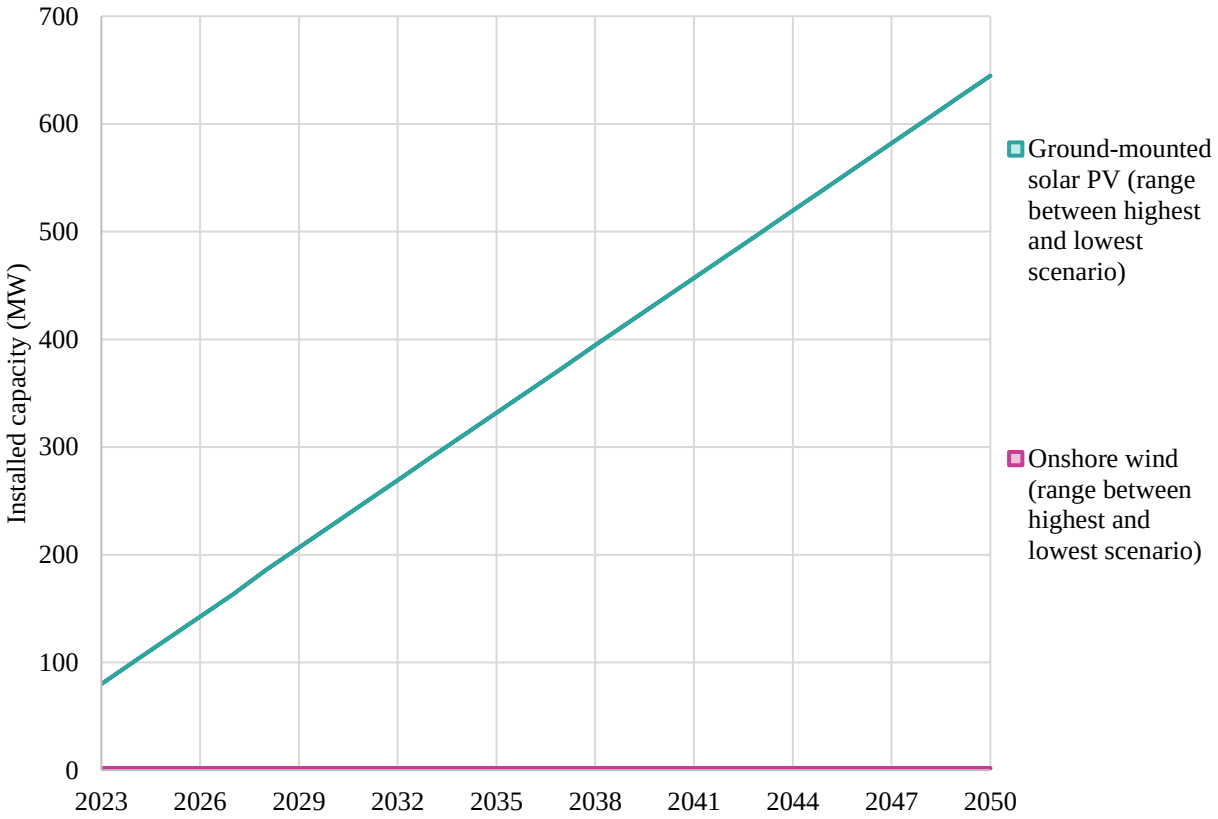


Figure 5.1.16: Summary of scale of renewables deployment across scenarios

5. Action planning
Reinforce and transition energy networks

Network transition planning

To achieve a net zero energy system, there are major changes needed to both the electricity and gas networks. SPEN (electricity distribution network operator in North Wales) and WWU (gas distribution network operator in Wales) are regulated utilities, and their operation is controlled by business planning cycles. They submit business plans in cycles:

- For electricity networks: RIIO-ED2 runs from 2023-2028, and ED3 will commence in 2028; the exact time period hasn't been announced yet.
- For gas networks: GD2 runs from 2021 to 2026. It was considered whether to extend GD2 to align the two networks. However, it's been announced that GD3 will start in 2026 for a "medium term ex-ante" period. Consideration is being given to the length of GD3.
- Outside of these cycles, a strategic reopener can be submitted to Ofgem to determine if there is sufficient evidence to make a case for additional investments beyond the business plans.

SPEN undertakes an annual modelling, planning and reporting process called Distribution Future Energy Scenarios (DFES) to support business planning, shown in Figure 5.1.15. WWU similarly uses historical data and modelling tools such as Pathfinder to forecast expected demands, resilience and storage needs, and general system operation. While these forecasting tools each incorporate some amount of input from the other network type (for example, DFES considers different options for heat pumps vs hydrogen for heating), they don't typically actively interlink and cross-communicate throughout the analysis processes. Therefore, the whole systems modelling undertaken within the LAEP process can be used as evidence to make strategic changes to the networks.

It is clear from the stakeholder engagement undertaken throughout the project, that one of the barriers currently is that the costs and timeframes of getting grid connections for renewable schemes and new development can make projects unviable.

The gas network provides natural gas to 82% of homes in Flintshire. Policy context for hydrogen shifted on 14th December 2023 with a decision to allow blending of 20% hydrogen into the network which will reduce the carbon emissions from the gas network by 7%, however this isn't a zero-carbon solution.

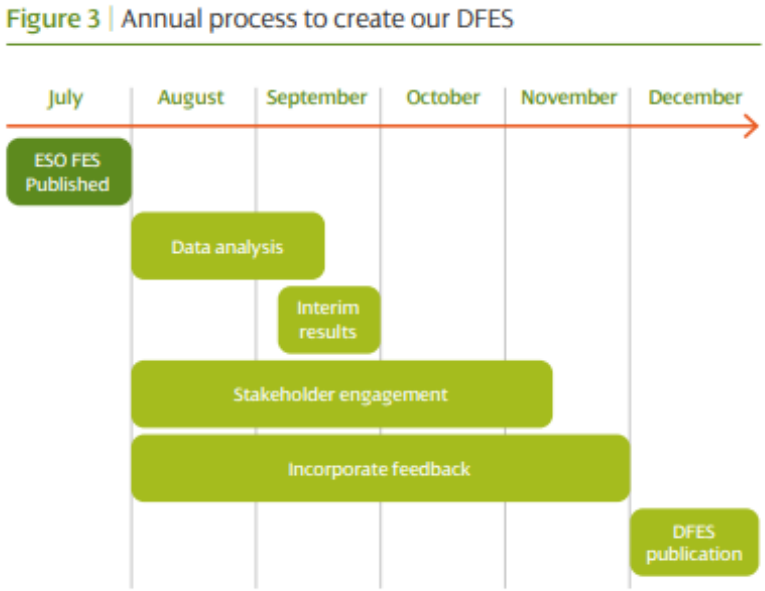


Figure 5.1.17: SPEN's annual DFES process (credit: SPEN)

5. Action planning
Reinforce and transition energy networks

Network transition planning

Gas distribution network

The gas network provided natural gas to 75% of homes in 2023.

£1.4million is invested in the iron mains replacement programme every week, which will make the current gas network hydrogen-ready. Policy context for hydrogen shifted on 14th December 2023 with a decision to allow blending of 20% hydrogen into the network which will reduce the carbon emissions from the gas network by 7%, however this isn't a zero-carbon solution.

Investment

The price control periods set out the allowances needed to complete the required mains replacement for that period, for RIIO-GD2 due to end in 2026 this was already awarded. WWU is currently preparing our RIIO-GD3 business plan which will set out the requirements needed to deliver the programme for the next price control period.

Most funding provided is through innovation funding. Ofgem provide WWU with Network Innovation Allowance funding (NIA) for innovative projects on our whole network. WWU looks for opportunities to deliver innovation that benefit the entire network and all local authorities within it, but also welcome any opportunities to collaborate with a specific local authority if there are relevant projects in their area.

There is additional funding available from Ofgem via re-openers (described earlier) which allow access to funding based on specific criteria.

WWU are actively involved in a range of innovation projects. Some examples specific to WWU's network in Wales:

Regional decarbonisation pathways – Completed in 2022, these pathways provide a strategic plan to decarbonise Wales (and Southwest England), outlining future gas network requirements to achieve the optimal energy system for the WWU network. Most of the projects described below have been designed to progress these findings and the resulting roadmap.

North Wales Conceptual Plan – Assess capability of existing infrastructure in North Wales for transporting hydrogen from Hynet Phase 3.

Hyline Cymru – plans for a new dedicated hydrogen pipeline across south Wales, linking hydrogen production with industrial demand.

Industrial Fuel Switching – Feasibility of fuel switching two sites in North Wales.

For more information on WWU's active projects, visit Network Innovation Allowance - Annual Report 22-23

5. Action planning
Reinforce and transition energy networks

Network transition planning

The future position

Our modelling shows that the electricity network needs upgrades and reinforcement to get ahead of the pace of change in renewables, heat pumps, EV charging and electrolysis. The map in Figure 5.1.16 shows areas where substation upgrades are needed if the rest of LAEP is carried out.

The substation upgrade areas, are those that should be prioritised for investment from the electricity network, considered for hydrogen or consider as part of a smart local energy system (SLES).

Electricity networks

To undertake the level of change shown in the map above which will be required if the uptake in EVs, renewables, heat pumps and electrolysis meets the modelled amounts, the number of substations that will need upgrading is 28. This equates to a total of 545MW additional capacity.

Additional upgrades to the network may be required following comprehensive contingency analysis

The cost of this is over £3m per year between the baseline and 2050. In total, this amounts to approximately £1,250 per home (in the high demand scenario).

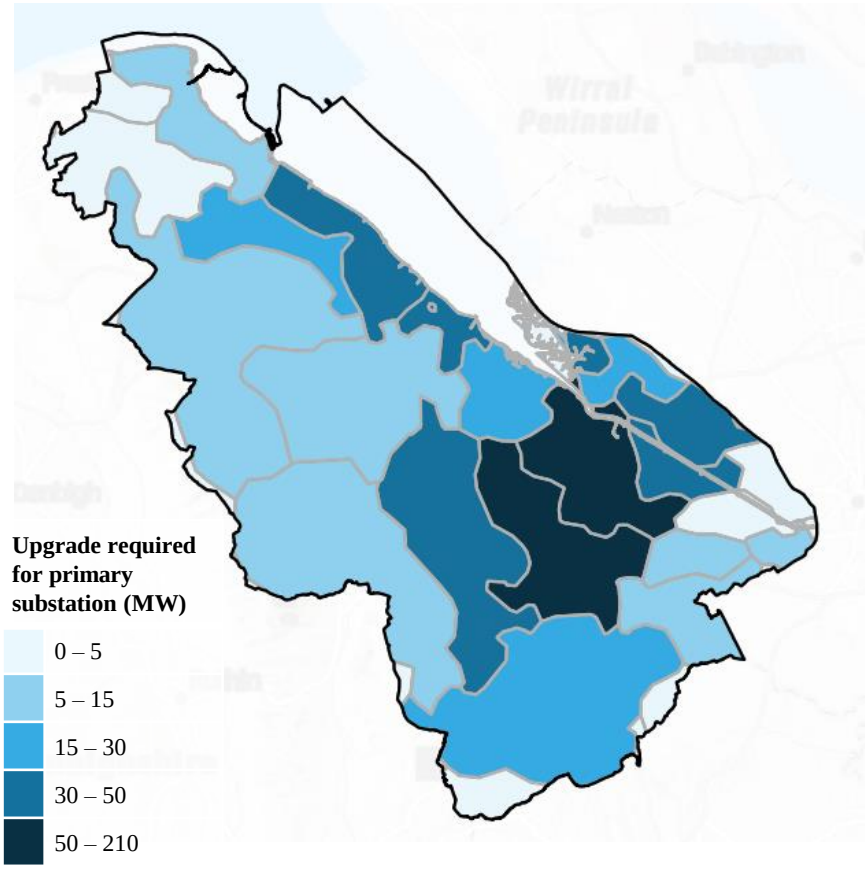


Figure 5.1.18: Map showing where substation interventions will be required by 2050 if the rest of the plan is followed

5. Action planning
Reinforce and transition energy networks

Network transition planning

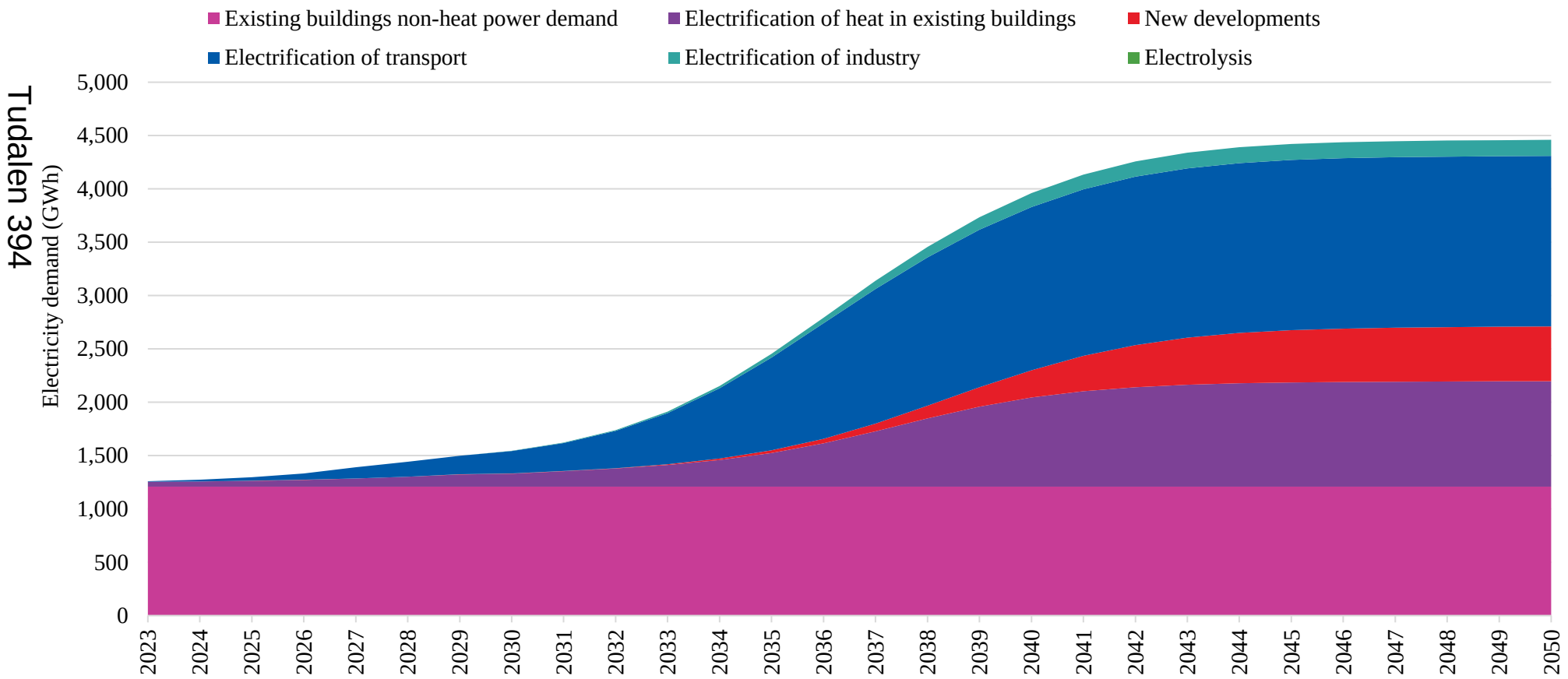


Figure 5.1.19: Projected change in electricity demand by end use between 2023 and 2050 in the High Demand scenario

5. Action planning
Reinforce and transition energy networks

Network transition planning

Hydrogen networks

There is more uncertainty around the changes needed to the gas network to enable the transition to net zero. There is a need to understand the role of the gas network in 2050, by continuing to explore the transition to 100% hydrogen and alternatives such as biomethane for specific locations. It's important to continue to explore this, and to make sure that changes made in the energy system do not negatively impact the gas network transition. We know that the deployment levels required for heat pumps will be difficult to achieve and therefore need to keep alternative options open. Our modelling excludes the cost of decommissioning the gas network, which is expected to be significant.

The gas network is undergoing a significant REPEX programme to make the gas networks more suitable for hydrogen by replacing iron mains within 30 meters of a property. The programme is mandated by UK Health and Safety Executive and funded by OfGem. Across Wales, WWU is currently 22 years into the 30-year programme, with a projected end date in 2032. In Flintshire this is 66.57% complete.

Our modelling has shown a demand of up to 220GWh/year for hydrogen in the future from industry and up to 710GWh/year for transportation. These numbers need additional verification with the industry within Flintshire

The optimisation model chooses hydrogen boilers for peak capacity only, which is a very unlikely domestic set up since it would be expensive per household. Therefore, we believe the future of hydrogen for home heating is still uncertain and have excluded this from the short-term road map and propositions, unless the LA is already underway with pilot projects.

The model shows the hydrogen required for industry and transportation is produced via electrolysis could be 0.04MW, supporting far less than 1% if the UK ambition of 10GW[T51] of low carbon hydrogen production by 2030. Hydrogen is currently localised in the model, which means it is used at the point of production, or imported into the system from a national asset.

The investment needed for hydrogen in Flintshire is £107m between now and 2050, mainly for hydrogen refuellers.

5. Action planning
Reinforce and transition energy networks

Network transition planning

Storage

Short term and seasonal storage also needs consideration. While our modelling does not show a lot of electrical storage, the majority of scenarios use the electricity grid as storage, choosing to export when there is excess renewable energy in the system and to import when there is a deficit of renewable energy in the system. Especially since neighbouring local authorities which opt for weather-dependent renewables (e.g. PV and wind) are likely to be generating (and thus exporting) renewable energy at similar times, there is a need for national asset level storage to provide flexibility and resilience in the energy system. This could come in many forms, including batteries, hydrogen storage with CCGT and CCUS, or more innovative alternatives. Especially where these storage solutions incorporate multiple energy vectors (for example, hydrogen storage) the relevant network operators will require close collaboration to ensure the storage solution effectively meets the needs of the regional or national energy system.

An approximate cost that would be available for national asset level production of electricity and storage would need to be commensurate to the OPEX costs for electricity imports in the model. Our model uses wholesale electricity costs; based on a cost of 6.3p/kWh for 3,130GWh/year of electricity imported in the high demand scenario, this equates to £188million/year.

5. Action planning
Reinforce and transition energy networks

Network transition planning

Smart Local Energy Systems (SLES):
SLES use different energy assets and infrastructure (known as Distributed Energy Resources (DERs)) to enable an area-level optimised demand and supply balance. SLES minimises unnecessary transition between vectors and can lead to benefits in terms of costs and carbon emissions. They are particularly beneficial where there is strong interplay between demand energy vectors (heating, cooling, electricity, and hydrogen).
SLES technologies can provide flexibility services to the national or local power networks, by shifting electricity demand in response to pricing or carbon signals. Technologies can interact directly with the DNO, or they may be aggregated by a central SLES market / control platform which enables the different technologies to interact with one another, and even enable peer to peer trading of energy generation, demand and storage.

Smart local energy systems

We have undertaken model runs at hourly, 3 hour and 24 hour intervals. These show that as the interval shortens, the annual electricity use (i.e. the GWh shown in the Sankey diagram) increases which is due to the peaks in the demand. When the demand is smoothed out over 24 hours, the annual electricity use smaller. If there were mechanisms to manage local supply vs demand, the annual electricity use could be decreased.

Areas to focus on would be those which need substation interventions (see Figure 5.0.16), liaising with the networks on the order of planned upgrade to the network will enable the Local Authority to prioritise where pilot programmes and roll-out of SLES would be most appropriate.

Investment in SLES can reduce the cost of upgrades needed in the electricity network. We haven't included specific costs for SLES because they should be undertaken in circumstances where it will reduce the cost to the electricity network and expediate the time that it takes to get a grid connection. Applying SLES as a means to avoid reinforcing the electricity network (thus reducing the cost of network upgrades) has nuanced impacts on the reliability and safety of the network which should be carefully considered by each community before implementing this approach.

Regulations need to make it easier for local communities to benefit from renewables installed behind the substation (as opposed to behind the meter). Local communities should be able to respond to signals about their demand to use their localised electricity. Electricity suppliers are rolling this out on a national basis (for instance Octopus saver sessions), and localised trials have been happening, however this is not easy to put in place currently.

Sponsors:

Delivery partners:

Technical report

Appendices

Appendices
Section A

Appendix A1 – Actions and recommendations	134
Appendix A2 - Deployment modelling – National, regional and local policies applied	184
Appendix A3 - Glossary of terms	187
Appendix A4 – Units of measure	194
Appendix A5 – Bibliography	196

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.1	1.2
Description	Develop and implement programme of support for off-gas grid homes	Develop programme for retrofit of Council owned buildings
Lead	FCC	FCC
Timescale	2024-2030	2024-2026
Benefits	Reduced emissions from domestic sector, less reliance on fuels with fluctuating prices	Safe, healthy, low carbon homes for those who most need them. Clear plan for needs, investment, and capital across the local authority.
Investment	Staff resources required from planning team	Staff resources required from planning team
Contributing stakeholders	Flintshire County Council	Flintshire County Council

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.3	1.4
Description	Promote rollout of EPCs to all Flintshire residents	Complete existing ECO4 and ORP 2 and 3 funding programmes
Lead	FCC	FCC
Timescale	2024-2026	2024-2025
Benefits	Greater awareness of energy performance of Flintshire's domestic stock, and potential for carbon reduction measures	
Investment	Unknown	
Contributing stakeholders	Local EPC contractors, the public, property owners	

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.5	1.6
Description	Upskill Council planning and regeneration team staff on retrofit of 'heritage' buildings, and novel technologies (e.g. heat pumps and charging hubs)	Develop emissions standards for operation and construction of Council new builds and retrofits
Lead	FCC	FCC
Timescale	2024-2025	2024-2025
Benefits	Greater in-house knowledge for hard to decarbonise areas of the domestic stock	Low energy, low carbon, safe and warm homes for residents, and council staff
Investment	Cost of training	
Contributing stakeholders	Training providers	External advisors

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.7	1.8 (linked to regional action B.1.8)
Description	Explore opportunities to engage with the supply chain to ensure they are adequately aware of the scale of change required for domestic retrofit	Apply lessons learnt from Optimised Retrofit Programme to retrofitting the privately rented and owner-occupied sectors through Welsh Zero Carbon Hwb.
Lead	FCC	Welsh Government
Timescale	2024-2026	2024 - 2030
Benefits	Lower cost and faster build out of decarbonisation and retrofit measures	
Investment		
Contributing stakeholders	Supply chain: producers, sellers, installers of decarbonisation retrofit measures	Welsh Zero Carbon Hwb

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.9 (linked to regional action B.2.1)	1.10 (linked to regional action R.1.4)
Description	Using the learning from other information hubs to develop an information service that provides a trusted source of retrofit and energy efficiency information for consumers. Explore the potential of establishing an advice hub to support regional decarbonisation / low carbon energy initiatives.	Work with Community Interest Companies (CIC) to provide a regional service of wrap around support for residents covering education, behaviour change, energy advice and support.
Lead	Welsh Government	Warm Wales
Timescale	2024-2026	2024-2028
Benefits		
Investment		
Contributing stakeholders		Community Interest Companies (CIC)

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.11 (linked to regional action 3A)	1.12 (linked to regional action 3C)
Description	Provide support and incentives for households to install energy efficiency measures and low-carbon heating systems, ensuring such support is targeted at those in fuel poverty and/or in most need.	Ensure PAS 2035 surveys and a clear plan for retrofit measures are prepared for individual social homes, in accordance with the Welsh Housing Quality Standard (WHQS)[M20].
Lead	RSLs	FCC and RSLs
Timescale	2024-2030	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.13 (linked to regional action 3D)	1.14 (linked to regional action 3C)
Description	Review current support provision to tenants and landlords in the private-rented sector to ensure minimum energy efficiency standards are met. Review enforcement provisions to ensure minimum statutory standards within the sector are achieved.	Explore development of support mechanisms for small to medium-sized enterprises (SMEs) to encourage uptake of energy efficiency improvements to commercial buildings.
Lead	Welsh Government	Business Wales / M-Sparc; North Wales Mersey Dee Business Council
Timescale	2024-2026	2024-2030
Benefits		
Investment		
Contributing stakeholders	Local Authorities	

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.15 (linked to regional action B.1.7)	1.16 (linked to regional action B.5.1 and 3E)
Description	Work with local authorities and regional bodies to determine an approach to coordinated, street-by-street approach to retrofit and the mechanisms for delivery (e.g. governance, resource, finance, policy). Co-ordinate a retrofit plan for all housing tenures which expands on the Optimised Retrofit Programme.	Identify specific local planning constraints (e.g. permitted developments i.e. 3 metre rule for heat pumps, permissive planning for listed buildings, new build regulations) limiting progress to net zero and delivering the LAEPs and work with Welsh Government to resolve these.
Lead	Welsh Government	Welsh Government and Local Authorities
Timescale	2024-2030	2024-2030
Benefits		
Investment		
Contributing stakeholders	Local Authorities, regional bodies	

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

	1.17 (linked to regional action B.5.2)	1.18 (linked to regional action B.1.2 and 3B)
Description	Consider tighter building regulations to support delivery of net zero ready buildings including a consultation on Part L regulations in 2024	Develop and agree an approach and delivery plan for tackling owner-occupied retrofit. Review existing and explore new potential financial mechanisms to support owner-occupiers and building owners seeking to undertake energy efficiency retrofit works.
Lead	Welsh Government	Welsh Government
Timescale	2024-2026	2024-2026
Benefits		
Investment		
Contributing stakeholders	Local Authorities, regional bodies	

Appendix A1
Actions and recommendations

Scaling zero carbon buildings

1.19 (linked to regional action E.4.1)

Description	Identify procurement frameworks for renewable technologies which consider local and ethical sourcing of goods and services. Develop national procurement framework, learning from previous ECO 4 roll out and the Optimised Retrofit Programme, to deliver street-by-street retrofit.
Lead	Welsh Government
Timescale	2024-2026
Benefits	
Investment	
Contributing stakeholders	

Appendix A1
Actions and recommendations

Decarbonising transport

	2.1	2.2
Description	Apply pressure to Welsh Government for greater direction for on street EV charging	Explore EV charging technologies for kerbline properties where no off-street options are available
Lead	FCC	FCC
Timescale	2024-2025	2024-2026
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

	2.3	2.4
Description	Understand charging facilities potential within town centre regeneration and place making plans, explore SPF and ORCS funding	Ensure commitment to high speed broadband connections for everyone in Flintshire
Lead	FCC	FCC
Timescale	2024-2026	2024-2025
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

	2.5	2.6
Description	Lobby for investment in the rail infrastructure to improve service frequency and reduce travel time	Further develop active travel networks and principles, keeping in mind impacts of equalities act
Lead	FCC	FCC
Timescale	2024-2026	2024-2025
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

	2.7	2.8
Description	Develop plans for last mile sustainable mobility requirements within the scope of new and improved stations in the North Wales metro programme	Provide public finance options and national standards for EV charging infrastructure.
Lead	FCC	FCC
Timescale	2024-2026	2024-2026
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

	2.9	2.10 (linked to regional action 4C)
Description	Release pilot EV charge point locator and costing tool for EV charge points.	Collaborate on opportunities to decarbonise the public sector fleet, public service vehicles, and commercial and industrial fleets and the co-ordination of associated infrastructure design and development across local authority boundaries.
Lead	FCC	ANW and WGES
Timescale	2024-2026	2024-2030
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

	2.11 (linked to regional action 4D)	2.12 (linked to regional action 4F)
Description	Work together to deliver the most appropriate electric vehicle public charging infrastructure across the region, aligning with national work being undertaken through Transport for Wales.	Support greater awareness raising of UK Government funding for development of electric vehicle charging infrastructure such as the on-street residential charging scheme.
Lead	ANW; North Wales Corporate Joint Committee; TfW; SPEN	ANW
Timescale	2024-2026	2024-2028
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

	2.13 (linked to regional action 4G)	2.14 (linked to regional action R4.1)
Description	Continue to support organisations such as local community car clubs to deliver community-oriented, low-carbon transport infrastructure and services.	Establish a Regional Transport Officer's Group that provides a forum for collaboration and alignment between local and national government in addition to Transport for Wales.
Lead	ANW; WGES	North Wales Corporate Joint Committee
Timescale	2024-2030	2024-2026
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

	2.15 (linked to regional action R4.2)	2.16 (linked to regional action R4.3)
Description	Explore opportunities around bus franchising across the region.	Produce the first Regional Transport Plan (RTP) in line with that Welsh Government statutory guidance.
Lead	ANW	ANW
Timescale	2024-2026	2024-2025
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Decarbonising transport

2.17 (linked to regional action T.2.4)

Description	Develop a national procurement framework for EV infrastructure
Lead	Welsh Government
Timescale	2024
Benefits	
Investment	
Contributing Stakeholders	

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.1	3.2
Description	Promote community energy schemes	Continue to rollout renewables in line with REAs, land assessments and constraints mapping
Lead	FCC	FCC
Timescale	2024-2025	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.3	3.4
Description	Facilitate rooftop solar PV uptake in owner-occupied dwellings through knowledge sharing and signposting	Understand local potential for solar carports
Lead	FCC	FCC
Timescale	2024-2027	2024-2026
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.5	3.6
Description	Support SMEs with rooftop solar installation for reducing energy costs	Further explore possibilities for geothermal energy generation within old coal fields, this can build on the work that has been undertaken by the Coal Authority.
Lead	FCC	FCC
Timescale	2024-2027	2024-2027
Benefits		
Investment		
Contributing stakeholders		The Coal Authority

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.7 (linked to regional action G)	3.8 (linked to regional action 2A)
Description	Explore the development of an investment prospectus for renewable developments currently in the pipeline.	Engage with Welsh Government to identify and build on opportunities that Ynni Cymru could provide to North Wales.
Lead	ANW	Ynni Cyrmu and ANW
Timescale	2024-2025	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.9 (linked to regional action 2B)	3.10 (linked to regional action 2D)
Description	Explore how to improve communication of available funding sources for the development and delivery of a range of low-carbon power generation projects (e.g. onshore and offshore wind, solar PV, nuclear, and tidal and marine energy).	Support workstreams in increasing local ownership of energy projects to be delivered in line with proposed guidance on local and shared ownership in Wales.
Lead	ANW	Ynni Cyrmu and ANW
Timescale	2024-2025	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.11 (linked to regional action 2E)	3.12 (linked to regional action 2F)
Description	Explore the potential of establishing an advice hub to support regional decarbonisation / low carbon energy initiatives.	Maximise opportunities for public procurement to support the acceleration of renewable energy generation and secure local economic and social value. Ensure that public procurement strengthens local supply chains / local jobs (social value). Ask the supply chain to deliver against public sector carbon ambitions through procurement frameworks.
Lead	ANW	ANW
Timescale	2024-2026	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.13 (linked to regional action 2G)	3.14 (linked to regional action R2.1)
Description	Maximise opportunities for community benefits funds from energy infrastructure projects (on the distribution network) to support local and regional decarbonisation initiatives, recognising the need to target those communities and areas most impacted by such developments.	Explore the opportunities that Power Purchasing Agreements could provide to energy generation across the region.
Lead	ANW	ANW
Timescale	2024-2030	2024-2026
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Increasing local renewable generation

	3.15 (linked to regional action R2.2)	3.16 (linked to regional action RN.4.1)
Description	Continue to explore the opportunities presented by solar canopies in car parking spaces and the enablers to scale the technology across the region.	Identify and explore opportunities for the development of renewables on public sector owned land.
Lead	ANW and WGES	Welsh Government and Trydan Gwyrdd Cymru
Timescale	2024-2027	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Supporting green business

	4.1	4.2
Description	Promote work undertaken by AMRC where appropriate	Continue to support Deeside Decarbonisation Forum and signpost funding opportunities
Lead	FCC	FCC
Timescale	2024-2026	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Supporting green business

	4.3	4.4
Description	Understand potential for redevelopment plan of Mostyn dock, undertake opportunities mapping	Understand how sustainability can be worked in to Flintshire's digital strategy and potential for data supported decarbonisation
Lead	FCC	FCC
Timescale	2024-2026	2024-2025
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Supporting green business

	4.5	4.6
Description	Look to undertake heat mapping exercise and understand heat network potential	Support SMEs to develop plans to decarbonise and signpost to funding opportunities
Lead	FCC	FCC
Timescale	2024-2026	2024-2030
Benefits		
Investment		
Contributing stakeholders		

Appendix A1
Actions and recommendations

Supporting green business

	4.7
Description	Continue to support town centre place making investment and signpost funding opportunities available to businesses and social enterprises
Lead	FCC
Timescale	2024-2030
Benefits	
Investment	
Contributing stakeholders	

Appendix A1
Actions and recommendations

Maturing hydrogen in industry

	5.1	5.2
Description	Plan for and be aware of upcoming hydrogen project funding opportunities	Develop local strategy to understand local need, requirements, challenges, and opportunities for hydrogen
Lead	FCC	FCC
Timescale	2024-2026	2024-2026
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Maturing hydrogen in industry

	5.3	5.4 (linked to regional action E)
Description	Look to support research into hydrogen co-challenges for local businesses	Support the emerging hydrogen economy, taking account of proposed hydrogen projects across the region.
Lead	FCC	ANW
Timescale	2024-2027	2024-2030
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Maturing hydrogen in industry

	5.5 (linked to regional action N.4.4)	5.6
Description	Publish a Welsh Government carbon intensity standard for hydrogen production based on that of UK Government. This standard can be used as a basis for future permitting by Natural Resources Wales.	Publish findings from North Wales Conceptual Plan for hydrogen infrastructure.
Lead	Welsh Government and NRW	WWU
Timescale	2024-2025	2024-2025
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Maturing hydrogen in industry

	5.7 (linked to regional action N.3.5)	5.8 (linked to regional action N.4.4)
Description	Make the network hydrogen ready. Deliver programme to convert remainder of gas network not covered by the REPEX programme to enable a 100% hydrogen conversion, WWUs sustainability strategy from 2023 identifies a desire to complete this between 2035-2040.	Develop hydrogen and bio-methane projects.
Lead	WWU	WWU
Timescale	2024-2040	2024-2050
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Maturing hydrogen in industry

5.9 (linked to regional action N.4.5)

Description	Develop a more detailed understanding of potential hydrogen transport demand and incorporate this demand within existing network demands. This action will be supported by WWU's innovation project HyDrive.
Lead	WWU
Timescale	2024-2025
Benefits	
Investment	
Contributing Stakeholders	

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.1 (linked to regional action N.1.2)	6.2 (linked to regional action N.2.2 and N.3.3)
Description	Hold regular engagement meetings between Flintshire County Council, SPEN and WWU	FCC and SPEN to work collaboratively to understand future demands (electricity) and use this to influence ED3 Planning and investment from OFGEM.
Lead	SPEN, WWU	FCC, SPEN
Timescale	2024-2030 (on an ongoing basis)	2024-2026
Benefits		
Investment		
Contributing Stakeholders	Flintshire County Council	

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.3 (linked to regional action N.2.1)	6.4 (linked to regional action N.2.3)
Description	Inform local authorities about available data resources by providing access to the DFES report and the resulting NDP (Network Development Plan) via SPEN's Open Data Portal as well as other datasets such as heat maps, network infrastructure & usage. Requests for additional, bespoke reports can also be made via the portal.	Use all relevant outputs from the LAEPs to inform SPEN's DFES (Distribution Future Energy Scenario) Report, in turn SPEN will share the trends and highlights from the DFES with individual LAs.
Lead	SPEN	SPEN
Timescale	2024-2030	2024-2025
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.5 (linked to regional action N.2.4)	6.6 (linked to regional action N.2.5)
Description	Provide low carbon technology (LCT) optioneering services to Local Authorities to support them with site optioneering (cost and timescale) for EV charging, heat pump rollout and renewable generation infrastructure planning.	Co-ordinate Net Zero clinics for Local Authorities to discuss decarbonisation of heat, transport and renewables strategies, and willingly contribute to workshops organised by the Local Authorities for local small-medium enterprises (SMEs).
Lead	SPEN	SPEN and WWU
Timescale	2027-2029	2024-2030 (on an ongoing basis)
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.7 (linked to regional action N.2.6)	6.8 (linked to regional action N.1.3)
Description	Discuss and agree any strategic optimisation opportunities with each Local Authority to continue progressing decarbonisation and economic growth plans.	Plan a method to consolidate the pipelines for all energy-related projects across the electricity and gas/hydrogen networks. This will consolidate all actions planned by electricity and gas/hydrogen networks within an area into one common database. As a starting point, set up ongoing engagement meetings with DataMapWales, NGED SPEN, and WWU to coordinate if and how DataMap Wales may be an appropriate platform to consolidate this information.
Lead	SPEN and WWU	SPEN and WWU
Timescale	2024-2030 (on an ongoing basis)	2024-2030 (on an ongoing basis)
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.9 (linked to regional action N.3.1)	6.10 (linked to regional action N.3.2)
Description	Highlight gas infrastructure opportunities. Support Local Authorities in exploring new opportunities to develop the existing gas networks in advance of 100% transition to existing hydrogen network.	Include new projects from the LAEP in strategic planning process.
Lead	WWU	WWU
Timescale	2024-2030 (on an ongoing basis)	2024-2027
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.11 (linked to regional action N.3.4)	6.12
Description	Share LAEP outputs on DataMapWales, plan how to keep this data up to date and relevant	Raise awareness of SPEN's Flexibility Service procurement to support a smarter system.
Lead	Welsh Government	SPEN
Timescale	2024-2025	2024-2025
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.13 (linked to regional action N.2.7)	6.14
Description	SPEN is already looking at industrial decarbonisation through their partnership in the NEW-ID (North East Wales Industrial Decarbonisation) Project. Any opportunities/benefits identified as part of work on this project will be shared with the affected Local Authorities, including Flintshire.	Explore opportunities for partnership delivery of district heating and cooling networks, using waste heat sources such as mine water.
Lead	SPEN	WG; Coal Authority; WWU
Timescale	2024-2030	2024-2027
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Reinforce and transition energy networks

	6.15 (linked to regional action 5B)	6.16 (linked to regional action R5.1)
Description	Understand the role that micro-grids and other innovative solutions can play in existing industrial clusters such as those in Deeside and Flintshire.	Explore and recognise opportunities that will be made available from the Flintshire/Wrexham investment zone.
Lead	ANW; DDF	North Wales Corporate Joint Committee; DDF
Timescale	2024-2028	2024-2028
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Enabling actions

	7.1(linked to regional action A)	7.2 (linked to regional action D)
Description	Ensure effective alignment between local, regional and national energy strategies, plans and initiatives.	Provide regional support in the delivery of commitments made in the Climate Action Wales public engagement strategy (July 2023) to help citizens take action to reduce demand, improve energy efficiency and use energy in a way which supports our vision.
Lead	ANW	ANW
Timescale	2024-2030	2024-2030
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Enabling actions

	7.3 (linked to regional action I.1.3 and F)	7.2 (linked to regional action R1.2)
Description	Continue to explore and support opportunities for smart local energy systems in the region. Using outputs from the LAEP, map smart local energy system opportunities and identify feasibility/demonstrator projects through engagement with key stakeholders including community energy groups and general public.	Ensure alignment between the scope and function of the new Regional Energy Strategic Planners (RESPs) with Ofgem's policy design. Consultation of the policy design will be published in the summer of 2024 with the RESPs in operation by late 2025/early 2026
Lead	ANW; Ynni Cymru; WG	WG; Ofgem; National Grid ESO
Timescale	2024-2030	2024-2026
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Enabling actions

	7.5 (linked to regional action R1.2)	7.6 (linked to regional action E3.1 and C)
Description	North Wales Corporate Joint Committee to support the Race to Zero campaign and provide oversight on carbon emissions across the region	Lead on developing the skills requirements identified in the Regional Skills Partnership's (RSP's) Green Skills Report and Welsh Government's Net Zero Skills Action Plan. Map and identify skills and labour needs and gaps up to 2050 for retrofit and low carbon new builds; renewable deployment; decarbonised transport and business / industry decarbonisation.
Lead	North Wales Corporate Joint Committee	RSP; WG
Timescale	2024-2030	2024-2030
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Enabling actions

	7.7 (linked to regional action E3.2)	7.8 (linked to regional action E3.3)
Description	Review and develop educational programmes to meet skills needed	Develop a communication strategy to educate, promote skills, training and the need for a supply chain
Lead	Welsh Government	Welsh Government
Timescale	2024-2030	2024-2030
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Enabling actions

	7.9 (linked to regional action R1.5)	7.10 (linked to regional action E2.2)
Description	Work with Welsh Government to create a governance structure and performance management framework for the LAEPs to facilitate monitoring of progress and performance of the LAEPs across the Region.	Using the outputs from the LAEPs and REPs, create a national plan which covers the gaps such as national and regional assets.
Lead	ANW; WGES	Welsh Government
Timescale	2024-2025	2024
Benefits		
Investment		
Contributing Stakeholders		

Appendix A1
Actions and recommendations

Enabling actions

	7.11 (linked to regional action R1.3)	7.12 (linked to regional action H)
Description	Develop the first regional Strategic Development Plan (SDP). Include policies in the plan that support low carbon building practices and low carbon new builds.	Strengthen the link between research, development and innovation with regards to current and emerging technology and the Energy Strategy priorities.
Lead	North Wales Corporate Joint Committee	Bangor University / M-Sparc; Wrexham University; ANW
Timescale	2024-2028	2024-2030
Benefits		
Investment		
Contributing Stakeholders		

Appendix A2

Deployment modelling – National, regional and local policies applied

National (UK or Wales) proposed and committed policies	Source
No more fossil vehicles from 2035	UK Government – Decarbonising Transport – A Better, Greener Britain. Available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan
No new gas boilers from 2035	UK Government – Net Zero Strategy: Build Back Greener. Available at: https://www.gov.uk/government/publications/net-zero-strategy
Phase out unabated coal by 2024	
UK Government committed to deploying CCUS at scale in 2030s	
UK Government committed to 10GW H_2 production by 2030	
New homes low carbon heating ready by 2025	Rigorous new targets for green building revolution. Available at: https://www.gov.uk/government/news/rigorous-new-targets-for-green-building-revolution
UK Government projects 600,000 heat pumps a year by 2028 (UK), up from 35,000 in 2021	Energy Security Bill factsheet: Low-carbon heat scheme. Available at: https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-low-carbon-heat-scheme
700,000 building retrofits by 2025, and all buildings by 2050 (UK)	UK Government – Energy efficiency: what you need to know. Available at: https://www.gov.uk/government/news/energy-efficiency-what-you-need-to-know

Appendix A2

Deployment modelling – National, regional and local policies applied

National (UK or Wales) proposed and committed policies	Source
Private rented homes EPC C by 2030, and EPC B for commercial units	UK Government – Heat and Buildings Strategy (2021). Available at: https://www.gov.uk/government/publications/heat-and-buildings-strategy/heat-and-building-strategy-accessible-webpage
Only 4 low carbon industrial clusters by 2030, and one net zero cluster by 2050 (UK)	UK Government – Industrial Decarbonisation Strategy. Available at: https://www.gov.uk/government/publications/industrial-decarbonisation-strategy
Quicker and more proportionate consenting regime for energy storage - all planning applications have been delegated to Welsh Local Planning Authorities	Welsh Government Developments of national significance (DNS). Available at: https://www.gov.wales/developments-national-significance-dns-guidance
Welsh Government requirement to explore heat networks within Future Wales	Heat strategy for Wales. Available at: https://www.gov.wales/heat-strategy-wales

Appendix A2

Deployment modelling – National, regional and local policies applied

Local proposed and committed policies	Source
New jobs over the plan period (2015-2030)	Flintshire LDP 2015-2030
Hectares of employment land	Flintshire LDP 2015-2030
New homes over plan period (2015-2030)	Flintshire LDP 2015-2030
New homes in Tier 1 locations (Main Service Centres listed on page 47 of LDP)	Flintshire LDP 2015-2030
New homes in Tier 2 locations (Local Service Centres listed on page 47 of LDP)	Flintshire LDP 2015-2030
New homes in Tier 3 locations (Sustainable Settlements listed on page 47 of LDP)	Flintshire LDP 2015-2030
New homes in Tier 4 locations (Defined Villages listed on page 47 of LDP)	Flintshire LDP 2015-2030
New homes in Tier 5 locations (Undefined Villages listed on page 47 of LDP)	Flintshire LDP 2015-2030
New homes on Northern Gateway Mixed Use Development Site	Flintshire LDP 2015-2030
New hectares of B2/B8 employment land at Warren Hall Development Site	Flintshire LDP 2015-2030
New hectares of B1 and B2 employment land at Warren Hall Development Site	Flintshire LDP 2015-2030
New commercial hub at Warren Hall Development Site	Flintshire LDP 2015-2030
New employment land allocation at Chester Aerospace Park, Broughton	Flintshire LDP 2015-2030

Appendix A3
Glossary of terms

Term	Definition or meaning
Action	The process of doing something – a specific action assigned to a responsible person preferably with a date to be completed.
Anaerobic Digestion	Processes biomass (plant material) into biogas (methane) that can be used for heating and generating electricity.
Baseline	The baseline is the data showing the current energy system, containing the 2019 data sets provided by the LA and publicly available data.
Batteries	Devices that store electrical energy to be used at a later time.
Biomass boiler	A boiler which burns wood-based fuel (e.g. logs, pellets, chippings) to generate heat and electricity.
Carbon Capture and Storage (CCS)	The process of capturing and then storing carbon emissions before they enter the atmosphere.
Certainties	A fact that is definitely true or an event that is definitely going to take place. In terms of a local energy system, certainties include funded projects, etc.
Demand	Local energy demand that the local energy system needs to meet.
Demand headroom	The difference between the electrical capacity of a substation, and the electricity demand at the substation at the time of peak demand.

Appendix A3
Glossary of terms

Term	Definition or meaning
Deployment modelling	A model investigating rates by which to deploy specific technologies between the baseline year and 2050 to achieve the end state developed by the optimisation model for each scenario. The model considers broader plan objectives and local, regional, and national strategic priorities, policies, and targets to help us to define a suitable level of ambition and inform an action plan.
Dispatchable energy generation	Energy generation that can turn on and off (i.e. isn't controlled by the weather) – this is likely to be gas turbines of some sort.
Distribution network	Takes energy from transmission network and delivers it to users via pipes or wires at low pressure / voltages.
Electricity network	Interconnected infrastructure which consists of power stations, electrical substations, distribution lines and transmission lines. The network delivers electricity from the producers to consumers.
Electrolyser	A piece of equipment that uses electricity to split water into hydrogen and oxygen.
Energy Proposition	A proposition is an energy component with a scale and a timescale. For instance, X MW of wind turbine to be built in 5 years, 10,000 buildings to retrofit with XX by 2030, or a pilot project such as hydrogen storage innovation. These are typically near term, low regrets energy components that are needed in future energy systems (it is likely that these appear in all scenarios).
Energy System Component	A term used to describe anything that can have a direct impact on energy demand and/or the way energy is supplied. E.g. installing retrofit measures can reduce overall heating demand, increasing solar PV capacity can change the supply mix and the way that the energy system operates.
Focus zone	A modelling zone which has been identified as an area in which to target near-term installation, upgrade, retrofit, or other activities related to a specific energy system component.
Generation	Local generation – size below 100MW.
Generation headroom	Generation headroom in a local authority's electricity distribution network refers to the remaining primary substation capacity at the time of peak generation, crucial for maintaining a stable and reliable power supply to meet the community's needs
Grid electricity	Electricity that is supplied by the electricity network.

Appendix A3
Glossary of terms

Term	Definition or meaning
Grid substation	The physical equipment comprising a substation with a 132kV-33kV transformer(s) connecting the grid-level, extra high voltage electricity lines to the primary-level, high voltage electricity lines. The grid substation facilitates connection with the national grid.
Heat network	A distribution system of insulated pipes that takes heat from a central source and delivers it to a number of domestic or non-domestic buildings.
Heat pump	A piece of equipment that uses a heat exchange system to take heat from air, ground or water and increases the temperature to heat buildings.
Hydrogen	A flammable gas that can be burned, like natural gas, to generate heat or power vehicles. The by-product is water only, no carbon.
Infrastructure	Local energy distribution infrastructure, includes storage assets if these are at grid level.
Landfill gas	Gases such as methane that are produced by micro-organisms in a landfill site that can be used as a source of energy.
Lever	We use the term policy levers to refer to the 'governing instruments' (Kooiman, 2003) which the state has at its disposal to direct, manage and shape change in public services.
Local energy system	The distribution level energy system, excludes the transmission and national assets.
Longer-term options	The likely outcome of these is less certain and dependent upon actions and decisions being made that are not under our control, e.g. a national policy or the capability / availability of a technology.

Appendix A3
Glossary of terms

Term	Definition or meaning
Major industrial load	The power demand of industrial sites in the 2019 NAEI Point Sources data are large enough to be classified as major industrial loads. Sites that aren't included in this database are likely too small to have a significant impact on the energy system singlehandedly.
Methane reformation	Process of producing hydrogen by heating methane from natural gas and steam, usually with a catalyst. Produces carbon dioxide as a by product.
Microgeneration	Small-scale generation of heat and electricity by individuals, households, communities or small businesses for their own use.
Modelling zone	A specified area in our modelling which is the smallest level of granularity for analysis. The zones are used through energy modelling, deployment modelling, and mapping. Zones were created by intersecting the Local Authority boundary with the primary substation service area boundary, as described in the "Methodology - electricity and gas network infrastructure" section of the Technical Report. *May also be called "zone" or "substation zone" in the reports.*
National Asset	National infrastructure (can be supply or demand and the accompanying transmission / distribution infrastructure) – defined as over 100MW, unless it produces heat which can only be used locally this is generally excluded from LAEP particularly the modelling.
National grid	A generic term used in the reports referring to the electricity network serving Wales, including both the transmission and distribution networks and facilitating the flow of electricity between neighbouring areas or regions. *May also be called generically "grid" in the reports.*
National Net Zero	The National Net Zero modelled in the LAEP. Details of assumptions are in the methodology section.
Natural Heritage	This includes features which are of ecological, geological, geomorphological, hydrological or visual amenity importance within the landscape, and which form an essential part of the functioning of the natural environment and natural assets of RCT.

Appendix A3
Glossary of terms

Term	Definition or meaning
Net Zero	Net zero when used in this LAEP is the energy net zero as it does not include all emissions, only energy emissions.
No regrets/ low regrets	Options which are common to all scenarios, cost-effective, provide relatively large benefits, and are very likely to be important parts of the future energy system, regardless of future uncertainty.
Optimisation modelling	Modelling to create the most cost and carbon optimal system.
Option	A term used to describe ways that a particular objective can be achieved. In the context of this LAEP, an option could be deploying a particular energy system component
Outward code	The first part of a postcode i.e. BS1.
Pathway	A pathway is how we get from the current energy system, to the most likely net zero end point. The pathway will consider what is needed from across the scenarios, the supply chain, number of installers etc. The propositions will make up the more certain part of the pathway, whereas the longer-term energy components will need further definition in the future.
Power purchase agreement (PPA)	A contract between two parties where one produces and sells electricity and the other purchases electricity.
Primary substation	The physical equipment comprising a substation with a 33kV-11kV transformer(s) connecting the primary-level, high voltage electricity lines to the consumer-level, low voltage electricity lines.
Primary substation service area	The area bounding the buildings or other electricity demands which are served by a primary substation (or, in ANW, a group of primary substations acting together to serve one area).

Appendix A3
Glossary of terms

Term	Definition or meaning
Programme	A series of projects, usually with a theme, that is run collectively.
Project	Strategic scale projects being implemented or planned for implementation in the local energy system that will significantly affect local demand or local supply.
Quick win projects	Very short-term actions, certain as no major blockers.
Renewable Energy Guarantees of Origin (REGO) Agreement	A scheme that tells consumers what proportion of their electricity comes from renewable sources.
Resistance heating/ heater	Generate heat by passing electrical currents through wires.
Scenario	A scenario is a set of assumptions for a particular end point (usually 2050) which are modelled in our optimisation model. We modelled 5 different scenarios to see what was common across the scenarios and therefore is a “no regrets” measure, and what changed between the modelled scenarios.
Sensitivities	Sensitivities of a specific scenario can be tested – for instance to test the impact of increasing electricity/hydrogen prices on the scenario. Testing a sensitivity is when you change one thing multiple times to assess the impact on the cost/carbon.
Sewage gas	A mixture of gases generated in sewer systems, used in a reciprocating gas engine to produce heat and electricity.
Solar PV	Convert solar radiation into electricity using photovoltaic (PV) cells.
Strategic objective	Strategic objectives are purpose statements that help create an overall vision and set goals and measurable steps to achieve the desired outcome. A strategic objective is most effective when it is quantifiable either by statistical results or observable data. Strategic objectives further the vision, align goals and drive decisions that impact change.

Appendix A3
Glossary of terms

Term	Definition or meaning
Strategic options	Strategic options are longer-term changes to demand, generation and infrastructure that will lead onto decarbonisation of the local energy system - and the key variables that determine scenarios.
Substation upgrades	Interventions at an existing primary substation designed to increase the capacity of the substation, such as upgrading an existing primary substation or installing a new primary substation. *May also be called 'substation interventions' in the reports.*
Supply	Energy supply options – this is how energy is delivered from the point of source – so a supply option would be solar PV.
Supply/generation headroom	The difference between the electrical capacity of a substation, and the power being supplied to the substation at a given time.
TfW zone	An area used by the Transport for Wales (TfW) as a point of origin or departure for vehicle trips. M*ay also be called "transport zone" within the reports.*
Transmission network	Move energy via pipes or wires for long distances around the country at high pressure/ voltages.
Uncertainties	Uncertainty results from lack of information or from disagreement about what is known or even knowable.
We	In this report, the term "we" has been used throughout to refer to the consultants that have been commissioned by Welsh Government to support the development of this LAEP.
Wind power	Harnessing the kinetic energy of wind to turn a turbine to generate electricity.

Appendix A4
Units of measure

Tudalen 460

Unit	Definition or meaning
°C	Degree(s) Celsius – a unit of temperature on the Celsius scale.
GWh	Gigawatt hour(s) – a unit of energy representing 1 billion watt-hours.
$kgCO_2e$	Kilogram(s) of carbon dioxide equivalents – a unit of measurement for greenhouse gas warming potential, expressing the equivalent weight of carbon dioxide with the same global warming potential.
$ktCO_2e$	Kilotonne(s) of carbon dioxide equivalents - a unit of measurement for greenhouse gas warming potential, expressing the equivalent weight of carbon dioxide with the same global warming potential. Represents 1 million kgCO2e.
kV	Kilovolt(s) – a unit of potential energy of a unit charge in a point of a circuit relative to a reference (ground) representing 1000 volts.
kW	Kilowatt(s) – a metric unit of power measuring rate of energy consumption or production representing 1000 watts.
kWh	Kilowatt hour(s) - a unit of energy representing 1000 watt-hours.
kWp	Peak kilowatt(s) – the maximum power rating possible produced by an energy generation source (i.e., amount of power produced in ideal generation conditions).
MW	Megawatt(s) – a metric unit of power measuring rate of energy consumption or production representing 1 million watts.
MWe	Megawatt(s) electric – a unit of electric power output from a generation source representing 1 million watts electric.

Appendix A4
Units of measure

Unit	Definition or meaning
MWth	Megawatt(s) thermal – a unit of thermal power output from a generation source representing 1 million watts thermal.
MWh	Megawatt hour(s) - a unit of energy representing 1 million watt-hours.
tCO_2 per capita	Tonne(s) of carbon dioxide per capita – a unit of mass of carbon dioxide emitted per member of a population per year. Represents 1000 $kgCO_2$ per capita.

Appendix A5
Bibliography

Appendices
Section B

Appendix B1 – Emissions sources in scope 198

Appendix B2 – Emission factors 201

Appendix B3 – Building assumptions 202

- Building - domestic archetypes 203
- Building - non-domestic archetypes 204
- Building - high demand retrofit packages – domestic 206
- Building - high demand retrofit options – non-domestic 207
- Building - low demand retrofit options – domestic 208
- Building - low demand retrofit options – non-domestic 209

Appendix B4 – Transport - assumptions 210

Appendix B5 – Renewable generation - assumptions 211

Appendix B6 – Heat networks - assumptions 212

Appendix B7 – Technology parameters for future energy system scenario modelling 225

Appendix B8 – Air quality – method, assumptions, and data sources 255

Appendix B1
Emissions sources in scope

LAEP emissions source	Inclusion	Comment
Domestic		
Electricity	✓	
Gas		
‘Other fuels’	✓	Oil, biomass, coal, LPG
Road transport		
‘A’ roads	✓	
Minor roads	✓	
Other (off-road, machinery)	✓	
Commercial and public sector		
Electricity	✓	
Gas		
‘Other fuels’	✓	
Industry	✓	
Electricity	✓	
Gas	✓	
‘Other fuels’	✓	
Large installations		Partial inclusion
Agriculture	✓	Emissions from agricultural processes not included but emissions from energy use is included.
Other fuels demand		
Domestic	✓	
Commercial	✓	
Industrial	✓	
Transport		

Appendix B1
Emissions sources in scope

LAEP emissions source	Inclusion	Comment
Gas network infrastructure		
Network coverage	✓	
Transport infrastructure		
EV charging infrastructure	✓	
Supply		
Non-renewable energy	✓	Includes: fossil (gas) and fossil (oil, LPG)
Renewable energy	✓	Includes: Ground- and roof-mounted solar PV, onshore wind, anaerobic digestion, biomass, energy from waste
Heat networks	✓	Undertaken for all LAs, only presented where appropriate
Generation		
Traditional electricity	✓	
Electricity demand		
Domestic	✓	
Commercial	✓	
Industrial	✓	
Transport	✓	

Appendix B1
Emissions sources in scope

LAEP emissions source		Comment
Gas demand		
Domestic	✓	
Commercial	✓	
Industrial	✓	
Electricity network infrastructure		
Primary substation headroom	✓	
Other		
Domestic and international shipping	X	Reserved as national priority
Domestic and international aviation	X	Reserved as national priority
Military transport	X	Reserved as national priority
Exports	X	Reserved as national priority
Waste	X	Emissions from waste treatment without energy recovery not included.
Storage		
Electrical	X	
Thermal	X	
Other	X	
Land use, land use change and forestry	X	LAEP focused on energy system and associated emissions, rather than all sources of territorial emissions.

Appendix B2
Emission factors

Technology	Value	Units	Notes
Biomass	0.0119	kgCO2e/kWh	DESNZ, 2023 (Average of 4 biomass fuels: wood logs, wood chips, wood pellets, grass/straw)
Sewage gas	0.0002	kgCO2e/kWh	DESNZ, 2023 (Biogas - Biogas)
Organic matter	0.0002	kgCO2e/kWh	DESNZ, 2023 (Biogas - Biogas)
Natural gas	0.1843	kgCO2e/kWh	DESNZ, 2023 (Gaseous fuels - natural gas, Gross CV)
Oil/LPG	0.2413	kgCO2e/kWh	DESNZ, 2023 (Average of LPG and Fuel Oil, Gross CV)
Diesel	0.2391	kgCO2e/kWh	DESNZ, 2023 (Liquid fuels - Diesel (average biofuel blend), Gross CV)
Petrol	0.2217	kgCO2e/kWh	DESNZ, 2023 (Liquid fuels - Petrol (average biofuel blend), Gross CV)
Landfill gas	0.0002	kgCO2e/kWh	DESNZ, 2023 (Biogas - Landfill gas)
Waste incineration	0.0380	kgCO2e/kWh	Tolvik, 2021 (https://www.tolvik.com/published-reports/view/uk-energy-from-waste-statistics-2021/)
Coal	0.3226	kgCO2e/kWh	DESNZ, 2023 (Coal - Industrial, Gross CV)

Grid electricity carbon factor source	FES 23 (average scenario)

Appendix B3
Buildings - assumptions

No.	Assumption Description
1	[BASELINE] EPC and AddressBase records are up to date from April 2023
2	[BASELINE] Properties without an EPC record were assigned most likely property attributes based on neighbouring buildings of the same age and archetype with EPC records. For example, a 1900s Victorian property (AddressBase) without an EPC will be assigned the most common house type and mean insulation levels for similarly aged properties in the same LSOA area. For flats in the same block (i.e. same building number/name), the same extrapolation method was used using flats in the same block in the first instance, instead of LSOA. Where there was insufficient data within an LSOA, the local authority average was used instead.
3	[BASELINE] Each non-domestic archetype is assigned a single energy benchmark value per unit floor area
4	[FUTURE ENERGY SYSTEM] The energy efficiency cost data is Carbon Trust proprietary data, incorporating a combination of inputs including Spon's Architects' and builders' price book 2021, in-house market research and published construction market data. The Spon's Architects' and builders' price book data was converted into a usable format using EPC building dimensions for the cost optimisation
5	[FUTURE ENERGY SYSTEM] The following assumptions were made to inform the application of the cost data to specific property types: • Pitched loft insulation happens at the joists (270mm) • Insulation on suspended floors is assumed to be "easy access" • Filled cavities are assumed to be fully insulated • Unfilled or partially filled cavities receive cavity wall insulation • Pre-1930s solid walls receive 100mm internal wall insulation • Post-1930s solid walls receive 200mm external wall insulation, with a higher rate for flats.
6	[FUTURE ENERGY SYSTEM] Pitched roofs include properties with roof rooms which account for a small percentage (<10%) of pitched roofs. Roof rooms are more challenging to insulate as it is more disruptive for the occupant – additional costs have not been considered in this analysis
7	[FUTURE ENERGY SYSTEM] The heat demand profile used in the analysis is based on 2018 weather conditions. Three individual profiles representing an intermediate day, a winter day, and an extreme winter day (Beast from the East) were applied across the whole year to generate annual energy consumption profiles.
8	[FUTURE ENERGY SYSTEM] The average lifetime of the packages of energy efficiency measures being installed is assumed to be 30 years.
9	[FUTURE ENERGY SYSTEM] Dwellings classed as EPC A will not make any additional fabric improvements

Appendix B3
Buildings – domestic archetypes

- For each domestic and non-domestic archetype, a property with median thermal attributes is selected to perform the energy efficiency analysis

Archetype	Description	Av. floor area (sqm)	Wall	Roof	Floor	Window	HTC* (W/K)
1	Detached - after 1930 - medium/high efficiency	121.9	Insulated cavity wall	Insulated pitched roof	Uninsulated solid floor	Double glazing	379.8
2	Detached - low efficiency	170.9	Uninsulated solid wall	Insulated pitched roof	Uninsulated solid floor	Double glazing	1192.1
3	Terrace - medium efficiency	77.1	Insulated cavity wall	Insulated pitched roof	Uninsulated solid floor	Double glazing	153.6
4	Terrace - before 1930 - low efficiency	89.5	Uninsulated solid wall	Uninsulated pitched roof	Uninsulated solid floor	Double glazing	422.5
5	Semi-detached - after 1930 - low efficiency	79.5	Uninsulated cavity wall	Partially insulated pitched roof	Uninsulated solid floor	Double glazing	288.6
6	Semi-detached - after 1930 - high efficiency	79.5	Insulated cavity wall	Insulated pitched roof	Uninsulated solid floor	Double glazing	231.7
7	Semi-detached - before 1930 - low efficiency	105.3	Uninsulated solid wall	Uninsulated pitched roof	Uninsulated solid floor	Double glazing	741.2
8	Semi-detached - before 1930 - high efficiency	102.4	Insulated cavity wall	Insulated pitched roof	Uninsulated solid floor	Double glazing	495.5
9	Flat - high efficiency	54.2	Insulated cavity wall	Insulated pitched roof	Other premises below	Double glazing	85.5
10	Top floor flat - low efficiency	64.6	Uninsulated solid wall	Uninsulated pitched roof	Other premises below	Double glazing	332.0
11	Bottom floor flat - low efficiency	61.7	Uninsulated solid wall	Other premises above	Uninsulated solid floor	Double glazing	231.8

** Heat Transfer Coefficient (HTC) is a measure of thermal efficiency and is proportional to heat demand.*
To calculate HTC, the heat flow rate is divided by the ideal indoor and lowest outdoor temperature difference

Appendix B3
Buildings – non-domestic archetypes

Archetype	Description	Age	Wall	Roof	Floor	Window	Heat demand (kWh/m²)	Electricity demand (kWh/m²)	Cooling demand (kWh/m²)
12	Office unit	Pre-1930	Uninsulated solid wall	Other premises above	Uninsulated solid floor	Double glazing	73.8	95.1	28.0
13	Retail	After 1930	Insulated cavity wall	Other premises above	Uninsulated suspended floor	Double glazing	95.1	117.0	28.0
14	Hotel / hostel	After 1930	Insulated cavity wall	Insulated flat roof	Uninsulated suspended floor	Double glazing	120.9	117.6	30.0
15	Leisure/sports facility	After 1930	Insulated cavity wall	Insulated flat roof	Uninsulated suspended floor	Double glazing	181.3	72.4	40.0
16	Schools, nurseries and seasonal public buildings	Pre-1930	Uninsulated solid wall	Uninsulated pitched roof	Uninsulated suspended floor	Double glazing	127.7	41.0	0.0
17	Museums / gallery / library / theatre	Pre-1930	Uninsulated solid wall	Part insulated pitched roof	Uninsulated suspended floor	Double glazing	107.3	59.7	0.0
18	Health centre/clinic	After 1930	Uninsulated cavity wall	Part insulated pitched roof	Uninsulated solid floor	Double glazing	141.0	55.7	0.0
19	Care home	Pre-1930	Uninsulated solid wall	Insulated pitched roof	Uninsulated suspended floor	Double glazing	113.3	64.6	30.0
20	Emergency services, local Gov services, law, military	After 1930	Insulated cavity wall	Insulated pitched roof	Uninsulated solid floor	Double glazing	177.8	94.5	0.0
21	Hospital	After 1930	Insulated cavity wall	Uninsulated flat roof	Uninsulated solid floor	Double glazing	162.6	86.4	45.0

Appendix B3
Buildings – non-domestic archetypes

Archetype	Description	Age	Wall	Roof	Floor	Window	Heat demand (kWh/m^2)	Electricity demand (kWh/m^2)	Cooling demand (kWh/m^2)
22	Warehouse						24.8	24.2	0.0
23	Restaurant / bar / café						67.1	245.8	0.0
24	Religious building						33.0	12.8	0.0
25	Transport hub/station						71.3	32.5	0.0
26	University campus						105.8	35.3	0.0
27	Other non-domestic						61.0	56.8	0.0

- For non-domestic archetypes 22-27, no retrofit options were modelled due to the increased difficulty in improving the thermal efficiency of these property types

Appendix B3
High demand retrofit options – domestic

Archetype	Original HTC (W/K)	Cavity wall insulation	Internal wall insulation (complex interior)	External wall insulation	External wall insulation (complex façade)	Loft insulation (Joists) 100 - 270mm	Loft insulation (Joists) 0 - 150mm	Insulate solid floor	high performance triple glazing	New-build standard thermal bridging	Enerphit airtightness (1 n50)	AECB airtightness (1.5 n50)	New double panel double convector radiators	New distribution pipework and triple panel radiators	Hot water cylinder and associated pipework	MVHR (de-centralised)	MEV	New HTC (W/K)	Cost £
1	379.8									■			■		■			357.1	£2,755
2	1192.1							■						■	■			1059.5	£9,115
3	153.6											■			■			148.6	£1,250
4	422.5						■						■		■			367.1	£3,404
5	288.6	■					■								■			231.7	£4,562
6	231.7														■			229.5	£1,250
7	741.2						■			■			■		■			678.9	£4,242
8	495.5									■					■			487.5	£1,250
9	85.5														■			85.3	£1,250
10	332.0						■								■			246.8	£2,810
11	231.8							■					■		■			176.1	£10,071

Appendix B3

High demand retrofit options – non-domestic

Archetype	Original heat demand (kWh/m²)	Cavity wall insulation	Internal wall insulation (complex interior)	External wall insulation (complex façade)	Loft insulation (Joists) 0 - 270mm	New roof with insulation (complex)	Insulate flat roof	Insulate solid floor	Insulate suspended floor (difficult access)	high performance triple glazing	New-build standard thermal bridging	Building regs airtightness (5 n50)	AECB airtightness (1.5 n50)	New double panel double convector radiators	New triple panel triple convector radiators	Hot water cylinder and associated pipework	New distribution pipework to radiators	Communal thermal store	MEV	New heat demand (kWh/m²)	Cost £
12	73.8									■						■				66.5	£1,517 +£82/m²
13	95.8										■	■				■				94.8	£1,250 +£0/m²
14	120.9										■							■		118.5	£11,250 +£0/m²
15	72.4										■							■		70.9	£26,000 +£0/m²
16	127.7				■							■			■					110.0	£27,295 +£32/m²
17	107.3					■									■		■			88.5	£49,620 +£45/m²
18	141.0	■												■		■				132.7	£5,120 +£10/m²
19	113.3								■									■		108.4	£11,250 +£22/m²
20	177.8											■		■		■				173.7	£5,120 +£0/m²
21	162.6						■								■			■		157.8	£83,076 +£69/m²

22-27 not modelled, Industry modelled separately

Appendix B3

Low demand retrofit options – domestic

Archetype	Original HTC (W/K)	Cavity wall insulation	Internal wall insulation (complex interior)	External wall insulation	External wall insulation (complex façade)	Loft insulation (Joists) 100 - 270mm	Loft insulation (Joists) 0 - 150mm	Insulate solid floor	high performance triple glazing	New-build standard thermal bridging	Enerphit airtightness (1 n50)	AECB airtightness (1.5 n50)	New double panel double convector radiators	New distribution pipework and triple panel radiators	Hot water cylinder and associated pipework	MVHR (de-centralised)	MEV	New HTC (W/K)	Cost £
1	379.8					■		■	■	■	■					■		302.4	£90,680
2	1192.1		■					■	■	■		■			■	■		710.5	£130,151
3	153.6							■	■	■		■			■			122.4	£18,186
4	422.5				■		■	■	■	■		■	■		■			226.5	£42,371
5	288.6	■					■	■	■	■		■				■		189.2	£30,945
6	231.7				■	■		■	■	■		■			■	■		189.2	£29,826
7	741.2			■			■	■	■	■		■				■		409.8	£76,134
8	495.5				■			■	■	■		■				■		393.2	£39,410
9	85.5								■		■				■		■	76.3	£10,255
10	332.0		■				■		■	■		■			■	■		166.6	£28,362
11	231.8																	111.6	£29,406

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Appendix B3
Low demand retrofit options – non-domestic

Archetype	Original heat demand (kWh/m²)	Cavity wall insulation	Internal wall insulation (complex interior)	External wall insulation (complex façade)	Loft insulation (Joists) 0 - 270mm	New roof with insulation (complex)	Insulate flat roof	Insulate solid floor	Insulate suspended floor (difficult access)	high performance triple glazing	New-build standard thermal bridging	Building regs airtightness (5 n50)	AECB airtightness (1.5 n50)	New double panel double convector radiators	New triple panel triple convector radiators	Hot water cylinder and associated pipework	New distribution pipework to radiators	Communal thermal store	MEV	New heat demand (kWh/m²)	Cost £
12	73.8		■							■	■					■			■	52.6	£1,517 +£150/m²
13	95.8								■	■	■		■			■			■	56.6	£1,250 +£172/m²
14	120.9								■	■	■							■		112.8	£11,250 +£116/m²
15	72.4									■	■	■						■		69.2	£26,000 +£73/m²
16	127.7			■	■				■	■	■	■			■					44.9	£9,805 +£393/m²
17	107.3			■	■				■	■	■	■			■		■			43.2	£36,105 +£340/m²
18	141.0	■			■			■		■	■	■		■		■				86.3	£5,120 +£198/m²
19	113.3			■					■	■	■	■						■		72.9	£11,250 +£271/m²
20	177.8				■			■		■	■		■			■				127.9	£1,250 +£185/m²
21	162.6			■			■			■	■	■			■			■		133.2	£83,076 +£115/m²

Appendix B4
Transport - assumptions

No.	Assumption Description
1	[BASELINE] Typical 24-hour period for demand tables represented average day in a year.
2	[BASELINE] Rail supplied by transmission network so excluded.
3	[BASELINE] Trip distances = distance between zone centroids multiplied by route indirectness factor
4	[BASELINE] Total mileage of trips taken from zone A to zone B: $Mileage_{AB}$= $distance_{AB}$ * number of $trips_{AB}$
5	[BASELINE] Mileage summed and assigned to outbound zone (zone A)
6	[BASELINE] Multiply mileage by vehicle fuel consumption factors to estimate annual kWh.
7	[BASELINE] Fuel consumption factors for combustion vehicles: Car: 0.94 kWh/mile Van: 0.89 kWh/mile HGV: 6.21 kWh/mile Bus: 8.43 kWh/mile
8	[FUTURE] Car dependency factors (1: national average, <1: less car dependent, >1: more car dependent) based on average number of cars per household Flintshire: 1.09 Isle of Anglesey: 1.08 Gwynedd: 1.02 Wrexham: 1.01 Denbighshire: 1.00

Appendix B5
Renewable generation - assumptions

No.	Assumption Description
1	[BASELINE] For renewable generators identified in the REPD database, only those marked as "Operational" were captured, using 2019 as a baseline year.
2	[BASELINE] For renewable generators identified in NGED and SPEN registers (ECR), only those marked as "Connected" were captured, using 2019 as a baseline year.
3	[BASELINE] Generation (MWh) was calculated using LA-specific, hourly time-step profiles for wind and solar from PVGIS and Renewables.ninja. For other technologies, standard capacity factors from BEIS/DESNZ were used.
4	[PIPELINE] For REPD entries, only those marked as "Planning Application Granted – Awaiting Construction" and "Under Construction" were captured.
5	[PIPELINE] For ECR entries, only those marked as "Accepted to connect" were captured.
6	[FUTURE ENERGY SYSTEM] The solar and wind capacity factors (MW/km^2) used to calculate maximum available capacity (MW) at substation granularity were calculated using an average of the 4 factors from the renewable energy assessment (REA) undertaken by the Carbon Trust between 2020-2021. The REA factors used were for Blaenau Gwent, Caerphilly, Monmouthshire and Torfaen, all of which had values in the range of 50-60 MW/km^2 for solar PV, which agrees with literature. The final values used to estimate solar and wind resource were 53.4 MW/km^2 and 8.1 MW/km^2, respectively.
7	[FUTURE ENERGY SYSTEM] Overlap between areas suitable for both wind and solar were calculated to ensure that capacity was not double-counted.
8	[FUTURE ENERGY SYSTEM] Maximum roof-mounted PV capacity was estimated using roof-area coverage at the LA- and substation-level. It was assumed that 50% of roofs would be north-facing and therefore unsuitable and assumed a further 50% would be unsuitable due to further technical or planning constraints (e.g.: unsuitable roof type, extensive shading, listed buildings…). As both residential and commercial roofs were considered, a factor of 7.2 m^2/kW was used to estimate maximum available capacity.
9	[FUTURE ENERGY SYSTEM] Areas suitable for wind and solar developments were mapped using a variety of sources provided by the individual LAs. In instances where no shapefiles were provided, areas were traced manually using publicly-available information (REA, LDP or similar). The additional areas identified in the Welsh-wide study (Arup, 2019) were included for LAs where data was either outdated or missing detail, see adjacent table.
10	[FUTURE ENERGY SYSTEM] It was assumed that of the areas identified in the Welsh-wide study (which primarily considered planning constraints and not technical constraints), 10% of the land could be developed on for solar and/or wind.

Local Authority	Welsh-wide Arup renewable study (2019)
Blaenau Gwent	No
[AREA]	No
Cardiff	Yes
Merthyr Tydfil	Yes
Monmouthshire	No
Torfaen	No
Rhondda Cynon Taf	No
Vale of Glamorgan	No
[AREA]	Yes
Flintshire	Yes
Isle of Anglesey	Yes
Gwynedd	Yes
Wrexham	Yes

Appendix B6
Heat networks – assumptions

- Counterfactual techno-economic assumptions - For developing a LCoH value for decentralised ASHPs

Assumptions log – 1/2

Item	Value	Units	Source/notes	Item	Value	Units	Source/notes
ASHP plant capex cost	700	£/kWth	Taken from calliope inputs – average of now and 2050 costs	Elec boiler plant capex cost	150	£/kWth	Taken from calliope inputs
ASHP lifetime	18	Years	Taken from calliope inputs	Elec boiler lifetime	20	Years	Typical technology assumption
ASHP O&M costs	0.01	£ p.a./kWhth	Used in the NCA study – calliope input looks like it has an error	Elec boiler O&M costs	0	£ p.a./kWhth	Taken from calliope inputs
ASHP peak capacity	50	% of peak building heat	Assumption based on typical load duration curves	Elec boiler peak capacity	50	% of peak buildin g heat	Electric boilers are assumed to provide peaking role
ASHP annual supply	80	% of annual building heat	Assumed to be lower than the 90% heat network figure due to less thermal storage at building level	Elec boiler annual supply	20	% of annual buildi ng heat	Assumed to be higher than 10% heat network figure due to less thermal storage at building level
Ambient air temperature	5	ºC	Typical ambient temperature during heating hours – inputs give equivalent COP to calliope	Elec boiler efficiency	100	%	Taken from calliope inputs
ASHP carnot cycle efficiency	50	%	Typical ambient temperature during heating hours – inputs give equivalent COP to calliope	Electricity unit cost	0.130 4	£/kWhe	HMT Green Book central commercial/public sector price
ASHP source ΔT	10	ºC	Typical ambient temperature during heating hours – inputs give equivalent COP to calliope	Electricity supply connection cost	200	£/kWe	Based on average of DNO connection offers in urban areas
ASHP supply ΔT	5	ºC	Typical ambient temperature during heating hours – inputs give equivalent COP to calliope	Building supply temperature	65	ºC	Typical building supply temperature – inputs give equivalent COP to calliope

Appendix B6

Heat networks – assumptions

- Counterfactual techno-economic assumptions - For developing a LCoH value for decentralised ASHPs

Assumptions log – 2/2

Item	Value	Units	Source/notes
Discount rate	3.5	%	HMT Green Book for public sector projects
Project lifetime	60	Years	DESNZ assumption
Testing & commissioning costs	2	% of Capex	High level assumption used in Arup HNDU feasibility studies
Builders work costs	3	% of Capex	High level assumption used in Arup HNDU feasibility studies
Preliminaries costs	10	% of Capex	High level assumption used in Arup HNDU feasibility studies
Overheads & profits costs	5	% of Capex	High level assumption used in Arup HNDU feasibility studies
Design & professional fees	12	% of Capex	High level assumption used in Arup HNDU feasibility studies
Optimism bias	15	% of Capex	High level assumption used in Arup HNDU feasibility studies

Appendix B6

Heat networks – assumptions

- For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log – 1/3

Item	Value	Units	Source/notes	Item	Value	Units	Source/notes
ASHP plant capex cost	420	£/kWth	Assumes large plant is 60% price of decentralised plant based on work on other Arup projects	Elec boiler plant capex cost	90	£/kWth	Assumes large plant is 60% price of decentralised plant based on work on other Arup projects
ASHP lifetime	18	Years	Taken from calliope inputs	Elec boiler lifetime	20	Years	Typical technology assumption
ASHP O&M costs	0.01	£ p.a./kWh th	Used in the NCA study – error in calliope input	Elec boiler O&M costs	0.0075	£ p.a./kWh th	Used in Arup HNDU feasibility studies; based on DECC report
ASHP peak capacity	50	% of EC peak heat	Assumption based on typical load duration curves	Elec boiler peak capacity	50	% of EC peak heat	Electric boilers are assumed to provide peaking role
ASHP annual supply	90	% of EC annual heat	Assumption based on typical load duration curves	Elec boiler annual supply	10	% of EC annual heat	Assumption based on typical load duration curves
Ambient air temperature	5	ºC	Typical ambient temperature during heating hours – same as counterfactual	Elec boiler efficiency	100	%	Taken from calliope inputs
ASHP carnot cycle efficiency	60	%	Applied to ideal carnot cycle COP; typical technology assumption; higher than for smaller equipment	Electricity unit cost	0.1304	£/kWhe	HMT Green Book central commercial/public sector price
ASHP source ΔT	10	ºC	Typical technology assumption – same as counterfactual	Electricity supply connection cost	200	£/kWe	Based on average of DNO connection offers in urban areas
ASHP supply ΔT	5	ºC	Typical technology assumption– same as counterfactual	Heat network supply temperature	65	ºC	Consistency in supply temperature

Appendix B6
Heat networks – assumptions

- For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log – 2/3

Item	Value	Units	Source/notes	Item	Value	Units	Source/notes
Waste-heat heat pump plant capex cost	420	£/kWth	Assumes large plant is 60% price of decentralised plant based on work on other Arup projects	Waste heat capture plant capex cost	*See note*	£/kWth	See waste heat assumptions; depends on source
Waste-heat heat pump lifetime	20	Years	Typical technology assumption	Waste-heat capture plant O&M costs	*See note*	£/kWhth	See waste heat assumptions; depends on source
Waste-heat heat pump O&M costs	0.01	£ p.a./kWhth	Used in the NCA study	Thermal storage capex cost	24	£/kWhth	Supplier quotes; used in Arup HNDU feasibility studies
Waste-heat heat pump peak capacity	50	% of EC peak heat	Assumption based on typical load duration curves	Thermal storage sizing	4	Hours of EC peak	High-level assumption
Waste-heat heat pump annual supply	90	% of EC annual heat	Assumption based on typical load duration curves	Network pipework cost	2000	£/m	DESNZ assumption
Waste-heat source temperature	*See note*	°C	See waste heat assumptions; depends on source	Network losses	20	%	DESNZ assumption and limit of acceptable losses in CIBSE CP1
Waste-heat heat pump carnot cycle efficiency	60	%	Typical technology assumption; higher than for smaller equipment	Network O&M costs	0.5	£/m pipework	Based on data from Arup projects
Waste-heat heat pump source ΔT	5	°C	Typical technology assumption; lower ΔT than for air	Energy centre ancillaries costs	20	£/kWth	Based on supplier quotes; used in Arup EfW heat network opportunities study
Waste-heat heat pump supply ΔT	5	°C	Typical technology assumption	Ancillary electricity usage (e.g., for pumps)	3	% of EC annual heat	Used in Arup HNDU feasibility studies

Appendix B6
Heat networks – assumptions

- For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log – 3/3

Item	Value	Units	Source/notes	Item	Value	Units	Source/notes
Energy centre building cost	100	£/kWth	Used in the NCA study	Discount rate	3.5	%	HMT Green Book for public sector projects
Hydrogen boiler capex cost	90	£/kW	Takes calliope input and assumes large plant is 60% price of decentralised plant based on work on other Arup projects	Testing & Commissioning costs	2	% of Capex	High level assumption used in Arup HNDU feasibility studies
Hydrogen boiler lifetime	15	Years	Calliope inputs	Builders work costs	3	% of Capex	High level assumption used in Arup HNDU feasibility studies
Hydrogen boiler efficiency	84	%	Calliope inputs	Preliminaries costs	10	% of Capex	High level assumption used in Arup HNDU feasibility studies
Hydrogen boiler O&M	0.005	£ p.a./kWhth	O&M costs half that of heat pumps – based on calliope inputs	Overheads & profits costs	5	% of Capex	High level assumption used in Arup HNDU feasibility studies
Hydrogen fuel cost	0.07	£/kWh	Calliope inputs	Design & professional fees	12	% of Capex	High level assumption used in Arup HNDU feasibility studies
Hydrogen boiler backup capacity	100	% of EC peak heat	Assumed that backup boilers able to meet full peak will be available	Optimism bias	15	% of Capex	High level assumption used in Arup HNDU feasibility studies
Project lifetime	60	Years	DESNZ assumption				

Appendix B6
Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: Substations

Item	Value	Units	Source/notes
Substation capturable heat (kW)	1.82	kWth/MVA	LSBU waste heat research
Substation capturable heat (kWh)	15,910	kWhth/MVA	LSBU waste heat research
Source temperature	45	ºC	LSBU waste heat research
Heat capture ΔT	5	ºC	Typical industry assumption
Capture plant capex rate	850	GBP/kWth	Estimate based on data from other Arup projects
Capture plant Opex rate	0.005	GBP/kWhth	Estimate based on data from other Arup projects

Appendix B6
Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: WWTW

Item	Value	Units	Source/notes
Waste production rate	32.5	Kg dried solids p.a./person	Sludge Treatment - Huber Technology UK - Rotamat Ltd.
WWTW capturable heat (kW)	0.035	kWth/PE	LSBU waste heat research
WWTW capturable heat (kWh)	302	kWhth/PE	LSBU waste heat research
Source temperature	17.5	ºC	LSBU waste heat research
Heat capture ΔT	5	ºC	Typical industry assumption
Capture plant capex rate	180	GBP/kWth	Estimate based on data from other Arup projects
Capture plant Opex rate	0.005	GBP/kWhth	Estimate based on data from other Arup projects

Appendix B6

Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: Minewater treatment plants

Item	Value	Units	Source/notes
Capturable heat per plant	2000	kW/plant	LSBU waste heat research
Operational hours	7884	hours	Assumes constant operation with 90% availability
Source temperature	20	ºC	LSBU waste heat research
Heat capture ΔT	5	ºC	Typical industry assumption
Capture plant capex rate	180	GBP/kWth	Estimate based on data from other Arup projects
Capture plant Opex rate	0.005	GBP/kWhth	Estimate based on data from other Arup projects

Appendix B6

Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: Data centres

Item	Value	Units	Source/notes
DC power density	1	kW IT/m^2	Estimate based on data from other Arup projects
Utilisation factor	80%	% of IT capacity utilised	Estimate based on data from other Arup projects
Capturable heat rate	35%	% of DC heat produced	Estimate based on data from other Arup projects
Source temperature	32.5	^oC	LSBU waste heat research
Heat capture ΔT	5	^oC	Typical industry assumption
Capture plant capex rate	180	GBP/kWth	Estimate based on data from other Arup projects
Capture plant Opex rate	0.005	GBP/kWhth	Estimate based on data from other Arup projects

Appendix B6

Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: EfW plants

Item	Value	Units	Source/notes
EfW capturable heat rate	33%	% of MWe capacity	Based on 10 MWth heat available from 30 MWe Cardiff facility
Plant operational hours	7884	hours	Assumes constant operation with 90% availability
Source temperature	>65	^{o}C	Assumes high grade heat; no heat pump boosting required
Capture plant capex rate	350	GBP/kWth	Estimate based on data from other Arup projects
Wholesale electricity cost	0.06	GBP/kWhe	Taken from calliope inputs
Z factor	10		https://assets.publishing.service.gov.uk/media/605b862ed3bf7f2f0b5830ec/draft-sap-10-2-appendix-c.pdf
Capture plant Opex rate	0.010	GBP/kWhth	Estimate based on data from other Arup projects plus lost electricity production costs

Appendix B6

Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: Cold stores

Item	Value	Units	Source/notes
EfW capturable heat rate	33%	% of MWe capacity	Based on 10 MWth heat available from 30 MWe Cardiff facility
Plant operational hours	7884	hours	Assumes constant operation with 90% availability
Source temperature	>65	^{o}C	Assumes high grade heat; no heat pump boosting required
Capture plant capex rate	350	GBP/kWth	Estimate based on data from other Arup projects
Wholesale electricity cost	0.06	GBP/kWhe	Taken from calliope inputs
Z factor	10		https://assets.publishing.service.gov.uk/media/605b862ed3bf7f2f0b5830ec/draft-sap-10-2-appendix-c.pdf
Capture plant Opex rate	0.010	GBP/kWhth	Estimate based on data from other Arup projects plus lost electricity production costs

Appendix B6

Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: Industry – water-based capture

Item	Value	Units	Source/notes
EfW capturable heat rate	33%	% of MWe capacity	Based on 10 MWth heat available from 30 MWe Cardiff facility
Plant operational hours	7884	hours	Assumes constant operation with 90% availability
Source temperature	>65	ºC	Assumes high grade heat; no heat pump boosting required
Capture plant capex rate	350	GBP/kWth	Estimate based on data from other Arup projects
Wholesale electricity cost	0.06	GBP/kWhe	Taken from calliope inputs
Z factor	10		https://assets.publishing.service.gov.uk/media/605b862ed3bf7f2f0b5830ec/draft-sap-10-2-appendix-c.pdf
Capture plant Opex rate	0.010	GBP/kWhth	Estimate based on data from other Arup projects plus lost electricity production costs

Appendix B6

Heat networks – assumptions

- Waste heat capture techno-economic assumptions - For using in HeatNet's TEM to estimate the LCoH of networks

Assumptions log: Industry – flue gas-based heat capture

Item	Value	Units	Source/notes
Heat capture rate	20%	% of kWh fuel use	Estimate based on data from other Arup projects
Plant operational hours	7884	Hours	Assumes constant operation with 90% availability
Source temperature	>65	°C	Assumes high grade heat; no heat pump boosting required
Capture plant capex rate – large sites	650	GBP/kWth	Estimate based on data from other Arup projects – for sites >3 MWth
Capture plant capex rate – small sites	350	GBP/kWth	Estimate based on data from other Arup projects - for sites <3 MWth
Wholesale electricity cost	0.06	GBP/kWhe	Taken from calliope inputs
Z factor for power producers	10		Assumes same Z factor as EfW plants
Capture plant Opex rate – non-power producers	0.004	GBP/kWhth	Estimate based on data from other Arup projects
Capture plant Opex rate – power producers	0.010	GBP/kWhth	Uplifts rate to account for lost electricity sale revenue

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Anaerobic digestion	Energy CAPEX	4,760.00	£ / kW	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000). Assumed price in 2020 is equivalent to projected 2025 price. No change across years
Anaerobic digestion	Energy efficiency	0.32	fraction	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	From the BEIS electricity generation costs 2020. This is the load factor multiplied by the plant efficiency to account for the fact that the plant cannot operate at full load throughout the year.
Anaerobic digestion	Lifetime	20.00	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Anaerobic digestion	Operational cost of production	0.07	£ / kWh generated	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	OPEX includes Fixed O&M, Variable O&M, Fuel Costs, Decommissioning and waste, Steam Revenue, Additional Costs (all provided in £/MWh). No change across years
Anaerobic digestion	Operational fuel consumption cost	0.00	$kgCO_2e$ / kWh fuel in	BEIS (2020). Greenhouse gas reporting: conversion factors 2020. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020	Biogas scope 1 emissions factor used

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydrogen import	Lifetime	1	years	n/a	Selected to have no effect
Hydrogen import	Operational fuel consumption cost	0.0203	kgCO2e / kWh	BEIS Hydrogen Production Costs 2021 report and annex. Availabe at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	Carbon capture rate for SMR + CCUS of 93% (BEIS hydrogen production costs) multiplied by the carbon emissions per kWh of hydrogen produced.
Hydrogen import	Operational cost of production	0.051	£ / kWh	BEIS Hydrogen Production Costs 2021 Annex, average of all the methane reformation technologies for the wholesale price (central) in 2050. Availabe at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	Average of all the methane reformation technologies for the wholesale price (central) in 2050.
Biomass import	Energy efficiency	1	fraction	n/a	Default
Biomass import	Lifetime	1	years	n/a	Default
Biomass import	Operational cost of production	0.04	£ / kWh generated	Heat roadmap EU (2017) EU28 fuel prices for 2015, 2030 and 2050. Available at: https://heatroadmap.eu/wp-content/uploads/2020/01/HRE4_D6.1-Future-fuel-price-review.pdf (Accessed 2023).	Price for wood pellet - medium labour share + fuel handling charges medium scenario. Converted from Euros using 0.91 exchange rate.
Biomass import	Operational fuel consumption cost	0.01053	kgCO2e / kWh	BEIS (2022). Greenhouse gas reporting: conversion factors 2022. https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-20202	
Electrolyser	Annual investment fraction	0.02	(fraction) of capex	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	50:50 SEM and Alkaline electrolyser from 2050.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Electrolyser	Energy CAPEX	750	£ / kW	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	50:50 SEM and Alkaline electrolyser from 2050.
Electrolyser	Energy CAPEX	535.5	£ / kW	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	50:50 SEM and Alkaline electrolyser from 2050.
Electrolyser	Energy efficiency	0.65	fraction	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	50:50 SEM and Alkaline electrolyser from 2050.
Electrolyser	Energy efficiency	0.82	fraction	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011506/Hydrogen_Production_Costs_2021.pdf (Accessed 2023).	Medium scenario for both Alkaline and PEM electrolysers.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Electrolyser	Lifetime	30	years	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011506/Hydrogen_Production_Costs_2021.pdf (Accessed 2023).	Medium scenario for both Alkaline and PEM electrolysers.
Ground PV	Energy CAPEX	431.25	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Large-scale Solar. CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000).
Ground PV	Energy CAPEX	531.25	£ / kW	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Ground PV	Lifetime	35	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Ground PV	Operational cost of production	7.3	£ / kW /year	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	OPEX includes Fixed O&M, Variable O&M, Fuel Costs, Decommissioning and waste, Steam Revenue, Additional Costs (all provided in £/MWh)
Hydrogen CCGT	Energy CAPEX	623.42	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	CCGT H Class. CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000).
Hydrogen CCGT	Energy efficiency	0.53	fraction	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	From the BEIS electricity generation costs 2020. This is the average fuel efficiency.
Hydrogen CCGT	Lifetime	25	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Hydrogen CCGT	Operational cost of production	0.004	£ / kWh generated	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	OPEX includes Fixed O&M, Variable O&M, Fuel Costs, Decommissioning and waste, Steam Revenue, Additional Costs (all provided in £/MWh).

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydrogen CCGT	Opex	18.8	£/kW/year	BEIS (2020) Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Includes fixed O&M, insurance, connection and use of system charges for CCGT H Class.
Hydrogen CHP	Annual operational cost	14.2	£/kW/year	Battelle Memorial Institute (2016) Manufacturing Cost Analysis of 100 and 250 kW Fuel Cell Systems for Primary Power and Combined Heat and Power Applications. Available at: https://www.energy.gov/eere/fuelcells/articles/manufacturing-cost-analysis-100-and-250-kw-fuel-cell-systems-primary-power (Accessed 2023).	Converted using 0.71 USD to GBP.
Hydrogen CHP	Energy CAPEX	2094	£ / kW	Battelle Memorial Institute (2016) Manufacturing Cost Analysis of 100 and 250 kW Fuel Cell Systems for Primary Power and Combined Heat and Power Applications. Available at: https://www.energy.gov/eere/fuelcells/articles/manufacturing-cost-analysis-100-and-250-kw-fuel-cell-systems-primary-power (Accessed 2023).	
Hydrogen CHP	Energy efficiency	0.42	fraction	2G Energy Ltd (2024) Leading Combined Heat and Power Technology. Available at: https://www.2-g.com/en/hydrogen-chp/ (Accessed 2023).	Heating efficiency

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydrogen CHP	Lifetime	15	Years	Alan Beech, Clarke Energy (2024) CHP - here to stay. Available at: https://www.energymanagermagazine.co.uk/chp-here-to-stay/#:~:text=INNIO%20Jenbacher%20gas%20engines%20can,into%20the%20net%20zero%20world. (Accessed 2023).	
Hydrogen refueller	Energy CAPEX	1076	£ / kW	Mariya Koleva and Marc Melaina (2020)Hydrogen Fuelling Stations Cost. Available at: https://www.hydrogen.energy.gov/pdfs/21002-hydrogen-fueling-station-cost.pdf (Accessed 2023).	Assuming a 24hr flat usage profile and an exchange rate of 0.74£/$.
Hydrogen refueller	Energy efficiency	0.65	fraction	G. Sdanghi, G. Maranzana, A. Celzard, and V. Fierro (2019), Review of the current technologies and performances of hydrogen compression for stationary and automotive applications. Available at: https://www.sciencedirect.com/science/article/abs/pii/S1364032118307822 (Accessed 2023).	Efficiency accounting for compression losses.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydrogen refueller	Lifetime	18	years	NREL (2014) Hydrogen Station Compression, Storage, and Dispensing Technical Status and Costs. Available at: https://www.nrel.gov/docs/fy14osti/58564.pdf (Accessed 2023).	
Hydrogen storage tank	Lifetime	30	years	NREL (2014) Hydrogen Station Compression, Storage, and Dispensing Technical Status and Costs. Available at: https://www.nrel.gov/docs/fy14osti/58564.pdf (Accessed 2023).	
Hydrogen storage tank	Energy efficiency	0.94	fraction	Department of Mechanical Engineering, The University of Hong Kong (2006) An Overview of Hydrogen Storage Technologies. Available at: https://journals.sagepub.com/doi/pdf/10.1260/014459806779367455 (Accessed 2023).	
Hydrogen storage tank	Operational cost of production	0.34	£ / kWh	HM Government (2021) Defining and organising functional documentation to meet functional standards. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760479/H2_supply_chain_evidence_-_publication_version.pdf (Accessed 2023).	Medium pressure tank - Unlikely to decrease over time.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydrogen storage tank	Storage CAPEX	11.45	£ / kWh	HM Government (2021) Defining and organising functional documentation to meet functional standards. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760479/H2_supply_chain_evidence_-_publication_version.pdf (Accessed 2023).	Medium pressure tank - Unlikely to decrease over time.
Onshore wind	Energy CAPEX	1088.63	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000). Assumed price in 2020 is equivalent to projected 2025 price.
Onshore wind	Lifetime	25	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Onshore wind	Opex	30	£/kW/year	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Onshore wind	Operational cost of production	0.006	£ / kWh generated	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	OPEX includes fixed O+M, Variable O+M, fuel costs, decommissioning & waste, Steam revenue, and additional costs. Costs are assumed constant between 2040 and 2050. No change across years.

Appendix B7
Technology parameters for future energy system scenario modelling

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Technology	Setting	Value	Units	Reference	Notes
Onshore wind	Operational cost of production	0	kgCO2e / kWh fuel in	Default value	Renewable energy, assume operational emissions are zero.
Hydrogen distribution	Energy CAPEX per energy capacity per distance	1.2	£/kW/km	Arup (2023) Future of Great Britain's Gas Networks. Available at: Future of UK Gas Networks, https://nic.org.uk/app/uploads/Arup-Future-of-UK-Gas-Networks-18-October-2023.pdf (Accessed 2023).	This is equivalent to the value for the LTS backbone as stated in the source document. Transformed from a capex and distance, to a capex/distance.This is then divided by 1m kW which is a typical capacity in the system to give 1.2 £/kW/km If the additional services were also transitioned the total cost per m would be 4.8£/kW/km.
Hydrogen distribution	Energy efficiency	1	fraction	To account for in demands	
Hydrogen distribution	Lifetime	40	years	NG2050 - from WWU	
Hydrogen export	Lifetime	1	years	n/a	Selected to have no effect.
Hydrogen export	Operational cost of production	-0.051	£ / kWh	BEIS Hydrogen Production Costs 2021 Annex, average of all the steam reformation technologies	
Hydrogen export	Operational fuel consumption cost	0	kgCO2e / kWh	n/a	Hydrogen for export only produced via electrolysis so assumed zero emissions.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Rooftop PV	Energy CAPEX	1100	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Solar PV 4-10 kW, assume 10 kW. CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000). Rooftop PV costs do not change.
Rooftop PV	Lifetime	30	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Rooftop PV	Annual operational cost	7	£/kW/year	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Rooftop PV	Operational cost of production	0	kgCO2e / kWh	Default value	Renewable energy, assume operational emissions are zero.
Hydroelectricity	Energy CAPEX	3000	£ / kW	BEIS (2020) Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	No new ones being built.
Hydroelectricity	Energy efficiency	1	fraction	DESNZ, Environmental Agency and BEIS (2013) Harnessing hydroelectric power. Available at: https://www.gov.uk/guidance/harnessing-hydroelectric-power#:~:text=Hydroelectric%20energy%20uses%20proven%20and, factor%20of%2035%20to%2040%25. (Accessed 2023).	Assumed to be equal to 1, with the capacity factor dictating the amount of electricity produced.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydroelectricity	Capacity factor	0.3605	fraction	DUKES (2023) Load factors for renewable electricity generation (6.3). Available at: https://www.gov.uk/government/statistics/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes. Accessed 2023.	Hydro load factor for 2019.
Hydroelectricity	Lifetime	41	years	BEIS (2020) Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	
Hydroelectricity	Operational cost of production	0	kgCO2e / kWh fuel in	Default value	Renewable energy, assume operational emissions are zero.
Hydroelectricity	Operational cost of production	0.006	£ / kWh generated	BEIS (2020) Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	OPEX only variable O+M
Hydroelectricity	Opex	48.1	£/kW/year	BEIS (2020)Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Fixed O&M
Tidal	Energy efficiency	1	fraction	n/a	Default
Tidal	Capacity factor	0.2	fraction	North Wales Tidal Energy (2024) Electricity consumption keeps rising. Available at: https://www.northwalestidalenergy.com/energy-generation (Accessed 2023).	Assumption that 4TWh per year of electricity could be generated from 2-2.5GW. This translates to a capacity factor of 0.182 - 0.228.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Tidal	Lifetime	120	years	Tidal Lagoon Swansea Bay plc (2014) Environmental Statement Volume 3 Appendix 5.1 Sustainability: Carbon Balance. Available at: http://www.tidallagoonpower.com/wp-content/uploads/2018/02/App-5.1-Sustainability-%E2%80%93-Carbon-Balance.pdf (Accessed 2023).	
Tidal	Energy CAPEX	3331	£ / kW	Arup experience. Available at: http://www.poyry.co.uk/sites/www.poyry.co.uk/files/tidallagoonpower_levelisedcoststudy_v7_0.pdf (Accessed 2023).	
Tidal	Opex	0.02	£ / kW	n/a	Arup experience
Anaerobic digestion	Energy CAPEX	4760	£ / kW	BEIS (2020)Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000). Assumed price in 2020 is equivalent to projected 2025 price. No change across years.
Anaerobic digestion	Energy efficiency	0.4	fraction	BEIS (2020)Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	From the BEIS electricity generation costs 2020. This is the load factor multiplied by the plant efficiency to account for the fact that the plant cannot operate at full load throughout the year.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Anaerobic digestion	Lifetime	20	years	BEIS (2020)Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	
Anaerobic digestion	Operational cost of production	0.07	£ / kWh generated	BEIS (2020)Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	OPEX includes Fixed O&M, Variable O&M, Fuel Costs, Decommissioning and waste, Steam Revenue, Additional Costs (all provided in £/MWh). No change across years.
Anaerobic digestion	Operational fuel consumption cost	0.00022	kgCO2e / kWh fuel in	BEIS (2022). Greenhouse gas reporting: conversion factors. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022 (Accessed 2023).	Biogas scope 1 emissions factor used.
Sewage gas	Energy CAPEX	5906.67	£ / kW	BEIS (2020)Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000). Assumed price in 2020 is equivalent to projected 2025 price. No change across years.
Sewage gas	Energy efficiency	0.46	fraction	BEIS (2020)Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	From the BEIS electricity generation costs 2020. This is the load factor, which can be used as an efficiency to ensure the plant does not operate at full capacity all year.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Sewage gas	Lifetime	20	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Sewage gas	Operational cost of production	0.014	£ / kWh generated	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Sewage gas	Opex	105	£/kW/year	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Sewage gas	Operational cost of production	0.00022	kgCO2e / kWh fuel in	BEIS (2022). Greenhouse gas reporting: conversion factors 2022. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022 (Accessed 18/03/2024).	Biogas scope 1 emissions factor used.
Biogas import	Operational cost of production	0.017	£ / kWh	IEA (2020) Outlook for biogas and biomethane: prospects for organic growth. Available at: https://www.iea.org/reports/outlook-for-biogas-and-biomethane-prospects-for-organic-growth/sustainable-supply-potential-and-costs (Accessed 2023).	

Appendix B7
Technology parameters for future energy system scenario modelling

Tudalen 506

Technology	Setting	Value	Units	Reference	Notes
Biogas boiler	Annual operational cost	6	£/kW/year	Climate Change Committee (2018) Analysis of alternative UK heat decarbonisation pathways (Imperial). Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways/ (Accessed 2023).	Assumed same maintenance cost as hydrogen boiler.
Biogas boiler	Energy CAPEX	150	£ / kW	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	Assumed same cost as hydrogen boiler.
Biogas boiler	Energy efficiency	0.84	fraction	HM Government (2013) Part L Domestic Building Services Compliance Guide. Available at: https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l. (Accessed 2024).	Assuming same efficiency as a gas boiler.
Biogas boiler	Lifetime	15	years	Currie & Brown and AECOM for CCC (2019) The costs and benefits of tighter standards for new buildings. Available at: https://www.theccc.org.uk/publication/the-costs-and-benefits-of-tighter-standards-for-new-buildings-currie-brown-and-aecom/. (Accessed 2024).	Assuming same lifetime as a gas boiler.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Biogas CHP	Energy efficiency	0.42	fraction	2G Energy Ltd (2024) Leading Combined Heat and Power Technology. Available at: https://www.2-g.com/en/hydrogen-chp/ (Accessed 2023).	Assume same as hydrogen CHP. Heating efficiency.
Biogas CHP	Lifetime	15	years	2G Energy Ltd (2024) Leading Combined Heat and Power Technology. Available at: https://www.2-g.com/en/hydrogen-chp/ (Accessed 2023).	Assume same as hydrogen CHP.
Biomass boiler to heat	Energy CAPEX	750	£ / kW	Biomass boilers: SPONS mechanical and electrical services	
Biomass boiler to heat	Energy efficiency	0.7	fraction	BEIS (2019) Measurement of the in-situ performance of solid biomass boilers. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831083/Full_technical_report.pdf (Accessed 2023).	Mean gross %
Biomass boiler to heat	Lifetime	20	years	BEIS (2019) Measurement of the in-situ performance of solid biomass boilers. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831083/Full_technical_report.pdf	
Biomass boiler to heat	Operational cost of production	0.004	£ / kWh generated	IRENA (2012) Biomass for Power Generation. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2012/RE_Technologies_Cost_Analysis-BIOMASS.pdf (Accessed 2023).	Variable OPEX from the report is stated as 0.005 USD/kWh. Adjusted for 2012 exchange rate (0.7271 GBP) and inflation from 2012 to 2022 (33%), shown to one significant figure.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Biomass boiler to electricity	Energy CAPEX	3141.74	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000).
Biomass boiler to electricity	Energy efficiency	0.29	fraction	BEIS (2020) Electricity Generation Costs.	
Biomass boiler to electricity	Lifetime	25	years	BEIS (2020) Electricity Generation Costs.	
Biomass boiler to electricity	Operational cost of production	0.009	£ / kWh generated	BEIS (2020) Electricity Generation Costs.	OPEX includes Fixed O&M, Variable O&M, Fuel Costs, Decommissioning and waste, Steam Revenue, Additional Costs (all provided in £/MWh).
Biomass boiler to electricity	Opex	96	£ / kW / year	BEIS (2020) Electricity Generation Costs.	
Biomass CHP	Operational cost of production	0.013	£ / kWh	BEIS (2020) Electricity Generation Costs.	
Biomass CHP	Energy CAPEX	5551.4	£ / kW	BEIS (2020) Electricity Generation Costs.	
Biomass CHP	Lifetime	24	years	BEIS (2020) Electricity Generation Costs.	
Biomass CHP	Annual operational cost	307	£ / kW / year	BEIS (2020) Electricity Generation Costs.	
Biomass CHP to heat	Energy efficiency	0.43	fraction	Digest of UK Energy Statistics (DUKES) (2023) combined heat and power. Available at: https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2023 (Accessed 2023).	Heat efficiency calculated using heat output and total CHP fuel use in 2022.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Biomass CHP to electricity	Carrier output ratio	0.57	fraction	Digest of UK Energy Statistics (DUKES) (2023) combined heat and power. Available at: https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2023 (Accessed 2023).	The carrier output ratio indicates that 0.57 units of electricity are produced for every unit of heat produced. Calculated using the ratio of electricity generation efficiency to heat generation efficiency.
Ground PV	Operational cost of production	0	kgCO2e / kWh fuel in	Default value	Renewable energy, assume operational emissions are zero.
Heat pump	Energy CAPEX	750	£ / kW	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	Average of ASHP and GSHP. For ASHP: Annual maintenance costs for medium business +industry ASHP £2966.04 Divided by the reference size (150kW) does not change between years. For GSHP - https://core.ac.uk/download/pdf/141667173.pdf
Heat pump	Energy CAPEX	650	£ / kW	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	Average of ASHP and GSHP. For ASHP: Annual maintenance costs for medium business +industry ASHP £2966.04 Divided by the reference size (150kW) does not change between years. For GSHP - https://core.ac.uk/download/pdf/141667173.pdf
Heat pump	Energy efficiency	2.5	fraction	HM Government (2021) Defining and organising functional documentation to meet functional standards. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/606818/DECC_RHPP_161214_Final_Report_v1-13.pdf (Accessed 2023).	

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Heat pump	Lifetime	18	years	Currie & Brown and AECOM for CCC (2019) The costs and benefits of tighter standards for new buildings. Available at: https://www.theccc.org.uk/publication/the-costs-and-benefits-of-tighter-standards-for-new-buildings-currie-brown-and-aecom/	
Heat pump	Annual operational cost	11.18	£ / kW / year	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	Average of ASHP and GSHP. For ASHP: Annual maintenance costs for medium business +industry ASHP £2966.04 Divided by the reference size (150kW) does not change between years. For GSHP - https://core.ac.uk/download/pdf/141667173.pdf
Hydrogen boiler to heat	Annual operational cost	6	£/kW/year	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	Annual maintenance costs for residential hydrogen boiler 120. Divided by the reference size (20kw) does not change between years.
Hydrogen boiler to heat	Energy CAPEX	150	£ / kW	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	CAPEX includes unit and installation costs. Values used for residential. Does not change through the years.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydrogen boiler to heat	Energy efficiency	0.84	fraction	HM Government (2013) Part L Domestic Building Services Compliance Guide. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/697525/DBSCG_secure.pdf	
Hydrogen boiler to heat	Lifetime	15	years	Currie & Brown and AECOM for CCC (2019) The costs and benefits of tighter standards for new buildings. Available at: https://www.theccc.org.uk/publication/the-costs-and-benefits-of-tighter-standards-for-new-buildings-currie-brown-and-aecom/	
Hydrogen OCGT	Energy CAPEX	345.65	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	OCGT 600MW 500hr. CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000).
Hydrogen OCGT	Energy efficiency	0.34	fraction	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Hydrogen OCGT	Lifetime	25	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Hydrogen OCGT	Operational cost of production	0.004	£ / kWh generated	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Assuming 300MW OCGT. Variable O&M.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Hydrogen OCGT	Opex	11	£/kW/year	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Assuming 300MW OCGT. OPEX includes fixed O&M, insurance, connection and use of system charges.
Methane reformation	Variable opex, annual operational cost of production	0.041	£ / kWh generated	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	Levelised Cost Estimates (£/MWh H2 (HHV)) for Projects Commissioning in 2050; Wholesale Price (Central); average of total cost (not including capex and fixed opex)for all SMR and ATR technologies.
Methane reformation	Fixed opex, annual operational cost of production	0.003	£ / kWh generated	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	Levelised Cost Estimates (£/MWh H2 (HHV)) for Projects Commissioning in 2050; Wholesale Price (Central); average of the fixed opex of all SMR and ATR technologies.
Methane reformation	Energy CAPEX	500	£ / kW	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	From the "technical and cost assumptions" data, average capex (medium scenario) for all SMR and ATR technologies, £/kW H2 HHV.
Methane reformation	Lifetime	40	years	BEIS (2021) Hydrogen Production Costs 2021. Available at: https://www.gov.uk/government/publications/hydrogen-production-costs-2021 (Accessed 2023).	Operating lifetime of SMR and ATR technologies.
Methane reformation	Operational cost of production	0.0203	kgCO2e / kWh	Available at: https://www.sciencedirect.com/topics/engineering/methane-steam-reforming	We assume in 2020 no CCS.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Methane reformation	Operational cost of production	0.01	kgCO2e / kWh	Timmerberg, Kaltschmitt, and Finkbeiner (2020)Hydrogen and hydrogen-derived fuels through methane decomposition of natural gas – GHG emissions and costs. Available at: https://doi.org/10.1016/j.ecmx.2020.100043 (Accessed 2023).	Assuming that our methane reformation technology is SMR with CCS. After converting units, the value to 3 significant figures is 0.013kgCO2e/kWh.
Resistance heating	Annual operational cost	0	£/kW/year	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	Annual maintenance costs for resistance heaters zero. Does not change between years.
Resistance heating	Energy CAPEX	150	£ / kW	Imperial College London for CCC (2018) Analysis of alternative UK heat decarbonisation pathways. Available at: https://www.theccc.org.uk/publication/analysis-of-alternative-uk-heat-decarbonisation-pathways. (Accessed 2023).	CAPEX includes unit and installation costs. Values used for Residential. Does not change through the years.
Resistance heating	Energy efficiency	1	fraction	National Renewable Energy Laboratory (1997) Saving Energy with Electric Resistance Heating. Available at: https://www.nrel.gov/docs/legosti/fy97/6987.pdf	All incoming electricicty is converted to heat by resistance heaters.
Resistance heating	Lifetime	20	years	Indeeco (2017) Heater life expectancy. Available at: https://indeeco.com/news/2017/06/20/heater-life-expectancy/. (Accessed 2024)	Assuming that the life expectancy of a resistance heater is dictated by the lifetime of the heating element.

Appendix B7
Technology parameters for future energy system scenario modelling

Tudalen 514

Technology	Setting	Value	Units	Reference	Notes
National grid import	Lifetime	1	years	n/a	Set to have no impact.
National grid import	Operational cost of production	0.063	£ / kWh	BEIS (2020) Updated energy and emissions projections 2019, Annex M. Available at: https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019 (Accessed 2023).	Annex M
National grid import	Operational fuel consumption cost	0	kgCO2e / kWh	Assume 0 emissions in 2050 as Welsh government has committed to net zero by 2050.	
National grid export	Lifetime	1	years	n/a	Selected to have no effect
National grid export	Operational cost of production	-0.063	£ / kWh	BEIS (2020) Updated energy and emissions projections 2019, Annex M. Available at: https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019 (Accessed 2023).	Annex M
National grid export	Operational fuel consumption cost	0	kgCO2e / kWh	n/a	Export set to zero carbon because export is when there are excess renewables
Electricity distribution lines (grid level)	Energy CAPEX	625.54	£/kW	NGED charging statements - CDCM model for South Wales (2021)	Assuming grid level electricity distribution lines correspond to 132kW network level assets, which have a cost of 13.9 £/kW/year. Multiplying by the asset lifetime of 45 years gives an energy CAPEX of 625.54.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Electricity distribution lines (primary substation level)	Energy CAPEX	0	£/kW	n/a	Assuming that the cost of the distribution lines are free, as they have already been built. The costs of new lines to be built in the future will be associated with substation upgrades.
Primary substation upgrades	Energy CAPEX	165.15	£ / kW	NGED charging statements - CDCM model for South Wales (2022) Available at: https://www.nationalgrid.co.uk/our-network/use-of-system-charges/charging-statements-and-methodology (Accessed 2023).	The cost of 132kV/HV network level assets in 2022 was 3.68 £/kW/year. Multiplying by the asset lifetime of 45 years gives an energy CAPEX for primary substation upgrades of 165.15 £/kW.
Battery	Annual operational cost	3	£ / kW/ year	Mott MacDonald for BEIS (2018) Storage cost and technical assumptions for BEIS. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910261/storage-costs-technical-assumptions-2018.pdf 50MW Frequency Management battery	
Battery	Storage CAPEX	186.42	£ / kWh	Cole, Wesley and Akash Karmakar.(2023) Cost Projections for Utility-Scale Battery Storage: 2023 Update. Golden, CO: National Renewable Energy Laboratory. Available at: NREL/TP-6A40-85332 https://www.nrel.gov/docs/fy23osti/85332.pdf (Accessed 2023).	Converted from USD to GBP 01.03.22

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Battery	Energy efficiency	0.92	fraction	Cole, Wesley and Akash Karmakar.(2023) Cost Projections for Utility-Scale Battery Storage: 2023 Update. Golden, CO: National Renewable Energy Laboratory. Available at: NREL/TP-6A40-85332 https://www.nrel.gov/docs/fy23osti/85332.pdf (Accessed 2023).	Changed energy efficiency to 0.92 this means a round trip efficiency of 0.85
Battery	Lifetime	15	years	Cole, Wesley and Akash Karmakar. 2023. Cost Projections for Utility-Scale Battery Storage: 2023 Update. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A40-85332. Available at: https://www.nrel.gov/docs/fy23osti/85332.pdf	
EV chargers	Energy CAPEX	817	£ / kW	Michael Nicholas (2019) Estimating electric vehicle charging infrastructure costs across major U.S.metropolitan areas. Available at: https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf (Accessed 2023). Calculations: https://arup.sharepoint.com/:x:/t/prj-28041700/EZof4JF_CH5HngEuZKZWJ5gBSDd8irdD4zCUWBIbznK54A?e=vjQttT	Networked 50 kW Rapid DC charger - Capex includes hardware, labour and materials (3-5 chargers per location)
EV chargers	Energy efficiency	1	fraction	n/a	Selected to have no effect

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
EV chargers	Lifetime	12	years	Deloitte (2019) UK EV charging infrastructure update (part 2): Show me the money. Available at: https://www2.deloitte.com/uk/en/pages/energy-and-resources/articles/uk-ev-charging-infrastructure-update-show-me-the-money.html (Accessed 2023).	
Landfill gas	Energy CAPEX	2740	£ / kW	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Landfill gas	Variable OPEX	0.01	£/kWh	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Landfill gas	Fixed OPEX	95	£/kW/year	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Landfill gas	Carbon OPEX	0.18387	kgCO2e/kWh	BEIS (2020). Greenhouse gas reporting: conversion factors 2020. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022 (Accessed 2024).	Assumed same as natural gas
Landfill gas	Energy efficiency	0.58	fraction	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	
Landfill gas	Lifetime	28	years	BEIS (2020) BEIS Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020	

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Energy from Waste	Energy efficiency	0.28	fraction	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (accessed 2023).	
Energy from Waste	Lifetime	35	years	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (accessed 2023).	
Energy from Waste	Energy CAPEX	8806.666667	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (accessed 2023).`	CAPEX includes pre-development cost (medium scenario) in Â£/kW, construction cost (medium scenario) in Â£/kW and infrastructure cost. Infrastructure cost (Â£'000) is converted to Â£/kW by dividing by reference plant size (MW*1000).
Energy from Waste	Carbon OPEX	0.038	kgCO2e / kWh	DESNZ (2023) Greenhouse gas reporting: conversion factors 2023, and Tolvik (2021) UK Energy from Waste Statistics. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023 and https://www.tolvik.com/published-reports/view/uk-energy-from-waste-statistics-2021/ (accessed 2024).	The DESNZ data provides a refuse combustion conversion factor of 21.280kgCO2e/tonne. Average energy from waste export electricity per tonne fuel input averaged over 2017-2021 is found at 558.4kWh/tonne (Tolvik, Figure 10). This results in a carbon OPEX of 21.280/558.4 = 0.0381kgCO2e/kWh.

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Heat storage	Energy efficiency	0.95	fraction	Arup expertise	
Heat storage	Storage loss	0.018164	fraction	Arup expertise	
Heat storage	Storage CAPEX	29	£ / kW	Arup expertise	
Heat storage	Lifetime	30	years	Arup expertise	
Canopy PV	Energy CAPEX	1100	£ / kW	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Solar PV 4-10 kW, assume 10 kW. CAPEX includes Pre-development cost (medium scenario) in £/kW, Construction cost (medium scenario) in £/kW and Infrastructure cost. Infrastructure cost (£'000) is converted to £/kW by dividing by reference plant size (MW*1000). Rooftop PV costs do not change.
Canopy PV	Annual operational cost	7	£/kW/year	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	
Canopy PV	Lifetime	30	years	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	

Appendix B7
Technology parameters for future energy system scenario modelling

Technology	Setting	Value	Units	Reference	Notes
Pumped storage	Lifetime	41	years	BEIS (2020) BEIS Electricity Generation Costs. Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 (Accessed 2023).	Assumed Lifetime of pumped storage the same as hydropower.
Pumped storage	Energy efficiency	0.75	fraction	Mott MacDonald for BEIS (2018) Storage cost and technical assumptions for BEIS. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910261/storage-costs-technical-assumptions-2018.pdf 50MW Frequency Management battery (Accessed 2023).	Round Trip Efficiency value used.
Pumped storage	Energy CAPEX	1362.9	£ / kW	Mott MacDonald for BEIS (2018) Storage cost and technical assumptions for BEIS. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910261/storage-costs-technical-assumptions-2018.pdf Connected peak lopping, 200MW (Accessed 2023).	CAPEX includes infrastructure costs, design costs, capital costs and installation costs. Medium value.
Pumped storage	Annual operational cost	17.8	£/kW/year	Mott MacDonald for BEIS (2018) Storage cost and technical assumptions for BEIS. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910261/storage-costs-technical-assumptions-2018.pdf Connected peak lopping, 200MW (Accessed 2023).	OPEX includes Operation, Inspection, Maintenance, Replenishment / refurbishment of consumables, Insurance, Security. Medium Value.

Appendix B8
Air quality – method, assumptions, and data sources

Calculation Method (all fuels other than electricity)

We used the Green Book supplementary guidance for air quality (AQ) activity costs from primary fuel use and the transport sector [1] to estimate the air quality cost for each year (2030 to 2050) for each scenario per the following calculation method.

For each scenario and fuel (other than electricity), and in each year 2030 – 2050:

$$AQ\ activity\ cost\ (£) = fuel\ (kWh)\ *\ fuel\ AQ\ activity\ cost\ \left(\frac{p}{kWh}\right)\ *\ \frac{1\ £}{100\ p}$$

For electricity only, for each scenario and in each year 2030 – 2050:

$$AQ\ activity\ cost\ (£) =\ \ annual\ electricity\ (kWh)\ *\ electricity\ AQ\ activity\ cost\ \left(\frac{p}{kWh}\right)\ *\ \frac{1\ £}{100\ p}$$

where

- Fuel (kWh) and annual electricity (kWh) were calculated in the deployment model.
- Fuel AQ activity costs (p/kWh) were from the Green Book guidance [1]. Refer to the remainder of this appendix for further assumptions. Electricity was the only "fuel" where the activity cost was allowed to vary each year between 2023 and 2050, reflecting the changing nature of the electricity grid.

For each scenario and year, the air quality impacts from each fuel then were summed to derive a total impact per year.

Appendix B8
Air quality – method, assumptions, and data sources

Primary Fuel Use

Electricity was the only "fuel" which was allowed to vary each year between 2023 and 2050, reflecting the changing nature of the electricity grid. We used the air quality values from the National Average scenario in Table 15 of the Green Book supplementary guidance [1]. These are documented in Table B9.1 below for reference.

All other primary fuels used the same activity cost for each year in 2023-2050, again reflecting the pattern shown in Table 15 of the Green Book supplementary guidance [1]. We used the activity costs shown in Table B9.2 below, each documented along with any relevant assumptions.

Table B9.1. Air quality activity costs from primary fuel use, 2022 p/kWh – Electricity [1]

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Electricity	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00

Table B9.2. Air quality activity costs from primary fuel use, 2022 p/kWh – Non-electric primary fuels

Fuel	Air quality cost (2022 p/kWh)	Data source(s) and assumptions
Natural gas	0.16	[1] Data Table 15 *Air quality activity costs from primary fuel use*, National Average (p/kWh) for gas.
Landfill gas	0.16	Assume the air quality impacts are similar to natural gas.
Organic matter	0.16	
Sewage gas	0.16	
Hydrogen	0.16	
Biomass	4.70	[1] Data Table 15 *Air quality activity costs from primary fuel use*, National Average (p/kWh) for biomass
Coal	3.74	[1] Data Table 15 *Air quality activity costs from primary fuel use*, National Average (p/kWh) for coal
Oil/LPG	1.25	[1] Data Table 15 *Air quality activity costs from primary fuel use*, average of the National Average (p/kWh) for burning oil (2.28 p/kWh) and LPG (0.22 p/kWh)

Appendix B8
Air quality – method, assumptions, and data sources

Transport Sector

We calculated activity costs from the transport sector (diesel and petrol) per the following procedure:

1. Estimating the proportion of diesel vs petrol vehicle using licensing data. The figures in Tables B9.3 and B9.4 below reflect 2019 Q4 data in the UK [2].
2. Taking the air quality activity cost (p/litre) for each vehicle type from the Green Book supplementary guidance, Table 14, Transport Average. The values for rigid HGV diesel (6.35 p/litre) and articulated HGV diesel (2.22 p/litre) were averaged to derive the value for HGV diesel in Table B9.3 below.
3. Calculating a weighted average air quality factor (p/litre) for each fuel type, weighted by the proportion of vehicles.
4. Converting this to air quality factors in p/kWh using:
    - The GHG intensity of each fuel by volume [3]
        - Diesel, average biofuel blend: 2.48 $kgCO_2e$ / litre
        - Petrol, average biofuel blend: 2.08 $kgCO_2e$ / litre
    - The GHG emission factor for each fuel (kgCO2e/kWh), documented in the deployment model Appendix B2

Table B9.3. Air quality activity costs transport (diesel)

Vehicle type	Quantity [2]	Air quality activity cost (p/litre) [1]
Car diesel	687,916	13.02
HGV diesel	22,360	4.29
LGV diesel	214,969	17.15
Air quality factor, weighted average by fuel (p/litre)		13.77
Air quality factor, converted to p/kWh		1.33

Table B9.4. Air quality activity costs transport (petrol)

Vehicle type	Quantity [2]	Air quality activity cost (p/litre) [1]
Car petrol	876,250	1.58
LGV petrol	6,167	1.28
Air quality factor, weight average by fuel (p/litre)		1.57
Air quality factor, converted to p/kWh		0.17

Appendix B8
Air quality – method, assumptions, and data sources

References

[1] Department for Energy Security and Net Zero (2023) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available at: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

[2] Department for Transport and Driver and Vehicle Licensing Agency (2023) vehicle licensing statistics data tables. Available at: https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-tables

[3] Department for Energy Security and Net Zero (2023) Greenhouse gas reporting: conversion factors 2023. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023.

The Coal Authority

Flintshire County Council: Mine Water Heat Opportunities

July 2024

Making a **better future** for people and the environment **in mining areas**

Disclaimer

This report has been prepared by the Coal Authority for Welsh Government and compliments the open access mine water heat opportunity maps available from DataMap Wales.

Any conclusions or recommendations made are those based on information obtained for the report and our current knowledge and practices. Data used within the report, either obtained by the Coal Authority or 3rd Party, has been cited within the report. Limitations of the data are identified within the report. The Coal Authority does not accept liability for the accuracy of any 3rd party data. Should new data or information become available these results, conclusions and recommendations may require amending. The Coal Authority does not accept liability for decisions made on the basis of this report or subsequent outcomes.

This report should only be used in the stated context.

Version	Produced by	Reviewed by	Approved by	Date
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Contents

Contents iii
List of Figures iv
List of Tables iv
Executive summary v
1 Introduction 7
1.1 Geographic area 7
2 Geological summary 7
2.1 Bedrock geology 7
2.1.1 Structural geology 8
3 Mining situation 12
4 Mine water regime 14
4.1 Description of mine water blocks 14
4.2 Monitoring data 14
4.2.1 Mine water levels 14
4.2.2 Mine water discharges 14
4.2.3 Mine water temperature 15
4.2.4 Mine water chemistry 16
5 Mine water heat opportunities 19
5.1 Borehole schemes 19
5.1.1 Good Opportunities 20
5.1.2 Possible Opportunities 20
5.1.3 Challenging Opportunities 20
5.2 Mine water treatment schemes 23
5.3 Gravity-fed discharge schemes 23
5.3.1 Prescott Level, Hawarden 24
7 References 27

List of Figures

Figure 2-1: Regional geological cross sections approximately west-east from BGS Sheet 108 England & Wales, 1999 9

Figure 2-2: Geology in the Flintshire locality (Contains British Geological Survey materials © UKRI 2024) 10

Figure 2-3: General sections of strata for the Coal Measures Group for Flintshire (based on Davies et al, 2004) 11

Figure 4-1: Mine water bocks in Flintshire 17

Figure 4-2: Gravity-fed coal water discharges in Flintshire 18

Figure 5-1: Borehole scheme opportunity tiers 21

Figure 5-2 Highlighted good opportunities 22

Figure 5-3: Prescott Level, Hawarden discharge upwelling 24

List of Tables

Table 2.1: Stratigraphy of Flintshire area between the Permo-Triassic and Upper Silurian (based on Davies et al 2004) 8

Table 3.1: List of most recent colliery closures (surface location of mine in Flintshire) 12

Table 4.1: Mine water discharges in Flintshire and adjacent areas 15

Table 4.2: Anticipated underground mine water temperatures in Denbighshire Coalfield 16

Table 5.1: Mine water heat opportunities within Flintshire 19

Table 5.2: Mine water heat opportunities in Flintshire 25

Executive summary

Coal mining has taken place in the Flintshire County Council area since at least the 16th Century with the last mine to close being Point of Ayr in 1996. Much of the county is underlain by coal mine workings, with multiple seams being worked in many localities. The presence of mine workings, combined with knowledge, where available, of recovered mine water levels are used to provide a very high level assessment of the potential for exploring the development of open loop mine water heat projects in the county. In addition to borehole opportunities, gravity-fed discharges have also been assessed for heat potential. Some discharges do not have sufficient data for assessment, hence are not included in this report.

The workings are relatively shallow across the county and occur in small localised areas. The strata and associated coal seams and generally workings dip to the east but are heavily affected by faulting. The presence of numerous 'gravity discharges' in the Flintshire administrative area together with the long period since the mines closed suggests that mine water has recovered.

The methodology for identifying the mine water heat opportunity areas is described in the overarching report. Mine water heat opportunities are based on mine workings information, with several 'good' and 'possible' opportunities in the Flintshire area. This reports also includes surface details to provide opportunities to be progressed, these are also shown in the table below.

While there are no Coal Authority mine water treatment schemes in Flintshire, there are some gravity-fed discharges, where mine water is emitting at surface. This mine water may offer potential for mine water heat without the cost and risk of drilling and pumping. Only one discharge was identified having a heat potential of over 0.5MW_{th} and is listed in table below.

It is recommended that the opportunities listed are considered against surface heat demands to highlight those which may be served by mine water heat technologies. A subsequent, more detailed study of the mining and hydrogeology would add further information to firm up the case to take a number of mine water heat projects forward.

Summary of selected mine heat opportunity locations

No./ Area	Opportunity name	Opportunity type	Opportunity Category	Estimated Heat Potential MW_{th}
1	Hawarden	Discharge	Good	0.71
2	Buntwood Pentre	Borehole	Good	Subject to further testing
3	Buckley	Borehole	Good	Subject to further testing
4	Ewole Green/Ewole	Borehole	Good	Subject to further testing
5	Mostyn	Borehole	Good	Subject to further testing

1 Introduction

The area covered in this section is the whole of the Flintshire County Council (CC) administrative boundary. Assessment of mine workings and mine water status along with knowledge of the area are used to provide a very high level assessment of the potential for exploring the development of open loop mine water heat projects in the county.

1.1 Geographic area

Flintshire covers an area of approximately 490km^2, and runs roughly 35km northwest-southeast between the coast and north of Wrexham; and approximately 15km southwest-northeast. Major urban areas include: Flint, Mold, Connah's Quay, and Buckley. Coal Measures strata and coal mine workings include along the Dee Estuary and in the eastern-central part of Flintshire. Elevation in Flintshire ranges from sea level along the Dee Estuary to >550m at Moel Famau. The Afon Lwyd southwest of Mold runs northerly before turning south-easterly around Mold and through Wrexham to the River Dee.

2 Geological summary

The solid and superficial geology, along with seam information has been ascertained by consultation of the available British Geological Survey records including:

- Online GeoIndex viewer;
- Online geological memoirs;
- Online geology maps (Sheet 108 and Sheet 96 for Flintshire area); and
- Borehole and mine shaft scans across the area of interest.

2.1 Bedrock geology

Flintshire contains bedrock geology (at surface) from the Permo-Triassic, Carboniferous, Devonian, and Silurian periods (**Table 2.1**).

The Carboniferous includes the Red Measures, Coal Measures (coal mine workings), Millstone Grit groups, which cover the central and northern parts of Flintshire. The Permo-Triassic cover parts of easternmost Flintshire, whilst the Silurian are present in part of west Flintshire (**Figure 2-1** and **Figure 2-2**). There is an overall dip in the Carboniferous rocks in Flintshire from west to east, with parts dipping east to west due folding and faulting present.

The coal mine workings are present within the Coal Measures group (Middle and Lower) and outcrop within parts of Flintshire. The Coal Measures in Flintshire comprises interbedded sequences of mudstone, siltstone, sandstone, seat earth, and coal seams. Nearly all of the Coal Measures and mine workings in Flintshire are the Flintshire Coalfield, the northernmost

part of Denbighshire Coalfield are present in the southernmost part of Flintshire. The Bwlchgwyn-Bala Fault effectively separates the two coalfields.

Up to 21 individual coal seams have been worked to varying extents in the area. Mine workings can have direct and indirect connections to each other. Hydraulically connected mine workings and mine form mine water blocks – where mine water behaves as a single unit.

Regional solid geology and selected structural geology is shown in **Figure 2-2**.

The stratigraphic sequence, approximate depths and thicknesses are shown in **Figure 2-3** and **Figure 2-3.**

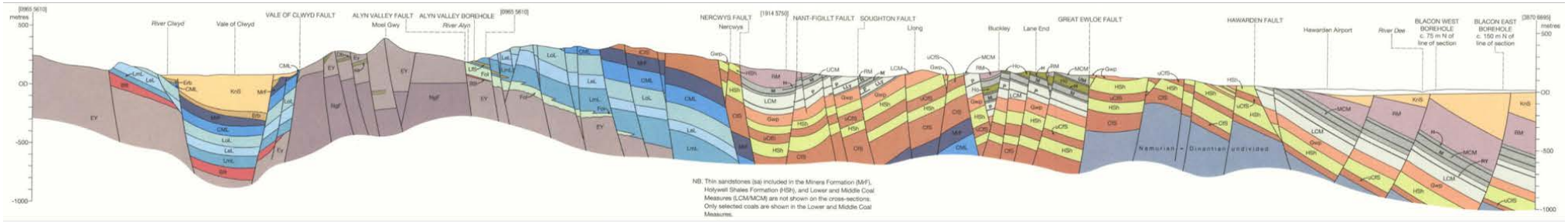
Table 2.1: Stratigraphy of Flintshire area between the Permo-Triassic and Upper Silurian (based on Davies et al 2004)

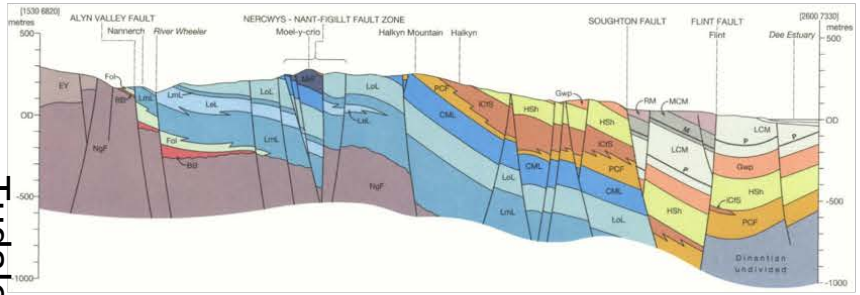
Period	Stages	Stage	Formations	Typical thickness (m)
Permo-Triassic	-	Sherwood Sandstone Group	Chester Peb Beds	>200
			Kinnerton Sandstone	>600
Unconformity				
Upper Carboniferous (Silesian)	Westphalian	Red Measures Group	Erbistock	>200
			Coed-yr-Allt	140
			Ruabon Marl	up to 300
		Coal Measures Group	Middle Coal Measures	up to 340
			Lower Coal Measures	up to 180
	Namurian	Millstone Grit Group	Gwespyr Sandstone	up to 260
			Holywell Shales	up to 120
			Cefn-y-few Sandstone	up to 600
			Pentre Chert	up to 180
Lower Carboniferous (Dinantian)	Visean	Carboniferous Limestone	Minera	up to 180
			Cefn Mawr	40 to 275
			Loggerheads Limestone	up to 175
			Llanarmon Limestone	75 to 280
			Leete Limestone	up to 140
			Foel	up to 88
			Basement Beds	up to 75
Unconformity and part of Dinantion and Silurian missing from the sequence				
Upper Silurian	Ludlow	-	Elwy	up to 600
			Nantglyn Flags	up to 400

2.1.1 Structural geology

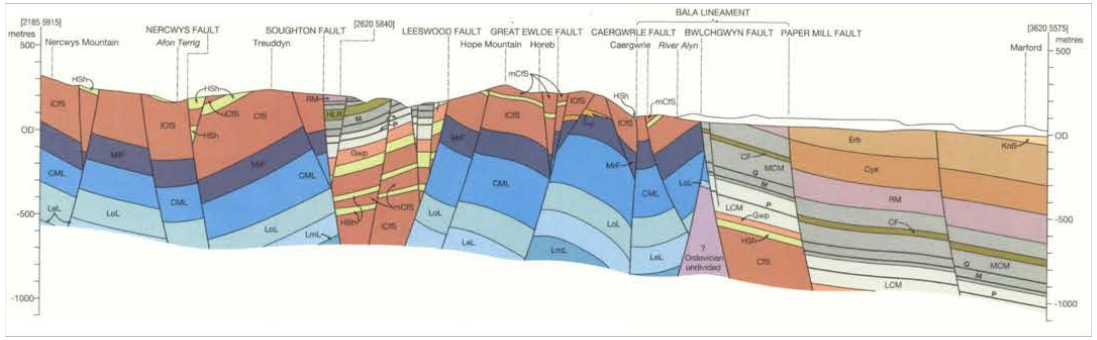
Major faults are shown in **Figure 2-1** and **Figure 2-2.** The main faults in the area typically trend approximately north-south, with some main faults such as the Blchgwyn-Bala fault that trends southwest-northeast.

West-East Section (central Flintshire)





Southwest-Northeast Section (central Flintshire)



West-East Section (south Flintshire)

Figure 2-1: Regional geological cross sections approximately west-east for Flintshire (from BGS Sheet 108 England & Wales, 1999)

Tudalen 533

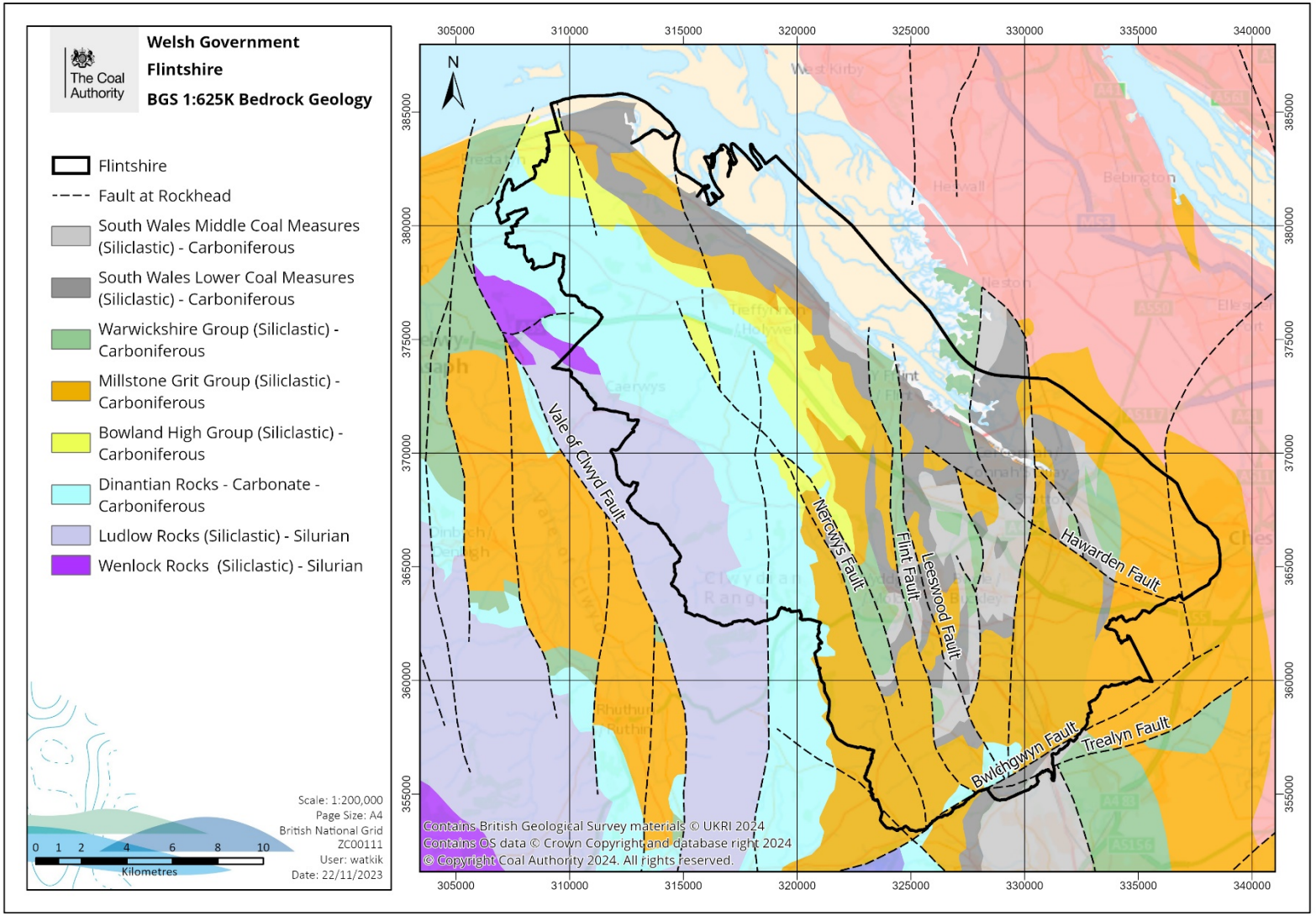


Figure 2-2: Bedrock geology in the Flintshire locality (Contains British Geological Survey materials © UKRI 2024)

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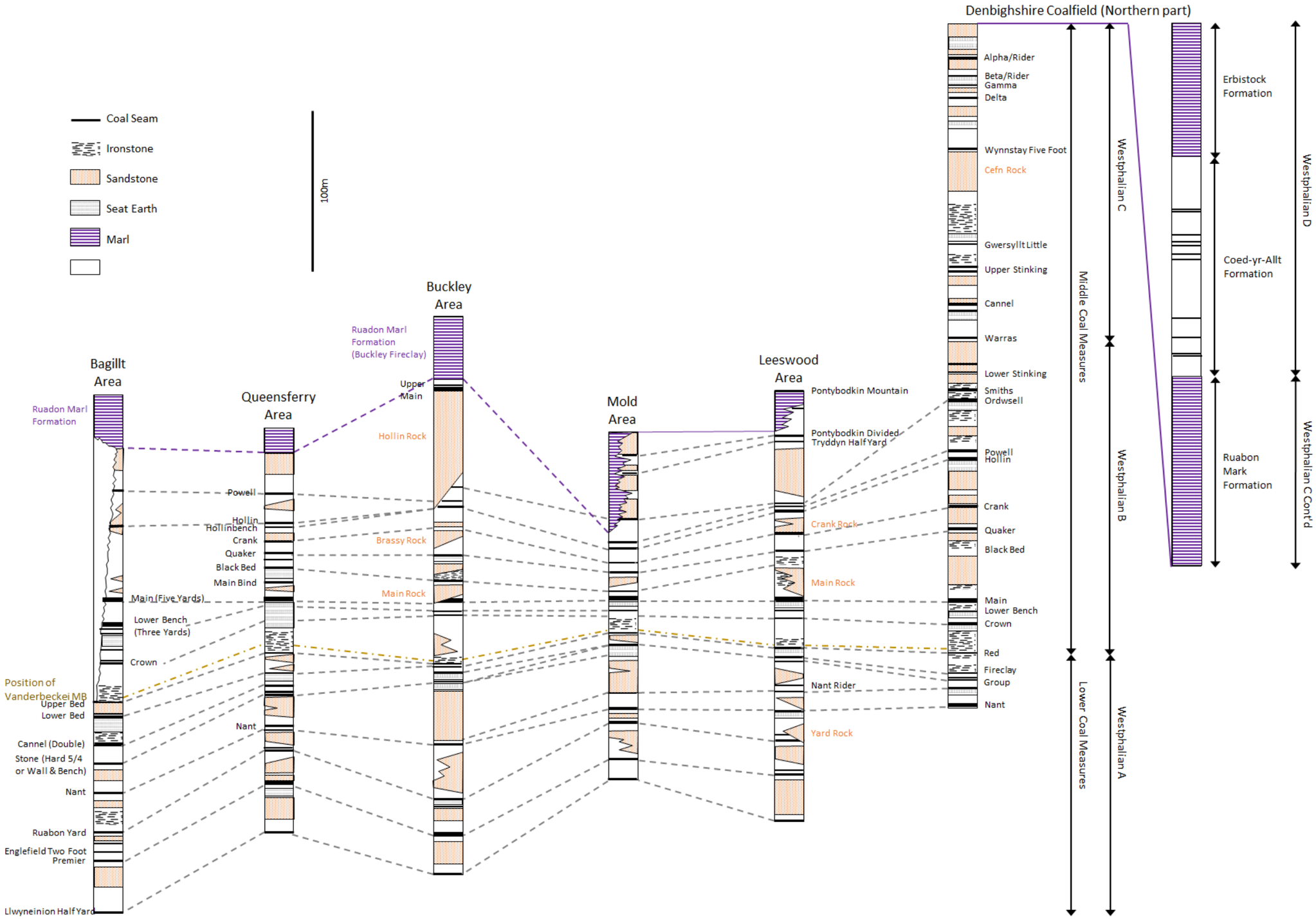

Figure 2-3: General sections of strata for the Coal Measures Group for Flintshire (based on Davies et al, 2004)

3 Mining situation

Coal mining has taken place in North Wales for several centuries with shallow seams being worked near to outcrop by means of roadways driven from the surface. These workings were often gravity drained by means of water levels or soughs. From the mid 1800's, the industrial revolution and concomitant increase in demand for coal led to the sinking of many collieries into the deeper seams.

Flintshire includes the mine workings in the Middle and Upper Coal Measures, with both onshore and offshore mine workings (at Point of Ayr Colliery). Parts of the coal mining areas also includes fireclay and ironstone mine workings. The shallow nature of the coal and ironstone results in early mining in the area, with a mixture of small scale and larger scale collieries. Some coal mines were connected during mining for aspects such as coal preparation, efficiency improvements, and water managements. These underground mining connections have a great bearing on the underground mine water regime by interconnecting considerable areas of mine workings. Due to volumes of pumping and associated financial costs, many collieries in the Mold / Buckley area closed around the 1920-1930s. The final collieries to close are shown in **Table 3.1.**

Table 3.1: List of most recent colliery closures (surface location of mine in Flintshire)

Colliery	Closure date	Connected underground to
Bettisfield	1934	Not confirmed
Buckley / Elm	1934	Not confirmed
Englefield	1928	Not confirmed
Leeswood Green	1932	Not confirmed
Mountain Buckley	1928	Not confirmed
Nerquis	1930	Not confirmed
Park Hill	1949	Not confirmed
Point of Ayr	1996	Not confirmed
Tan Llan	1943	Not confirmed

Following these closures, pumping ceased and the mines started to fill with mine water.

Up to 21 individual coal / ironstone / seatearth seams have been worked in the area with seams between the Pontybodkin Mountain (Cannel?) Seam and Llwyneinion Half Yard (Queen) being mined.

In general terms, coal mining in Flintshire is as follows:

- North Flintshire
    - Along the coast between Flint and Point of Ayr
    - Typically recorded mine workings are between 30 and 500m below surface
    - Potential for shallow and unrecorded mine workings
    - Includes offshore mine workings.
    - Potentially small isolated areas
- Central / south Central Flintshire
    - Coal mine workings are in areas between Mold and Garden City and extending down to south of Pontybodkin
    - Coal mine workings are present between <30m and 300m below surface
    - Potential for shallow and unrecorded mine workings
    - Potentially small to moderate areas, and may include area of isolated and connected mine workings
- Southern extremities of Flintshire
    - Coal mine workings from the Denbighshire Coalfield, around Cefn-y-bedd
    - Coal mine workings area present between <30m and 300m below surface
    - Includes areas where mine workings connected to a wider regional system and areas with potentially isolated mine workings

The same seam may have various names across the area, no seam nomenclature correlation has been undertaken for this report.

4 Mine water regime

4.1 Description of mine water blocks

Flintshire contains the Flintshire Coalfield and the part of the northernmost part of the Denbighshire Coalfield.

The Flintshire Coalfield contains several different areas of mine workings, some of which are likely to be isolated from other mine workings. Mine water levels in Flintshire Coalfield are considered to be recovered and potentially controlled by gravity-fed discharges to the surface. Point of Ayr Colliery workings were flooded by connecting the workings to the sea, the status of this connection is unknown.

The northern part of the Denbighshire Coalfield contains interconnected mine workings and form part of a wider mine system. Some of the mine workings in north Denbighshire Coalfield may be isolated. It is uncertain if all of the Denbighshire Coalfield is recovered, or which parts are undergoing mine water recovery.

4.2 Monitoring data

4.2.1 Mine water levels

There are no Coal Authority mine water level monitoring points within Flintshire. Mine water level status can be estimated using existing gravity-fed discharges.

4.2.2 Mine water discharges

The mine water discharge are places where mine water reaches the surface and can discharge. Mine water levels in mine workings connected to a discharge should be elevated above the surface elevation of a discharge.

There is one monitored mine water discharge (monitored by the Coal Authority) in Flintshire (**Table 4.1** and **Figure 4-2**), from Prescott Level in Hawarden. In addition to the monitored discharge at Hawarden, there are several known, unmonitored discharges (**Table 4.1** and **Figure 4-2).** It is unclear how representative the gravity discharges are of the mine water levels within the mine workings.

Table 4.1: Mine water discharges in Flintshire and adjacent areas

Monitoring point name	Mine water area	Comments
Hawarden Prescott Level	Hawarden	Remedial programme for coal mine discharges
Red Water Wood (Picton Brook)	Llanasa	Possible unrecorded mine workings and unrecorded mine entry. Other discharges may exist in area
Wepre Brook	Northop	Possibly from Dublin Main shaft(s) to north
River Alyn (Mold)	North Mold	Bankside staining
River Terrig	Nerquis (Nercwys)	Possibly from Neqruis Colliery nearby
West Leeswood Adit	Leeswood	From Return Adit
River Alyn (Coppa Wood)	Coppa	Possible unrecorded workings or Coppa Colliery Shafts
Little Mountain (Pontybodkin) Adit	Leeswood	From Screen Adit
Black Diamond King Coal Adits	Cefn-y-coed	May also include former opencast water
River Cegidog	Coed-y-Felin	Adit to possible unrecorded mine workings
Bottom Lodge Adit (Fireclay)	South Flintshire	Connectivity to Denbighshire Coalfield mine system (confirmation required)
Cegidog Ffrwd (Ffwd Adit)	South Flintshire	From Ffwd Colliery Level Adit

4.2.3 Mine water temperature

A study into mine water temperatures at various depths around the Britain's coalfields was published in 2020 (Farr et al, 2020). This study used historic underground water and strata temperatures along with data from mine water pumping where available.

Temperature typically increases with depth and data published in the study suggests the following may be anticipated for the Flintshire area, there is no data in Farr et al, 2020 for the Flintshire Coalfield:

Table 4.2: Anticipated underground mine water temperatures in Denbighshire Coalfield

Depth (m BGL)	Mean Temperature (°C)
100	12.5
200	14.9
300	17.5
400	19.8
500	22.3

4.2.4 Mine water chemistry

Mine water chemistry can be highly variable depending on specific location and would not normally form part of any initial high level opportunity scoping considerations guided by this study. The matter would be included in any more detailed, site specific, studies which may be commissioned in future.

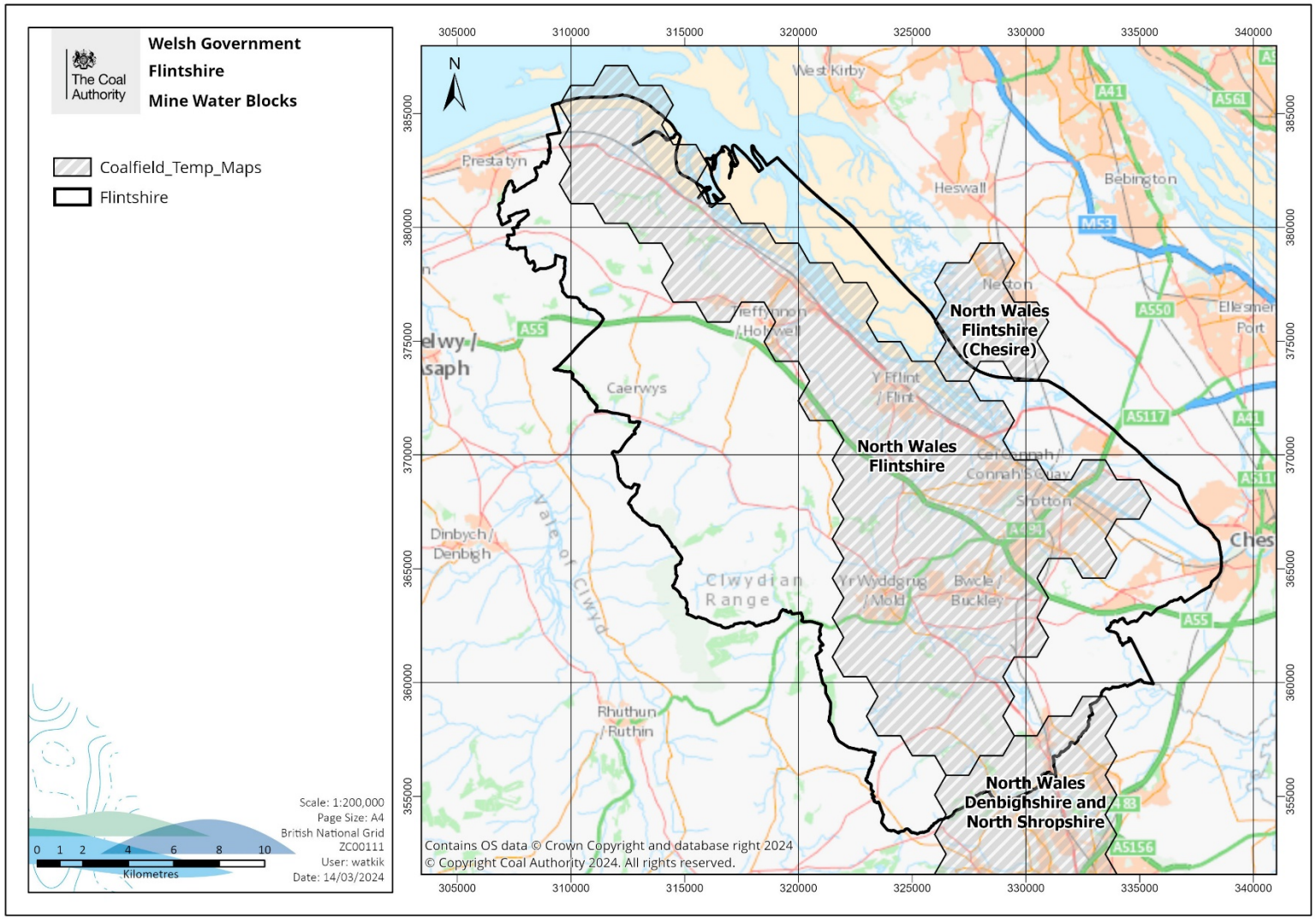

Figure 4-1: Mine water bocks in Flintshire

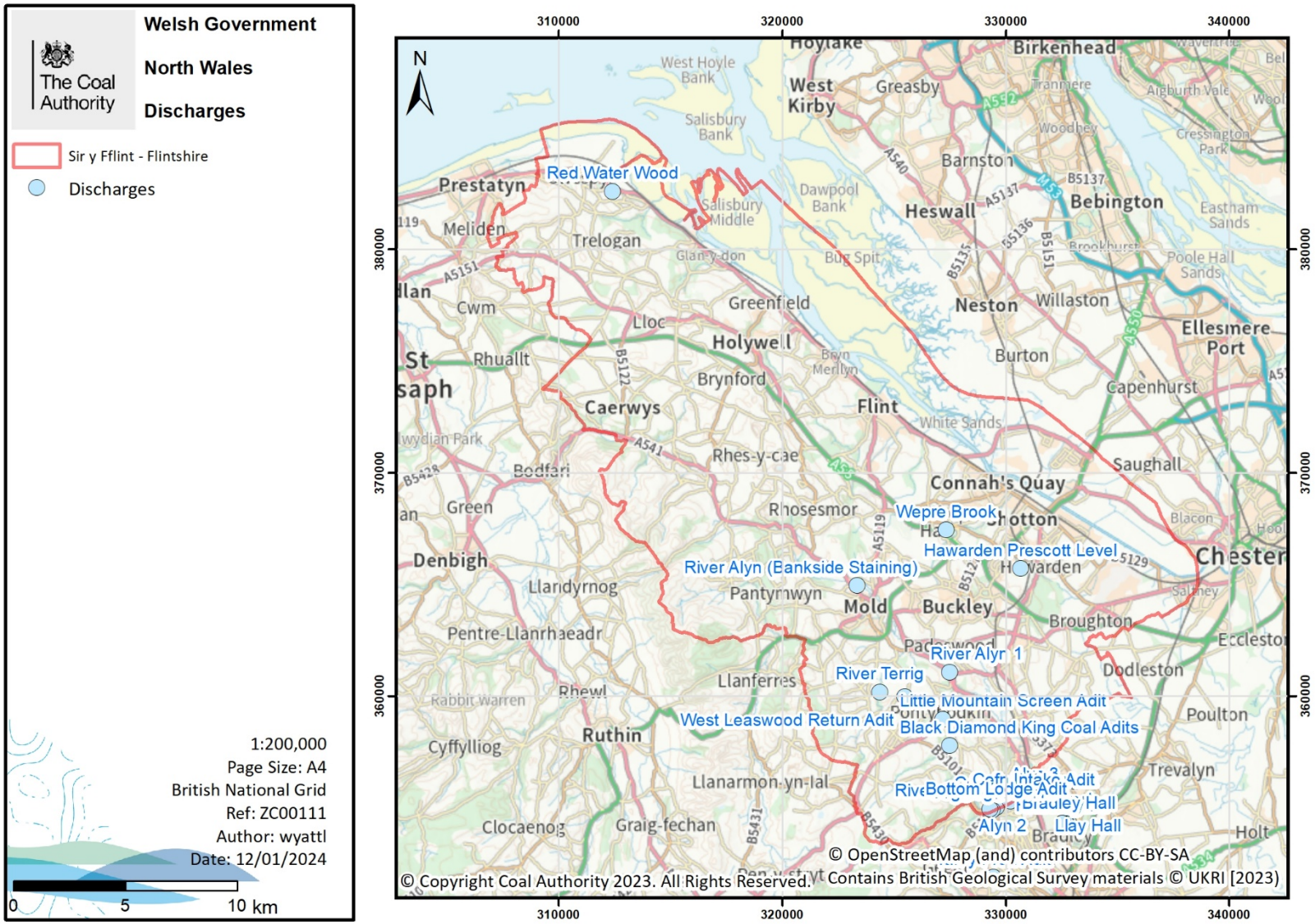

Figure 4-2: Gravity-fed coal water discharges in Flintshire

5 Mine water heat opportunities

Considerable areas of the Flintshire administrative area are underlain by abandoned coal mine workings. The earlier sections of this report consider the mining and mine water parameters across the whole borough to rank areas by reference to an opportunity classification system. This summary section overlays the opportunities on populated settlement areas to provide a steer on localities where mining aspects and surface development may present the most likely places to further investigate and potentially deploy mine water heat.

The opportunity areas are set out in **Table 5.1** and their locations illustrated in Figure 5-2

Table 5.1: Mine water heat opportunities within Flintshire

No./ Area	Opportunity name	Opportunity type	Category	Potential MW_{th}
1	Hawarden	Discharge	Good	0.71
2	Buntwood Pentre	Borehole	Good	Subject to further testing
3	Buckley	Borehole	Good	Subject to further testing
4	Ewole Green/Ewole	Borehole	Good	Subject to further testing
5	Mostyn	Borehole	Good	Subject to further testing

5.1 Borehole schemes

The prospects for progressing a mine water heat scheme based on drilling boreholes to access and return the mine water are assessed on a 'tier' basis.

Three tiers have been adopted for the purposes of this study, the methodology and assessment criteria being set out in the over-arching report for Welsh Government. The tiers are:

Good opportunities – shown coloured dark orange
Possible opportunities – shown coloured medium orange
Challenging opportunities – shown coloured light orange

The tier areas within Flintshire CC boundary are outlined below and are illustrated on **Figure 5-1** and **Figure 5-2**.

Any areas where no opportunity exists, mainly due to absence of mine work are shown uncoloured/un-hatched. Other options such as discharges and using mine shafts can offer additional opportunities that are within tier zones, and that could also be outside of the tier zones.

5.1.1 Good Opportunities

Although areas of good opportunity have been identified across Flintshire, the age and nature of the workings will make integration into a potential heat network difficult due to the sporadic nature of the workings and where they sit regarding built up areas.

The built up areas around **Buckley**, **Little Mountain**, **Burntwood Pentre, Mold** and the area between **Ewloe Green,** and **Ewole** represent good opportunities. There is also an area of good opportunity to the area to the west of **Flint** centred around the **Red Wood** area **(Figure 5.2).**

Other good areas exist in the borough but are either situated in rural areas or areas near the cost without any potential heat offtakers. These include rural areas to west of **Pontblyddyn** centred on **Leeswood Green Farm** and the rural area that sits between the A55 and A494 in a triangular area.

Good costal opportunities include **Talacre**, **Mostyn and Baglit** but the residential areas are likely to be too small to generate the number of users required for a district scheme. There may be sufficient industrial demand in Mostyn to make a scheme viable.

The area to the north west of **Greenfield** represents an area of good to possible opportunities but is a combination of costal and rural which will make and future development challenging.

5.1.2 Possible Opportunities

The possible opportunities in Flintshire are closely linked to the areas of good opportunities or are beneath highways. There are two areas of possible opportunities beneath the A55 highway to the south of Northop Hall and as a result are unlikely to ever be developed. Similarly there is an area beneath the A548 to the north east of Flint.

The possible areas closely associated with good opportunities include those around Buckley Mountain and Burntwood Pentre. Here any proposed development would benefit from early discussions with the Coal Authority to see if the surface layout could be altered in any way to take advantage of a ‘good’ opportunity.

There is an isolated area of possible opportunity in the area to the south east of Nercwys centred on The Poultry Court. This business may be able to use mine water to decarbonise and save energy costs.

5.1.3 Challenging Opportunities

An area of challenging opportunities exist around the Shotton area but these consist of small isolated areas that are unlikely to be viable options. Further challenging areas exist to the south of Mold and Padeswood, these opportunities are in areas where there is little or no development making the prospect of a heat network unlikely.

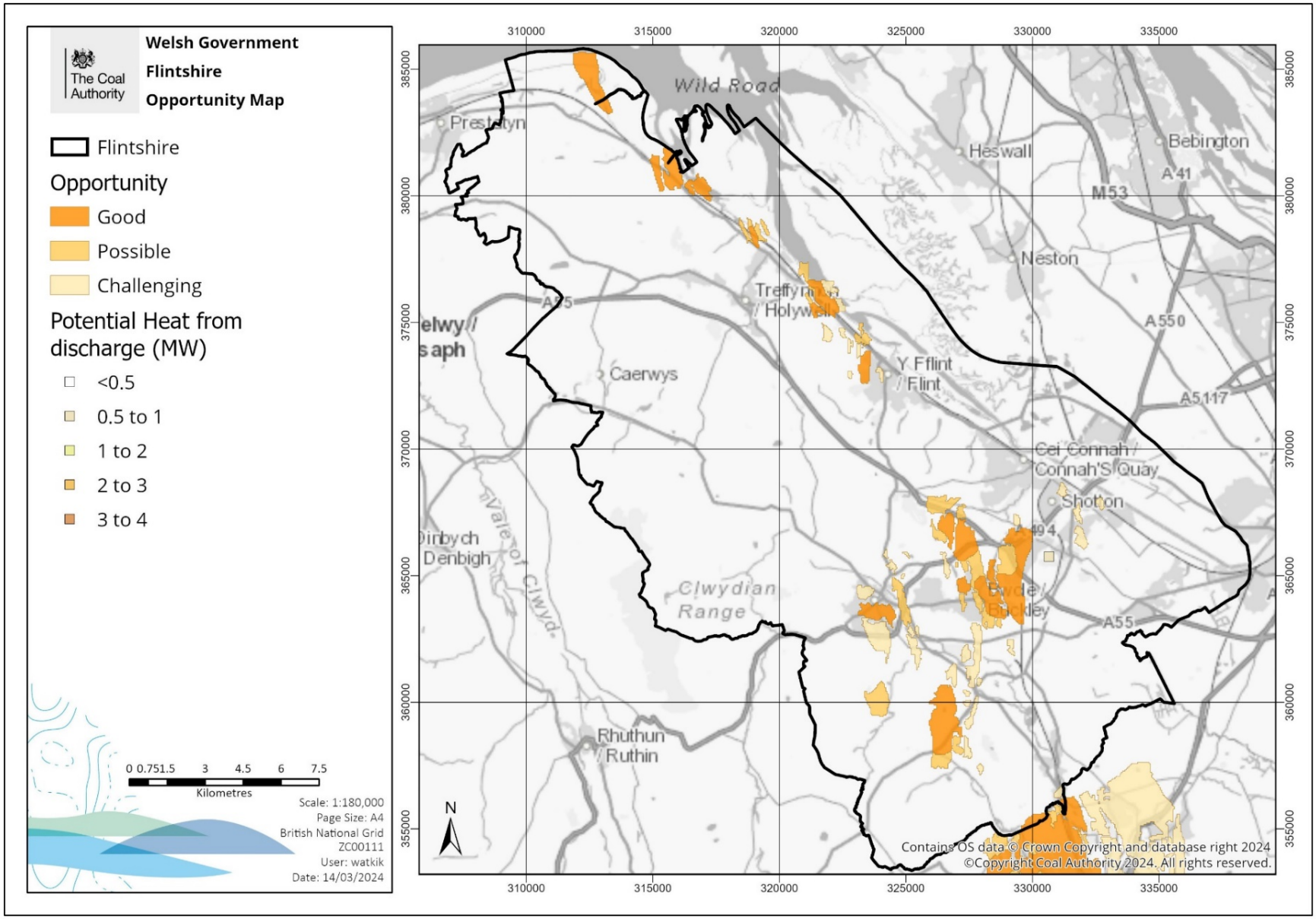

Figure 5-1: Borehole scheme opportunity tiers

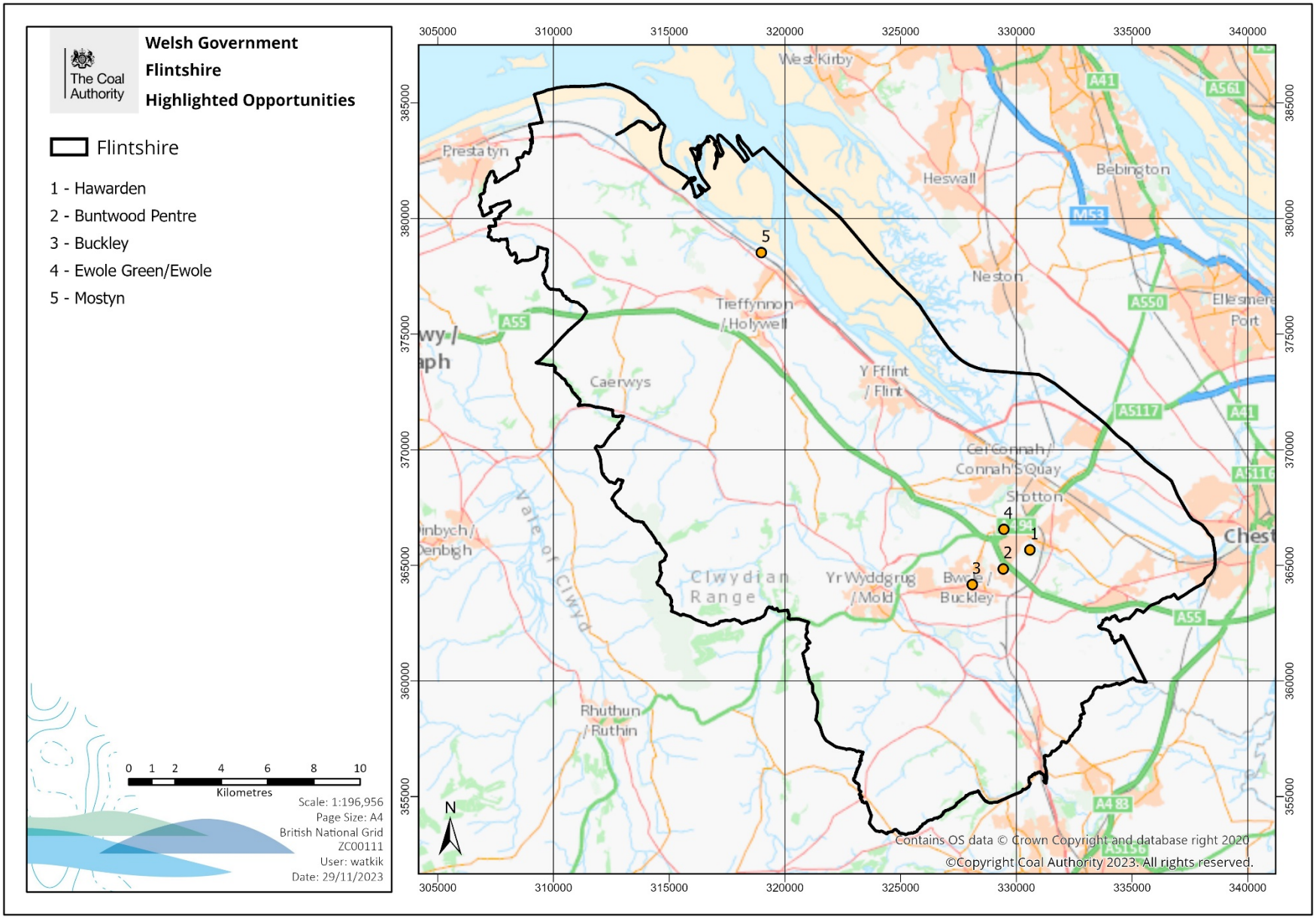

Figure 5-2 Highlighted good opportunities

5.2 Mine water treatment schemes

Existing Coal Authority mine water treatment schemes where mine water is already either pumped or flowing may in some circumstances potentially offer a lower risk approach to developing mine water heat projects as new drilling and testing of boreholes would not be required. However there are currently no Coal Authority mine water treatment schemes IN Flintshire.

5.3 Gravity-fed discharge schemes

Numerous gravity mine water discharges exist in the Flintshire area. Many are not monitored for flow rate, water quality or temperature, some of these may offer heat potential not presented in this report. Gravity-fed discharges generally occur when mine workings connect with the surface, typically via mine entries and boreholes.

The nature of gravity-fed discharges (flow, temperature and quality) will be dependent upon a number of factors including mining type and geometry, the hydrogeological system of the mine workings and rainfall.

Some discharges are likely to be more variable in flow rate and temperature than others but as many of the discharges are not currently monitored for flow rate, water quality or temperature and it is difficult to evaluate with any degree of confidence.

Flow rate data is only available for one discharge in Flintshire; at Hawarden. The data for Hawarden shows an average flow rate of 30 L/s; and a temperature of 11.1°C; these suggest an average heat potential of 0.8MW. Assessment of heat potential for other known discharges will required further investigation, mainly to confirm flow rates.

Should a potential heat demand be identified, close to one of these discharges (shown in **Table 4.1**) or any other discharge in the area, then a more detailed study would be required. Additional investigation and data gathering will likely be required to establish its potential.

5.3.1 Prescott Level, Hawarden

The discharge is from an upwelling adjacent to the stream at Hawarden Golf Course. The upwelling is thought to be from a mine shaft sunk to the Prescott Level (drainage adit), the mouth of which is further downstream. The drainage adit runs from mine workings to the west of the discharge. There are mine shafts further upstream along the adit, which also access the drainage adit. Capturing the mine water discharge would need investigating. The discharge in on the priority list for remediation of existing discharges, however, it is uncertain if any scheme is likely to implemented.

An initial broad estimate suggests an average potential of around 0.71MW_{th} may be available, but a more detailed site specific study will be needed to assess flow rate and temperature with more certainty and confirm feasibility for a heat scheme(s). Further investigation will need to be undertaken to confirm potential heat users.

Figure 5-3: Prescott Level, Hawarden discharge upwelling

6 Summary & Recommendations – Flintshire

Flintshire CC was an active coal mining region between the mid1800s and 1996. Much of the borough is underlain by overlapping seams, with workings between 30 m and 500 m, and water levels <75 mBGL. There are some patches of open cast workings, and some shallow (<30 mBGL) and deep (>500 mBGL) workings also across the region. Mine water temperatures are expected to range between 12.5 and 22.3 °C between 100 mBGL and 500 mBGL.

A summary of opportunity areas are presented in **Table 5.2**.

Table 5.2: Mine water heat opportunities in Flintshire

No./ Area	Opportunity name	Opportunity type	Category	Potential MW_{th}
1	Hawarden	Discharge	Good	0.71
2	Buntwood Pentre	Borehole	Good	Subject to further testing
3	Buckley	Borehole	Good	Subject to further testing
4	Ewole Green/Ewole	Borehole	Good	Subject to further testing
5	Mostyn	Borehole	Good	Subject to further testing

6.1 Borehole schemes

6.1.1 Good Opportunities

There are a number of “Good” opportunity areas for borehole mine water heat schemes across much of Flintshire, with a number of the main settlements with existing end users underlain by mine workings which may be suitable. The built up areas around **Buckley**, **Little Mountain**, **Burntwood Pentre, Mold** and the area between **Ewloe Green,** and **Ewole may** represent good opportunities.

6.1.2 Possible Opportunities

“Possible” opportunities for boreholes schemes in Flintshire are located in mainly rural and coastal areas with little or no development. Depending on future development plans at these locations, they may warrant further investigation, but would be considered lower priority over those marked as “Good” opportunities

6.2 Mine water discharges

A number of gravity mine water discharges are known to exist in the Flintshire, but only one has any monitoring information. Ratings have been applied to discharges according to the following criteria:

- Good means heat potential over 0.5MW uncomplicated capture and uncomplicated heat transfer.
- Possible means heat potential over 0.5MW complicated capture or complicated heat transfer.
- Challenging heat potential over 0.5MW complicated capture and complicated heat transfer

The gravity discharges is:

- **Hawarden**, which sits to the west of Hawarden village, and is considered “Good” due to the distance to end users and lies in close proximity to a large secondary school.

7 References

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Mae'r dudalen hon yn wag yn bwrpasol

Environment & Economy Overview & Scrutiny Committee

Date of Meeting	14th January 2025
Report Subject	Council Carbon Emissions Update 2023/24
Cabinet Member	Collective Responsibility
Report Author	Chief Officer (Planning, Environment & Economy)
Type of Report	Operational

EXECUTIVE SUMMARY

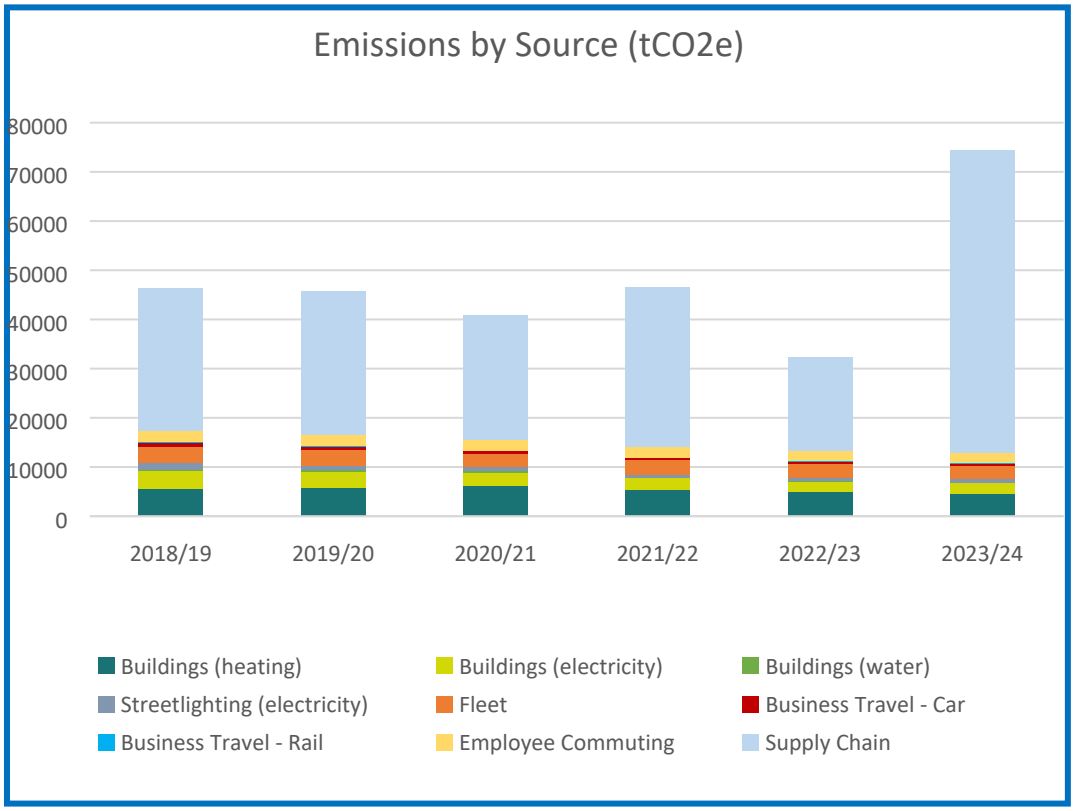
The council calculates its carbon footprint annually to measure the quantity of greenhouse gas emissions it is responsible for to monitor and direct decarbonisation efforts towards Net Zero Carbon by 2030. This report is for the period relating to 1st April 2023 – 31st March 2024 and the calculation was submitted to Welsh Government on 2nd September 2024.

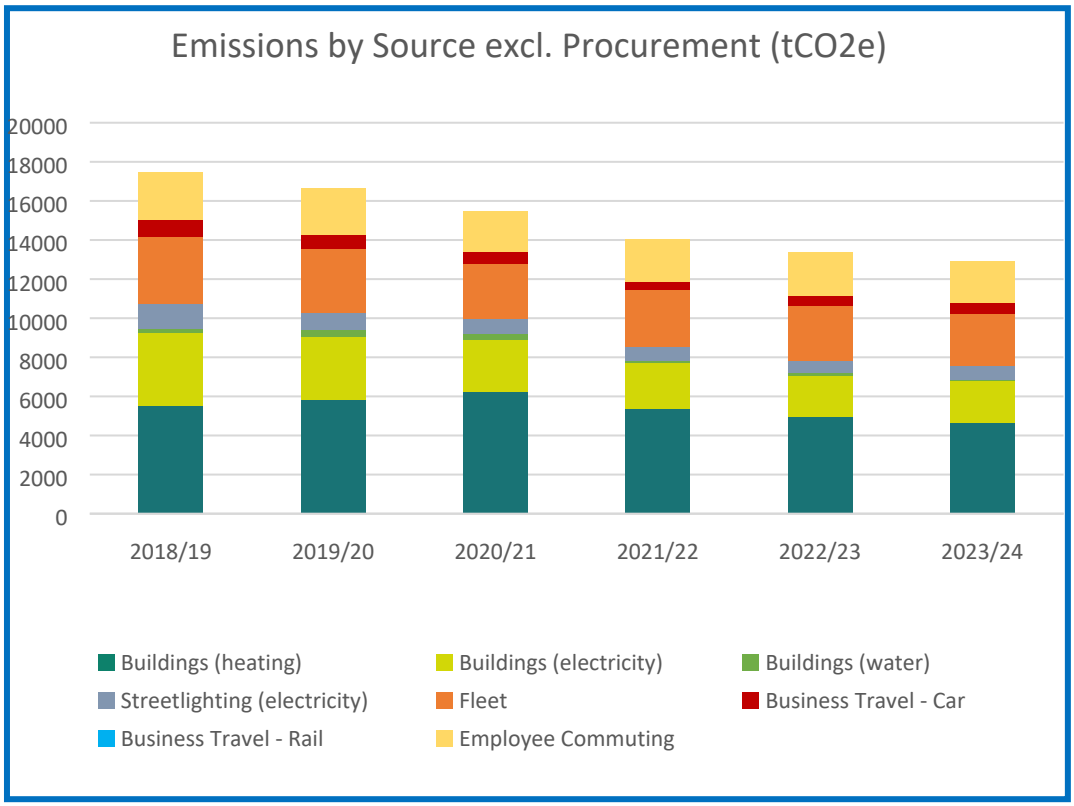
The Carbon Emission Update 2023/24 presents the results of the 2023/24 calculation, comparing them against figures from the Council's baseline year of 2018/19, in this case showing an increase of greenhouse gas emissions. The report also provides explanation as to why emissions have changed, as well as noting any improvements or difficulties relating to the data and methodology. The report also notes the significant progress made by the Council to generate renewable energy.

The end of the report concludes with considerations to review targets and internal reporting of procurement emissions, investigate impacts of leisure facilities coming back under Council control, and introduce methodology to better understand land sequestration.

RECOMMENDATIONS	
1	Cabinet support the contents of the report, and the progress made in the past year to improve data collection for the Council's carbon footprint.

REPORT DETAILS

1.00	EXPLAINING THE CARBON FOOTPRINT UPDATE REPORT
1.01	**Background** The Carbon Footprint Update 2023/24 presents the results of the council's carbon emissions calculation for the period of 1 April 2023 to 31st March 2024. The carbon emissions are compared against the Council's baseline year of 2018/19 and previous reporting year of 2022/23, while providing explanations for any changes seen.
1.02	**Purpose** The council calculates its carbon footprint annually, measuring the quantity of greenhouse gas emissions it is responsible for to monitor and direct decarbonisation efforts towards Net Zero Carbon by 2030. In September 2024, the calculation for the period 1st April 2023 – 31st March 2024 was completed and submitted to Welsh Government.
1.03	Total carbon emissions for the period 2023/24 were 74,386 tCO_2e, a 60.2% increase in emissions compared to the 2018/19 baseline, and a 130.1% increase from the previous year.  ***Image 1** showing changes in annual emissions per source.* The cause of this increase is due to emissions from procurement which has seen a significant increase due to a methodology change. This increase is explained in section 1.04. Other emission sources have seen decreases which reflects the positive action being taken across the Council. Building emissions have reduced 3.4% compared to 2022/23 and 29.6% compared to the baseline year. Mobility and Transport emissions have reduced 3.1% compared to 2022/23 and 20.4% since the baseline year.

	The methodology for procurement emissions remains highly challenging due to the spend-based methodology, significantly limiting the ability to reliably measure and monitor. Image 2 removes the procurement emission source helping to demonstrate more clearly the reductions across the Buildings, and Mobility and Transport sources.  ***Image 2** showing changes in annual emissions per source excluding procurement emissions.* If Procurement emissions were excluded from all previous reporting, total emissions for 2023/24 would be 12,909 tCO_2e, a 3.3% reduction compared to 2022/23, and a 26.1% reduction compared to the baseline year.
1.04	In 2023/24, emissions from building electricity increased by 2.4%, and emissions from streetlighting increased by 7.4%, compared to 2022/23. This is a result of the electricity grid's emission factor increasing by 7% compared to the previous period due to greater generation from natural gas, compensating for lower generation from renewables. Electricity consumption for buildings did reduce by 4.4% demonstrating progress being made to increase building efficiency and on-site renewables generation. Streetlighting electricity consumption increased by 0.2%. The Mobility and Transport theme's emission reduction seen in 2023/24 is mostly explained by a reduction of Fleet emissions, the theme's largest emission source. Fleet emissions in 2023/24 reduced by 4.8% compared to 2022/23. Gas Oil/Red Diesel is no longer purchased due to legislative changes, and fleet vehicles have been and continue to be replaced with

	newer and more efficient vehicles, resulting in an overall reduction of fuel use. Employee commute emissions reduced by 3.6% compared to 2022/23.This is due to small reduction in employee headcount used in the methodology, and a reduced emission factor for private vehicles with unknown fuel. The methodology used has been carried over from previous year's reporting. This does not include a revised methodology from the 2023 Employee Travel Survey. Business Travel emissions by car have increased 9.9% compared to 2022/23 and are now 40.7% lower than the baseline year. This is a result of an increase of staff making claims (4.3%), and the total miles claimed in the reporting period (9.5%). Additionally, Business Travel by rail has been included, with data being recorded since January 2024. Emissions for this source are minor at 0.048 tCO_2e. This is the second consecutive year of increases for Business Travel with 2022/23 also seeing a 9.9% increase. The significant increase in Procurement emissions is predominantly a result of revised mapping of the spend categories the council uses internally to the spend codes used in the carbon emissions calculation. This mapping revision has resulted in two outcomes. • Spend has been allocated across more spend categories. • A greater amount of spend has been accounted for in 2023/24. Another explanation for emissions increase, the emission factors of categories where Flintshire County Council has allocated spend in 2023/24 has increased 9.7% from the previous year. The 2023/24 Procurement calculation also includes emissions from three capital construction contracts using the higher tier methodology, and using actual data from these projects results in lower emissions when compared to spend.
1.05	Building on the improvements for Water Use in 2022/23, further minor improvements were made in 2023/24. This involved a better understanding that data is supplied based on billing periods. This allows data to be more reliably removed to prevent double counting a previous year's data where bill periods exceed the emissions reporting period. Data for Business Mileage by car remains good quality with 67.2% of data meeting the highest tier of methodology. This is a slight reduction from the 2022/23 period (71.9%) and remains limited as some employees cannot record their claims electronically which mandates fuel and engine size information. This is a known issue and is still in progress of being resolved. An employee travel survey was conducted in November and December 2023, with the aim of understanding barriers to more sustainable travel and improve the methodology used for employee commute emissions. However, a 10% response rate and erroneous travel data has rendered the responses unrepresentative of staff commute (as stated in the Environment and Economy Overview Scrutiny Committee, 11th June 2024). As a result, the original methodology for staff commute has been

	continued for 2023/24. A follow up employee travel survey with greater response rate will help to ensure the data is representative of the workforce. Most Procurement emissions continue to be calculated using spend-based methodology where council spend (£) is multiplied by an emission factor specific to a particular spend category. A significant change for the 2023/24 period is revised mapping of Flintshire County Council spend categories (Thompson) to the spend codes used in the emission calculation (SIC codes). This mapping exercise was carried out by Denbighshire County Council to more accurately and consistently allocate spend to a category. This has resulted in a 145.7% increase of spend being allocated to the calculation. Historically, spend has been omitted where no suitable category was identified. Emission factors were also updated in the 2023/24 period. For the categories where Flintshire County Council had spend, emission factors were 9.7% higher than the previous year. These two changes explain the significant increase in procurement and overall Council emissions, and demonstrates the inability to measure and monitor procurement emissions using this methodology. For 2023/24, a higher tier methodology was included in the calculation of some procurement emissions for the first time. The construction projects for Mynydd Isa, Croes Atti School, and Theatr Clwyd issued actual data of which Scope 1 and 2 emissions were applied to the Council's procurement calculation. Using this methodology calculates emissions as 321.9 tCO_2e for these three projects. A spend-based approach would have calculated emissions as 10,190 tCO_2e. This example and resulting emissions are not representative of all spend categories using a higher tier methodology but does demonstrate the potential difference in outcomes and the progress being made by the Joint Procurement Business Partner employed jointly by Flintshire County Council and Denbighshire County Council.
1.06	2023/24 Emissions v 2018/19 Baseline Year and Targets - Building emissions have reduced 29.6% since 2018/19, aiming for a 35% reduction by 2024/25. - Mobility and Transport emissions have reduced 20.4% since 2018/19, aiming for a 50% reduction by 2024/25. Procurement emissions have increased 112.2% since 2018/19, aiming for a 30% reduction by 2024/25. 2023/24 Emissions v 2022/23 Emissions - Building emissions: Reduced 3.4%% (with a 9% YOY target) - Mobility and Transport emissions: Reduced 3.1% (with a 9% YOY target) Procurement emissions: Increased 223.8% (with an 8% YOY target) Land-use Emissions - Our land is estimated to have removed 1,513 tCO_2e - This figure continues using our baseline year's methodology and land use figures.

	- Data on Flintshire County Council's land type and size is currently being updated to acknowledge disposals, acquisitions, and land-use changes such as tree planting. Alternative calculation methodologies are being investigated to allow for greater accuracy of carbon accounting and incorporate tree planting and felling data. Renewable Energy Generation - Total generation from renewables increased by 55.9% from the 2022/23 period with 5,486,409 kWh generated. - This improvement is mostly due to solar farms in Flint and Connah's Quay completing their first full year of generation. - Generation across all solar farms has increased by 124.6% since 2022/23, with roof-mounted solar increasing by 11.37%. - Electricity generation from wind increase by 22%. - However, generation from Biomass has reduced 5.42% and Landfill Gas by 39.07% compared to 2022/23
1.07	Although positive steps have been made in measuring emissions in the Procurement theme, the spend-based methodology continues to present significant challenges as seen by the change in spend code mapping. This mapping change will not be applied to previous years in order to update the 2018/19 baseline, therefore, the theme's targets should be reviewed so it is possible to measure and monitor aspects the council has control and influence over. Removing procurement emissions from the council's carbon footprint does demonstrate the continued progress to reduce emissions and/or energy consumption from many sources it has control or direct influence over, although for 2023/24, no theme has met its year-on-year reduction targets. The Council's Climate Change Strategy is currently under review, and the 2023/24 emissions calculation and recent developments have identified considerations shown below. - Review the targets and internal reporting of procurement emissions. - Investigate the carbon emission impacts of leisure facilities returning to Council control. - Introduce improved Land Use methodology to better understand the gap to Net Zero Carbon and enable monitoring of land use change.

2.00	**RESOURCE IMPLICATIONS**
2.01	Capital and revenue resource is required to fulfil clmmate actions. Exact resources needed are calculated as part of individual business cases.

3.00	**CONSULTATIONS REQUIRED / CARRIED OUT**
3.01	Not Required/ None

4.00	**RISK MANAGEMENT**
4.01	There are risks when calculating carbon emissions that the quality or lack of raw data or the way in which it is processed and reported may reduce reliability through error or availability. To address this risk, the Climate Change team review the work in detail and is supported by neighbouring local authorities through peer review. Regarding the Carbon Emissions Update 2023/24 report, a key risk is poor communication of the council reporting its progress to Net Zero Carbon, which is compromised by procurement emissions out of the council's control and only considered an academic practice. This risk is addressed through *Image 2* in *Section 1.03* and further explanations throughout the report. Lower risks regarding communication includes poor use of terminology or presentation of data creating confusion or misunderstandings. To address this, language is carefully considered and a glossary at the end of the report is provided. Data is presented in simple tables and detailed further where it is felt useful for the reader.
4.02	**Ways of Working (Sustainable Development) Principles Impact**

Long-term	Positive: Scrutiny Committee will be informed of the council's progress towards Net Zero Carbon by 2030 as well as successes and challenges. In doing so the Committee will be to be able to scrutinise the results effectively.
Prevention	Positive: The update will inform of emissions that have been prevented in the reporting year and how future emissions can be prevented by addressing issues identified.
Integration	Positive: The Carbon Emission Update 2023/24 forms part of the carbon emission calculation, decarbonisation and reporting process, which in turn integrates with the following priorities under the Council Plan; Green Council, Ambitious Council and Supportive Council. It integrates with the public service board objectives in the Environment priority of the Wellbeing Plan as well as the Smart Access to Energy project in the North Wales Growth Deal. It also integrates with the Environment (Wales) Act 2016

		and Welsh Government's decarbonisation of the public sector agenda.
	Collaboration	Positive: The update explains the progress made to introduce high tier methodologies into procurement, a result of collaboration between Flintshire and Denbighshire County Councils.
	Involvement	Positive: The update highlights the continued need to improve data quality which again includes staff commute and procurement to direct decarbonisation efforts and improve monitoring.

4.03 **Well-being Goals Impact**

Prosperous Wales	Positive: Decarbonising the council brings benefits of reduced energy costs, increased generation from renewables and greater control of activities through improved monitoring.
Resilient Wales	Positive: Resilience can be increased through reduced energy demand and reliance on fossil fuels. Through the monitoring of emissions and data quality, we can improve decarbonisation strategies and target areas which are less resilient than others. Improved monitoring of land use in future will also bring climate resilience benefits.
Healthier Wales	Positive: Realising progress towards Net Zero Carbon 2030 goals promotes positivity towards climate change helping to address related issues such as climate anxiety and stress. Addressing emissions from the local area (e.g., transport) will also benefit people's physical health.
More equal Wales	Neutral: No impact identified.
Cohesive Wales	Neutral: No impact identified.
Vibrant Wales	Neutral: No impact identified

	Globally responsible Wales	Positive: The update reports on how the council is reducing its contribution to global warming through reduced emissions and makes recommendations on how to progress further.

5.00	**APPENDICES**
5.01	None

6.00	**LIST OF ACCESSIBLE BACKGROUND DOCUMENTS**
6.01	None

7.00	**OFFICER CONTACT DETAILS**
7.01	**Contact Officer:** Ben Turpin – Climate Change Project Officer **Telephone:** 01352 703393 **E-mail:** ben.turpin@flintshire.gov.uk

8.00	**GLOSSARY OF TERMS**
8.01	**Baseline Year**: The emissions that occurred in the period of 1st April 2018 – 31st March 2019 are what targets are based on and all future carbon emission calculations compared to. **Carbon emissions**: Used interchangeably with greenhouse gas emissions; meaning emissions of carbon dioxide, methane etc from human and natural activities and sources. Wider greenhouse gas emissions are collectively calculated into a 'carbon dioxide equivalent' displayed as CO2e. **Carbon Footprint**: A measurement of the council's carbon emissions during a defined period of time, given as tonnes of carbon dioxide equivalent (tCO_2e) **Carbon sequestration**: the process involved in carbon capture and the long-term storage of atmospheric carbon dioxide. **Decarbonisation –** Reduction of carbon emissions that result from an activity, material or product **Greenhouse Gas/ Carbon emissions**: Emissions of carbon dioxide, methane etc from human and natural activities and sources. Wider greenhouse gas emissions are collectively calculated into a 'carbon dioxide equivalent' displayed as CO_2e. **Methodology**: How the collected raw data used for carbon emission calculations is managed and rated in terms of its reliability. This is governed by Welsh Government.

	Net Zero Carbon – Reduce carbon emissions and balance any that remain with carbon dioxide removal activities. **Raw Data**: The most basic of data units used for carbon emission calculations. Examples include units of energy (kWh of electricity), vehicle type and mileage, tonnes of a particular waste, etc. **Spend Categories**: A specific goods and services category within the procurement calculation which has an emission factor ($kgCO_2e$ per £ spent).

Environment & Economy Overview & Scrutiny Committee	
Date of Meeting	14 January 2025
Report Subject	Public Health (Wales) Act 2017 and the Introduction of Special Procedures' Licensing
Cabinet Member	Cabinet Member for Planning, Public Health and Public Protection
Report Author	Chief Officer (Planning, Economy, and Environment)
Type of Report	Operational

EXECUTIVE SUMMARY

The new licensing scheme for 'Special Procedures' was introduced on 29 November 2024, under Part 4 of the Public Health (Wales) Act 2017.

Special Procedures include cosmetic piercing, tattooing (to include semi-permanent makeup), acupuncture, dry needling and electrolysis.

Practitioners who are currently registered with Flintshire County Council have a nine-month transition period, commencing on 29 November 2024, to submit an application via Flintshire County Council's website and pay the appropriate fee. We expect to be granting approximately 150 licences and approval certificates.

Welsh Government's intention through the introduction of this scheme is to reduce the health risks associated with these procedures. Most notably infections can occur at the site of the procedure, in addition, improper and unhygienic practices may result in the spread of infectious diseases, such as blood-borne viruses.

Section 76 of Part 4 of the Public Health (Wales) Act 2017 allows local authorities that have issued a Special Procedures Licence or an Approved Premises Certificate to charge a fee. The amount of fee to be charged by a local authority is to be determined having had regard to the costs incurred or expected to be incurred by the authority.

The national fees concerning the new licensing scheme have been calculated across Wales based on the principles of cost recovery. These fees should cover the costs to Flintshire County Council of administering the scheme including officer time for the requisite inspections.

RECOMMENDATIONS	
1	Members approve the delegation to officers of the Public Health (Wales) Act 2017, as set out in section 3.1 of this report.
2	That the Constitution to be amended accordingly to reflect this delegation.

REPORT DETAILS

1.0	**LEGISLATIVE BACKGROUND**
1.1	The new licensing scheme for 'Special Procedures' was introduced on 29 November 2024, under Part 4 of the Public Health (Wales) Act 2017. Special Procedures include cosmetic piercing, tattooing (to include semi-permanent makeup), acupuncture, dry needling and electrolysis. The main requirements of this regime will include: ii Practitioners must be licensed to carry out special procedures. It will be an offence to carry out special procedures without a licence; iii Business premises or vehicles must be approved. It will be an offence for a practitioner to perform any procedures from premises or vehicles that are not approved; iiii A full licence will last for three years and a temporary licence will last for seven days (to allow for events and conferences); iiv Licence conditions will cover a practitioner's competence, the condition of the premises, the equipment and practices used, advice given before and after the special procedure and the records kept.
1.2	Practitioners who are currently registered with Flintshire County Council have a nine-month transition period, commencing on 29 November 2024, to submit an application via Flintshire County Council's website and pay the appropriate fee. We expect to be granting approximately 150 licences and approval certificates.
1.3	Practitioners in this field will be required to demonstrate their competence to undertake these procedures through obtaining the new regulated Level 2 award in Infection Prevention and Control for Special Procedure Practitioners and being subject to inspection by Environmental Health Officers. In addition, they will have to provide a basic DBS as part of their licence application.
1.4	The Welsh Government's intention through the introduction of this scheme is to reduce the health risks associated with these procedures. Most notably infections can occur at the site of the procedure, in addition, improper and unhygienic practices may result in the spread of infectious diseases, such as blood-borne viruses.
2.0	**FEES**
2.1	Section 76 of Part 4 of the Public Health (Wales) Act 2017 allows local authorities that have issued a Special Procedures Licence or an Approved Premises Certificate to charge a fee. The amount of fee to be charged by a local authority is to be determined having had regard to the costs incurred or expected to be incurred by the authority.
2.2	The national fees for new application and renewal fees have been set at the same level by all local authorities in Wales, which are based on the principles of Hemmings case law. As required by regulations these fees will collectively be

	reviewed after one year from implementation and at the end of each subsequent three-year period.
2.3	Total fees for practitioners and premises are divided into application fee and compliance fee which is payable once the application has been granted. The application fee covers the cost of processing the application, inspection and issuing documentation. The compliance fee is a reasonable contribution to the running of the licensing scheme, advising licence holders, following up complaints, additional inspections, and ongoing support.
2.4	In accordance with Flintshire County Council's Income Generation Policy the Chief Officer and Cabinet Member for Planning, Public Protection and Public Health have approved the adoption of the fees. The fee schedule can be found in Appendix 1 of this report.
3.0	**DELEGATED AUTHORITY**
3.1	To deal efficiently with applications and enforcement, it is proposed that all of the executive powers within the Public Health (Wales) Act 2017 are delegated to the Chief Officer Planning, Environment and Economy (subject to the limitations described in paragraph 3.2 of this report) and without any restrictions on further delegation from the Chief Officer to appropriate operational officers. This includes but is not limited to those listed below. These are executive powers, and therefore are at the discretion of Cabinet to delegate.

Power to be Delegated by Cabinet	**Public Health (Wales) Act 2017 Provisions**
To issue a Special Procedures Licence where all the applicable licensing criteria is met.	Section 65(3)
To issue a refusal notice for a special procedure licence where the authority is not satisfied that all of the applicable licensing criteria are met but only where no representations under The Public Health (Wales) Act 2017 Schedule 3 paragraph 15 have been made following the issue of a "warning notice" that sets out what the authority proposes to do and why.	Section 65(2)
Where all the applicable licensing criteria is met, but the applicant has been convicted of a relevant offence, the power to decide whether the applicant's fitness to perform a procedure to which the application relates has been called into question	Section 66(3)

to such an extent that it would be inappropriate to issue the licence in respect of the performance of that procedure but only where representations have not been made following the issue of a "warning notice" that sets out what the authority proposes to do and why.	
To determine the renewal of a Special Procedures Licence but only where representations have not been made following the issue of a "warning notice" that sets out what the authority proposes to do and why.	Section 67
To issue a revocation notice for a Special Procedure Licence in cases where the licence holder has failed to comply with an applicable mandatory licensing condition that the non-compliance presents, or could present, significant risk of harm to human health but only where representations have not been made following the issue of a "warning notice" that sets out what the authority proposes to do and why.	Section 68
To issue an approval certificate for a premises or vehicle.	Section 70(1)
To renew an approval certificate for a premises or vehicle. Set out in The Special Procedures Approved Premises and Vehicles (Wales) Regulations 2024 Part 12	Section 70(7)
To refuse an approval certificate for a premises or vehicle. Set out in The Special Procedures Approved Premises and Vehicles (Wales) Regulations 2024 Part 12	Section 70(7)
To take reasonable steps for bringing a voluntary termination notice to the attention of appropriate persons.	Section 72(4)

To issue a stop notice.	Section 77(2)
Power to issue a remedial action notice in respect of a Special Procedures Licence.	Section 78(1)
To issue a remedial action notice in respect of an Approved Premises Certificate.	Section 79(1)
To issue a completion certificate in respect of a Special Procedure Licence or an Approved Premises Certificate.	Section 80(2)
To carry out enforcement action and consultation in respect of intimate piercing.	Section 97
Power to issue warning notices.	Sections 61, 65-67

3.2 There are certain powers associated with Special Procedures that cannot be delegated to officers, in such circumstances a number of new powers have been conferred to the Licensing Committee. Those are powers to determine certain matters where an officer cannot (e.g. where representations have been made) and powers to consider representations. The Public Health (Wales) Act 2017 expressly delegates these powers to the Licensing Committee and a detailed report outlining the implications of these changes will be presented to Licensing Committee at its next meeting.

Power Delegated to Licensing Committee	**Public Health (Wales) Act 2017 Provisions**
To issue a refusal notice for a special procedure licence where representations under The Public Health (Wales) Act 2017 Schedule 3 paragraph 15 have been made.	Section 65(2)
Where an applicant has been convicted of a relevant offence, to decide whether the applicant's fitness	Section 66 (3)

	to perform a procedure to which the application relates has been called into question to such an extent that it would be inappropriate to issue the licence in respect of the performance of that procedure in cases where representations have been made.	
	To determine the renewal of a Special Procedures Licence in cases where representations have been made.	Section 67
	To issue a revocation notice for a Special Procedure Licence and/or Approval Certificate in cases where the licence/Approval certificate holder has failed to comply with an applicable mandatory licensing condition that the non-compliance presents, or could present, significant risk of harm to human health and where representations have been made.	Section 68 and 73
	Power to consider representations following the issue of a "warning notice"	paragraph 15 – Schedule 3

4.00	**RESOURCE IMPLICATIONS**
4.01	The national fees concerning the new licensing scheme have been calculated across Wales based on the principles of cost recovery. These fees should cover the costs to Flintshire County Council of administering the scheme including officer time for the requisite inspections.
4.02	As required by regulations, these fees will collectively be reviewed after one year from implementation and at the end of each subsequent three-year period. The licence fees can be adjusted in future where a deficit or surplus is identified which is in accordance with the case law R (on the application of Hemmings(t/a Simply Pleasures Ltd) and others) v Westminster City Council [2015].

5.00	**CONSULTATIONS REQUIRED/CARRIED OUT**
5.01	There is no requirement with respect to this report. Welsh Government have previously undertaken an extensive consultation process with respect to Special Procedures.

6.00	INTEGRATED IMPACT ASSESSMENT
6.01	This report is to approve the scheme of delegated authority for the Public Health (Wales) Act 2017 in respect of special procedure licensing. An integrated impact assessment is therefore considered unnecessary.

7.00	RISK MANAGEMENT
7.01	The Public Health (Wales) Act 2017 will place a statutory duty on local authorities in Wales to administer and enforce the special procedures licensing scheme. To ensure that the local authority can fulfil this statutory obligation efficiently, an appropriate fee structure and scheme of delegated powers is required to be adopted.

8.00	APPENDICES
8.01	The fee structure is included as part of this report, in Appendix 1.

9.00	LIST OF ACCESSIBLE BACKGROUND DOCUMENTS
9.01	**Contact Officer:** Sian Jones - Community and Business Protection Manager/ Gill Hulme - Health, Safety and Environmental Control Manager **Telephone:** 01352 702132/ 01352 703385 **E-mail:** sian-jones@flintshire.gov.uk; gill.hulme@flintshire.gov.uk

10.00	GLOSSARY OF TERMS
10.01	Not required

APPENDIX 1

Fees

All fees relating to the mandatory licensing scheme have been agreed by all 22 LAs in Wales for at least the first year of operation of the scheme, and will be the same in every LA:

All first applications

For a 3-year special procedure licence (for individual practitioners)	
application fee payable at the time the application is submitted.	£159
compliance fee, payable after a licence has been granted.	£44
For a 3-year premises/vehicle approval certificate	
application fee payable at the time the application is submitted.	£244
compliance fee, payable after an approval certificate has been granted.	£141
Renewal Applications* (due 3 years after date of grant of first licence)	
For a special procedure licence renewing for the following 3 years:	
application fee payable at the time the renewal application is submitted.	£147*
compliance fee, payable after a renewed licence has been granted	£41*
For a premises/vehicle approval certificate renewing for the following 3	
years:	
application fee payable at the time the renewal application is submitted.	£204*
compliance fee, payable after a renewed approval certificate has	£141*
been granted.	
* Indicative fees only – these are subject to review and may change before a practitioner reaches the end of their existing 3-year licence period which is when they will then need to submit a renewal application for a further 3-year period.	
Variation to a Licence and Replacement Licence	
Special Procedure Licence - Variation (Add new procedure)	£131
Special Procedure Licence - Variation (Change of detail)	£26
Special Procedure Licence - Replacement Licence	£13
Variation to an Approval Certificate and Replacement Approval Certificate	
Approved premises / vehicle - Variation (Add new procedure)	£189
Approved premises / vehicle - Variation (Structural change)	£189
Approved premises / vehicle – Variation (Change of detail)	£26
Approved premises / vehicle - Replacement Certificate	£13
Fees for Temporary Events	
Temporary Special Procedure Licence and Temporary Approval Certificate	
Temporary Special Procedure Licence (per individual)	£92
Approved premises/ vehicle -Temporary Approval (Convention/main purpose	£680
Approved premises/ vehicle - Temporary Approval (Ancillary event)	£385

Mae'r dudalen hon yn wag yn bwrpasol

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Mae'r dudalen hon yn wag yn bwrpasol

ENVIRONMENT AND ECONOMY OVERVIEW AND SCRUTINY COMMITTEE

Date of Meeting	Tuesday, 14th January 2025
Report Subject	Car Parking Management Policy Review
Cabinet Member	Cabinet Member for Streetscene and Transportation
Report Author	Chief Officer, Streetscene and Transportation
Type of Report	Strategic

EXECUTIVE SUMMARY

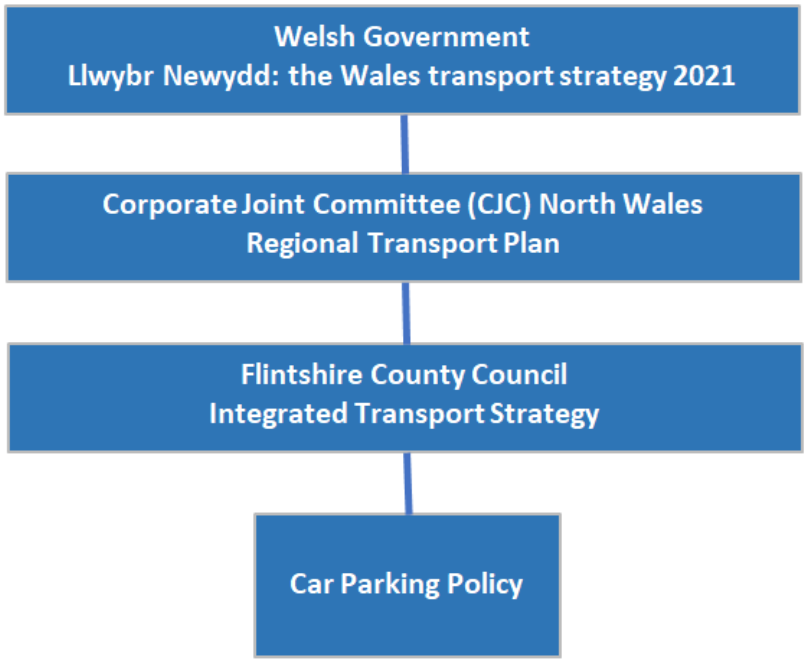
The Council recognises that car parks play an important part in promoting the vitality and viability of town centres and communities, assisting both residents and businesses, as well as providing opportunities for access to health, open green spaces and leisure.

The current car parking management policy was introduced as a strategy document for the provision of car parking across the county and was last reviewed in 2015. The policy now needs to be revised to reflect a number of changes that have been introduced since 2015, and to ensure that the Council's parking objectives are consistent with and contribute to the overall aims of the national and regional transport strategies and any legislative changes. The policy sets out proposals for the way we manage and regulate our car parks across the county and our objectives for the next five years.

The policy does not cover parking charges, as this is covered separately, normally through the annual review of fees and charges. However, proposals are included for Wepre Park car park, which is currently managed by the Access and Natural Environment Service, to be included in the traffic regulation orders (TROs) for chargeable car parks from May 2025. Presently, the car park at Wepre Park is free and allows parking without restriction. Visitor numbers have increased significantly in the last five years, with vehicles and footfall having a negative impact on the site leading to an increase in maintenance beyond the current revenue budget. It is proposed to introduce car park charging at Wepre Park to provide an additional income to better manage and maintain the car park and make up the deficit in the revenue budget.

RECOMMENDATIONS	
1	Scrutiny supports the proposed Car Parking Management Policy.
2	Scrutiny endorses the introduction of car parking charges at Wepre Park.

REPORT DETAILS

1.00	Explaining the background to the Car Parking Policy Review
1.01	The Council recognises that car parks play an important part in promoting the vitality and viability of town centres and communities, assisting both residents and businesses, as well as providing opportunities for access to health, open green spaces, and leisure. The current car parking management policy was introduced as a strategy document for the provision of car parking across the county and was last reviewed in 2015. The policy now needs to be revised to reflect a number of changes that have been introduced in the intervening time since 2015 and to ensure that the Council's parking objectives are consistent with and contribute to the overall aims of the national and regional transport strategies and any legislative changes. A copy of the proposed new car parking policy is included in **Appendix 1** for comments and review.
1.02	The previous document was entitled a 'strategy,' but it is proposed to amend this to be a policy document, as the provision and management of car parking sits beneath the wider transport strategy for the Council, the Regional Transport Plan and Welsh Government's overarching transport strategy for Wales: Llwybr Newydd: the Wales Transport Strategy 2021. The following diagram serves as a pictorial representation of the policy context in Wales: 
1.03	This policy covers a five-year period 2025-2030. The document sets out proposals for the way we manage and regulate all council owned car parks. It does not set out every decision or action that will affect car parking management across the county, but it sets out our objectives and what these are intended to achieve.

1.04	This policy review is being treated separately to any charging structure with car parking tariffs anticipated to remain part of the annual review of fees and charges schedule in July each year. Nevertheless, we will continue to consider our fees and charges for car parking in line with the council's Medium Term Financial Strategy and budget setting process, and charges will be set at levels that encourage sustainable travel and are competitive with neighbouring local authorities, but which do not act to suppress the local economy.
1.05	The aspects included within the new policy that have been introduced since the original strategy document was implemented are as follows: - • Environmental impacts (sustainable transport) • Integration with active travel (walking, cycling, wheeling) • Alternative payment methods, such as PayByPhone • Clarity on permit types (annual, resident, business) • Electric vehicle (EV) charging provision • Coach parking provision / Park and Ride provision • Free car parking for Town/Community Councils e.g. free after three initiative • A formalised mechanism for charging for events / businesses utilising the car parks for social and public events • Blue badge management and misuse
1.06	The aims and objectives of the policy are to: • Prioritise the needs of disabled people, residents, businesses, and their customers and manage parking capacity for both on-street and off-street facilities. • Promote sustainable travel choices through the availability and effective costing of car parking, where demand is identified in support of the highway network. • Where appropriate, discourage the use of central parking spaces for long stay and seek to maximise the availability of short stay spaces and turnover of customers. • Retain long stay parking places and offer competitively priced permits. • Ensure all on-street and off-street restrictions are effectively enforced and the impact on surrounding residential areas is minimised. • Prioritise parking enforcement in areas where the requirement is greatest and to be responsive to changing needs, local factors, and demand; with particular regard to reducing congestion and increasing the availability of short-stay parking spaces. • Provide parking dispensations and suspensions, as appropriate. • Ensure the ability to keep roads clear of vehicles in contravention of a restriction, which create safety and obstruction issues. In doing so, this can reduce traffic delay, improve the reliability of bus services and enhance the environment for pedestrians and cyclists to provide easier access for emergency vehicles. • Increase the turnover of short-stay spaces and encourage the appropriate use of long-stay spaces through better enforcement, which can result in less circulating traffic and help support the vitality and vibrancy of communities and town centres.

	• Improve enforcement to help 'Blue Badge' holders by ensuring that dedicated spaces are not used inappropriately.
1.07	Section 5 of the policy covers the various pieces of legislation that apply to the regulation of car parking by local authorities. The Council is responsible for all aspects of on-street parking on the local highway network, introducing regulations to improve safety and the turnover of spaces, as well as the enforcement of regulations by civil enforcement officers. Traffic regulation orders (TROs) are in place within our towns and communities, designated with appropriate restrictions, signing and lining. TROs place restriction on parking, for instance loading/unloading, disabled and residential permits. There is no statutory duty on local authorities to provide car parking; however, the Road Traffic Regulation Act 1984 provides powers under which Councils are able to provide and manage off street car parks. The use of the Council's car parks is regulated by traffic regulation orders permissible under the Act. It also provides powers for the Highway Authority to make traffic regulation orders for the control and regulation of traffic and parking on the highway. Further information on the use of TROs is detailed within Section 5 of the policy (see **Appendix 1)**.
1.08	Proposals are included in the policy for the car park at Wepre Park, which is managed by Flintshire's Access and Natural Environment Service, the intention is for the park to be included in the TROs for chargeable car parks from April 2025. Currently the car park at Wepre Park is free of charge and allows parking without restriction. Visitor numbers have increased significantly in the last five years, with vehicles and footfall having a negative impact on the site leading to increase in maintenance beyond the current revenue budget. It is proposed to introduce car park charging to provide an additional income to better manage and maintain the car park and make up the deficit in the parks' revenue budget.
1.09	Wepre Park is an ancient woodland, rich in wildlife and history. It is a greatly valued green space for the residents of Connah's Quay and for visitors from across the region. The park's 160 acres are cared for on a daily basis by Flintshire's Access and Natural Environment Service for the public to enjoy its open green spaces and facilities. Visitor number have increased significantly in the last five years, with cars and footfall having a negative impact on the site.
1.10	The overflow, seasonal grass car park, was improved in 2021 to provide all year-round parking using Welsh Government Green Recovery Grant Funding. This work enabled the park to be more resilient to increasing visitor numbers throughout the year.
1.11	As noted above, the car park is currently free of charge and allows parking without restriction. There was a proposal to include Wepre Park in the wider Flintshire County Council car park charging introduction in 2019, but this was halted at the time, as Cabinet wished to maintain free access to the countryside.

	Since the pandemic, visitor numbers have increased to a point where their impact is having a detrimental effect on the site and the revenue budget is insufficient to maintain the park standards.
1.12	Introducing a traffic regulation order at Wepre Park will help to better manage visitors through enforcement and thereby provide a safe, organised, and well-structured area for visitors to park and to discourage users who may be using the area to park long stay. The introduction of traffic management on the roads in the vicinity of the park entrance will also address the issue of people who do not want to pay to use the car park and park on the residential streets adjacent to Wepre Park. A SWOT analysis has been undertaken to assess the factors that might affect charging at the car park at Wepre (strengths and weaknesses) and external factors (opportunities and threats), which is detailed in **Appendix 2**.
1.13	A full cost analysis for introducing car parking charges at Wepre Park was produced in 2021 and this will need to be updated to reflect current costs; however, the initial outlay is estimated to be around £20,000 and can be met from the Access and Natural Environment Service revenue budget in-year. A conservative estimate for projected income of around £28,000 (full year) and annual running costs of around £5,000 have been calculated with the revenue budget transferring to Streetscene and Transportation to align with all other chargeable car parks. The proposed parking tariffs are set out in Section 2.02 and the proposed operational (chargeable) days will be Monday to Sunday (including bank holidays) from 09:00 to 21:00 hours.

2.00	**RESOURCE IMPLICATIONS**
2.01	**Revenue:** The revised policy is not anticipated to have any negative implications for the revenue budget within the Streetscene & Transportation portfolio and cost recovery for public events that are held on car parks will ensure that the revenue budget is maintained. The current cost of delivering and managing the car parking service is £1,052,384 per annum (2024/2025). The income from car parking helps to offset the costs of providing and maintaining car parks in the county, but it does not meet the full cost of managing and operating the car parks. This position is contrary to the Council's adopted corporate policy for fees and charges which expects chargeable non-mandatory functions to be provided on a full cost recovery basis wherever possible. The current budgeted income target for 2024/2025 for car parking income is £729,306 with an expected outturn of £732,064 (as at month 7 budget reporting). Income from the payment of penalty charge notices (PCNs) is also used to help finance the operational costs of the council's parking service.

2.02	There are significant costs associated with operating and managing the Council's car parks, many of which sit outside the main budget for car parks. The main areas of expenditure include: • General maintenance costs • Street lighting repairs • Street lighting energy costs • Cleansing costs • Gully emptying and sweeping costs • Ground maintenance works • Inspection costs • National non-domestic rates (NNDR) • Infrastructure maintenance replacement costs e.g. Pay and display ticket machines, signage etc. • Enforcement costs • Administration / management. • Winter Maintenance e.g. salt bins, priority 2 gritting However, car parking maintenance is viewed as a whole service and there will be cross subsidy across the car parks in terms of repairs and maintenance, which are carried out on car parks as and when they are needed, and this is not necessarily distributed evenly over the car parks.
2.03	In terms of the impact on the revenue budget for Flintshire's Access and Natural Environment Service, it is likely that there would be negative implications for this service if car parking charges were not introduced at Wepre Park with maintenance costs increasing and visitor numbers becoming unsustainable, impacting the local community, and surrounding road network. The introduction of charges will see the transfer of responsibility for income generation and maintenance transfer to the Streetscene and Transportation portfolio to align with other chargeable carparks. The proposed tariffs for car parking at Wepre Park are as follows: - • £1 for up to 2 hours • £2 up to 4 hours • £4 all day • Season ticket permit - £50.00 (full year) The proposed charges are not in line with other Flintshire town car parks, but it is felt that they are appropriate for the usage at Wepre Park and align to those charges in Talacre. For comparison, other similar country park charges elsewhere in north-east Wales are as follows: - • Loggerheads Country Park £1.50 for 2 hours / £2.00 for 4 hours / £5.00 all day. • Alyn Waters Country Park Daily charge - £1.00 / Season ticket £50.00

2.03	**Capital:** Investment funding would be required for the introduction of new pay and display machines, for instance with contactless functionality, and for EV charging. Options would be explored through grant funded schemes in the first instance.
2.04	**Human Resources:** There are no implications for additional capacity or for any change to current workforce structures or roles because of any amendments to this policy.

3.00	**IMPACT ASSESSMENT AND RISK MANAGEMENT**
3.01	As this is a strategic report, a full integrated impact assessment has been completed, attached as an appendix to this report, which elected members are advised to read. The key risks for introducing charges at Wepre Park are detailed below: - • Initial reaction of the public and visitors to Wepre Park could reflect negatively for the Authority. • Risk of not achieving the projected income targets introduced to the Access & Natural Environment Service will lead to ongoing overspend. • Not implementing charges at Wepre Park may lead to budget and resource pressures in the park, which may lead to declining standards in park infrastructure. The Ways of Working principles of Sustainable Development focus on balancing economic, social, and environmental factors to ensure long-term viability and minimise harm to the planet. When applied to the design and management of car parking provision, these principles can help create systems that are more efficient, equitable, and less harmful to the environment. Details are shown below how each of the Sustainable Development principles can impact car parking: **Ways of Working (Sustainable Development) Principles Impact**

Long-term	Positive - By linking the car parking policy with Welsh Government's Llwybr Newydd: Wales Transport Strategy and Regional Transport Plan, it takes account of the sustainability and long-term impact, for instance, the policy reflects the transport hierarchy in terms of promoting alternatives to private car use, such as public transport, cycling and walking, and ensuring that parking areas are equipped with charging stations to support the transition to electric vehicles.
Prevention	Positive - In the context of sustainable development, the principles of prevention and impact in car parking policies focus on reducing the negative environmental, social, and economic consequences of car use and parking. The revised car parking policy is based on sustainable development principles, which involves strategies that prioritise reducing the need for car use,

	promoting alternative transportation, and minimising the environmental footprint of parking infrastructure, such as integrating EV charging points into new and existing parking infrastructure. The policy aims to promote sustainable travel choices through the availability and effective costing of car parking, where demand is identified in support of the highway network.
Integration	Positive - Sustainable development should ensure social inclusion, accessibility, and equitable opportunities for all individuals, regardless of income or background. The policy aims to prioritise the needs of disabled people, local residents, businesses, and their customers and manage parking capacity for both on-street and off-street facilities. The policy also aims to improve enforcement to help 'Blue Badge' holders by ensuring that dedicated spaces are not used inappropriately.
Collaboration	Positive - The policy prioritises active travel and sustainable travel methods like walking, cycling, and public transport. With the growing adoption of electric vehicles, the parking policy supports the installation of EV charging stations to encourage low-carbon transport options. Opportunities for collaboration are employed e.g. working with Transport for Wales, NMWTRA and neighbouring local authorities through the CJC and adoption of the Regional Transport Plan.
Involvement	Positive - Having a car parking policy can help mitigate climate change by encouraging alternatives to car usage. For example, implementing electric vehicle (EV) charging stations, or prioritising active transportation (walking, cycling) and public transport over car parking. Sustainable development emphasises equity and accessibility. The car parking policy can ensure that parking spaces are available for everyone: people with disabilities, families with young children, or those who depend on cars for mobility in areas with limited public transport options.

Well-being Goals Impact

Prosperous Wales	Positive – The car parking policy takes into account the use of sustainable transport: providing alternatives to car use (such as cycleways, public transport or walking) can reduce reliance on cars, improve air quality, and potentially lower traffic congestion, benefiting the economy and productivity. Using technologies such as electric vehicle (EV) charging stations can support innovation and create new business opportunities, contributing to a prosperous and sustainable economy. The policy promotes sustainable travel choices through the availability and effective costing of car parking charges.
Resilient Wales	Positive - Oversubscription of parking spaces and the stress of finding a parking spot can negatively impact mental well-being. Ensuring well-managed parking facilities and prioritising spaces or reducing the need for parking through better promotion of more sustainable travel can alleviate this stress and improve resilience. The policy seeks to discourage the use of central parking spaces for long stay and seek to maximise the availability of short stay spaces and turnover of customers, where appropriate. The policy also aims to increase the turnover of short-stay spaces and encourage the appropriate use of long-stay spaces through better enforcement, which can result in less circulating traffic and help support the vitality and vibrancy of communities and town centres. The introduction of charging stations within car parks for electric vehicles can help the transition to cleaner, more resilient energy systems.
Healthier Wales	Neutral - If car parking is limited or more expensive, people might be encouraged to use other modes of transportation, such as walking or cycling, which improve physical health and reduce air pollution.
More equal Wales	Positive – The policy prioritises the needs of disabled people, local residents, businesses, and their customers and manage parking capacity for both on-street and off-street facilities, by ensuring car parking spaces are available to people with disabilities, which can support a more equal society. Ensuring access to sustainable transport, whether public or private, can have a significant impact on people's ability to engage in work, education, and social activities.
Cohesive Wales	Positive - The car parking policy aims to supports residents, businesses, commuters and visitors alike, and provides a sufficient number of suitably located and well-managed parking spaces to sustain the long term economic, social and environmental wellbeing within Flintshire's towns and communities.

Vibrant Wales	Positive - The car parking policy can contribute to the well-being of Welsh citizens, by improving air quality, reducing congestion, enhancing social inclusivity, and promoting healthier lifestyles, all while supporting a prosperous economy. The policy includes the allowance of public events on car parks, which supports vibrant cultural experiences that may lead to the repurposing of car parks for cultural events that emphasise local traditions and creativity.
Globally responsible Wales	Neutral - The car parking policy can have a significant impact on the well-being goal of being globally responsible and also relate to issues of sustainability and community well-being. For instance, car parking contributes to increased carbon emissions from cars. Reducing the need for car parking, promoting electric vehicles (EVs), and improving active travel and promoting public transport can reduce emissions and make towns and communities more sustainable.

The car parking policy also reflects some of the Council's **Well-being Objectives** 2022-2023 (https://www.flintshire.gov.uk/en/PDFFiles/Council-Democracy/Council-Plan-and-Well-Being-Objectives/Well-Being-Objectives-2022-23.pdf), as follows: -

- Limiting the impact of the Council's services on the natural environment and supporting the wider communities of Flintshire to reduce their own carbon footprint – EV charging, promotion of active travel and sustainable transport.

- Enabling a sustainable economic recovery and growth - Providing safe and convenient parking is vital to the economy and vibrancy of Flintshire, ensuring that our towns and communities remain easily accessible for people who choose to drive and offer access to amenities and places to visit.

- To have a parking estate that meets the needs of the county and remains fit for purpose in the current modern day is key to achieving this. A policy that supports its residents, businesses, commuters and visitors alike, and provides a sufficient number of suitably located and managed parking spaces to sustain the long term economic, social and environmental wellbeing within Flintshire's towns and communities is important.

4.00	**CONSULTATIONS REQUIRED/CARRIED OUT**
4.01	Consultation will be required with the park stakeholders to share plans around the proposals of introducing car parking charges at Wepre Park.

4.02	Statutory public consultation will be required as part of the Traffic Regulation Order (normally 21 days). Public notices will be displayed in the Wepre Park visitors' centre, online through the Flintshire County Council website and will be publicised via social media. A communications plan will be developed for wider publication of the charge following approval and subject to the statutory consultation. An indicative timescale for implementation is included below: • Consultation with all stakeholders to be completed in early February 2025 • Review of outcome from consultation period in mid to late February 2025 • Advertisement of Off-Street Order in early March 2025 (21 days) • Civils and installation works in early April 2025 • Go live date in May 2025.
4.03	Consultation to be undertaken with the Environment & Economy Overview & Scrutiny Committee.

5.00	**APPENDICES**
5.01	**Appendix 1** – Car Parking Policy 2025-2030
5.02	**Appendix 2** – SWOT Analysis Wepre Car Parking Charges

6.00	**LIST OF ACCESSIBLE BACKGROUND DOCUMENTS**
6.01	Llwybr Newydd: the Wales Transport Strategy 2021 https://www.gov.wales/llwybr-newydd-wales-transport-strategy-2021

7.00	**CONTACT OFFICER DETAILS**
7.01	**Contact Officer:** Ruth Tulley, Regulatory Services Manager **Telephone:** 01352 704796 **E-mail:** ruth.tulley@flintshire.gov.uk
7.02	**Contact Officer:** Tom Woodall, Access & Natural Environment Manager **Telephone:** 01352 703902 **E-mail:** tom.woodall@flintshire.gov.uk

8.00	**GLOSSARY OF TERMS** **These are provided corporately on the Infonet (link) and maintained by the Executive Office**
8.01	TRO = Traffic Regulation Order EV = Electric Vehicles

Mae'r dudalen hon yn wag yn bwrpasol

CAR PARKING POLICY 2025-2030

TABLE OF CONTENTS

1. Mission Statement
2. Introduction
3. Overview and Background
4. National and Regional Policies
5. Legislation
6. Parking Policy
7. Main Principles
8. Car Park Locations
9. Disabled Parking Provision and Blue Badge Enforcement
10. Parking Enforcement
11. Residents Parking
12. Environmental Impact & Active Travel
13. Management of Off-Street Parking Places
14. Parking Charges
15. Payment Methods
16. Permits
17. Car Park Provision
18. Motorcycle Bays
19. Electric Vehicle (EV) Charging
20. Coach Parking
21. Motorhomes/Caravans
22. Maintenance
23. Use of parking spaces for events and businesses
24. Sale of Goods and Services
25. Authorised Personnel

Appendices
Appendix 1 – Accessible and Supportive Information
Appendix 2 – Permit Types & Application
Appendix 3 – Parking Provision and Spacing

1. MISSION STATEMENT

Providing safe and convenient parking is vital to the economy and vibrancy of Flintshire, ensuring that our towns and communities remain easily accessible for people who choose to drive and offer access to amenities and places to visit. To have a parking estate that meets the needs of the county and remains fit for purpose in the current modern day is key to achieving this. A policy that supports its residents, businesses, commuters and visitors alike, and provides a sufficient number of suitably located and managed parking spaces to sustain the long term economic, social and environmental wellbeing within Flintshire's towns and communities is important.

2. INTRODUCTION

2.1 Flintshire County Council is the Parking Authority and the Enforcing Authority responsible for all on-street parking and off-street council owned public car parks in Flintshire.

2.2 This document sets out our approach within Flintshire for the provision of both on-street and off-street parking and for the enforcement of traffic regulation orders (TROs). By their nature, parking polices adapt and change over time and will need to be regularly reviewed and updated.

3. OVERVIEW AND BACKGROUND

3.1 Civil Parking Enforcement (CPE) was first introduced in Flintshire in October 2013, and, through effective enforcement, many vehicles have been transferred to off-street car parks.

3.2 In order to maintain the vibrancy and vitality of a community or town it is essential to effectively manage off-street parking usage.

3.3 Parking measures and enforcement are key tools in managing an effective highway network, in support of the effective movement of traffic. There can be numerous conflicts between town centre visitors and residential parking where previously ineffective management of these areas has led to congestion.

3.4 Pay and Display (P&D) parking is a good parking tool, which, through the use of appropriate charging, can encourage commuters to the car parks on the periphery of the centre, whilst promoting proximity spaces for short stay.

3.5 The introduction of CPE has resulted in more effective management of on-street parking, which has had a positive impact on the movement of traffic in town centres.

3.6 Civil parking activities are carried out by the Civil Parking and Environmental Enforcement team. The team comprises of nine full time positions (FTEs) and a working supervisor. The team is multi-functional, covering the enforcement of on-street and off-street parking contraventions, environmental crimes (littering; dog fouling; control of dog's in public spaces, public space protection orders (PSPOs), fly tipping; side waste; household duty of care) along with any educational related campaigns on such matters.

3.7 The team's primary focus is on engagement and education of the public, ensuring that, when out on patrol, the residents of Flintshire are understanding of the law and their own personal responsibilities.

3.8 Officers patrol across all areas of Flintshire where parking restrictions exist and which are covered by a traffic regulation order (TRO). This includes double and single yellow lines, loading and unloading areas, disabled bays, limited waiting areas, taxi ranks and any Council controlled off-street car parks.

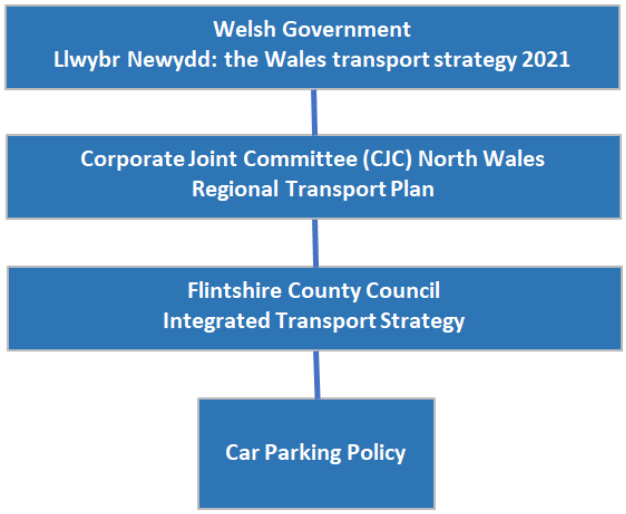
3.9 Enforcement officers will issue Penalty Charge Notices (PCNs) to drivers who have parked in contravention of any regulations in force at that time. Parking illegally or in the wrong place on the highway network or Council run car parks may result in a Penalty Charge Notice (PCN) being issued.

3.10 Flintshire County Council is a partner of the Wales Penalty Processing Partnership (WPPP). WPPP provides all the back-office function following the issue of a PCN. The WPPP also produce Civil Parking Enforcement Procedures which sets out the methodology of enforcement and the appeals process.

3.11 The Wales Penalty Processing Partnership (WPPP), which is hosted by Denbighshire County Council, works on behalf of ten Welsh local authorities to support the enforcement operation by dealing with challenges, payments and processing of all penalty charge notices that are issued.

4. NATIONAL & REGIONAL POLICIES

4.1 The Car Parking Policy needs to ensure that the Council's parking objectives are consistent with and contribute to the overall aims of the national and regional transport strategies. The parking policy sits beneath the Council's own Integrated Transport Strategy, which sits within a hierarchy of transport strategy in Wales. Welsh Government's overarching Llwybr Newydd transport strategy sets the direction of transport at a national level, while the Regional Transport Plan (RTP) provides the strategic direction for transport at a regional level through the Corporate Joint Committee (CJC) for North Wales and the Council's own Integrated Transport Strategy serving as a local level plan for the county. The following diagram serves as a pictorial representation of the structure in Wales:



4.2 WG's strategy consists of three main priorities and aims to provide an accessible, sustainable and efficient transport system that is good for people and communities, good for the environment, good for the economy and places in Wales, and good for culture and the Welsh language, contributing to each of the seven national well-being goals set out in the Well-being of Future Generations (Wales) Act 2015, as outlined in the following diagram.

4.3 WG's strategy also identifies a new sustainable transport hierarchy, which reinforces the move towards more sustainable modes of travel, and the parking policy will be required to take this into account: -

5. LEGISLATION

5.1 Flintshire County Council is responsible for all aspects of on-street parking on the local highway network, introducing regulations to improve safety and the turnover of spaces and enforcement of regulations by civil enforcement officers. Traffic regulation orders are in place within our towns and communities, designated with appropriate restrictions, signing and lining. Traffic orders place restriction on parking such as loading/unloading, disabled and residential permits.

5.2 **Road Traffic Regulation Act 1984**
The Road Traffic Regulation Act provides powers under which Councils are able to provide and manage off-street car parks. The use of the Council's car parks is regulated by traffic regulation orders permissible under the Act. It also provides powers for the Highway Authority to make traffic regulation orders for the control and regulation of traffic and parking on the highway.

5.3 **Road Traffic Act 1991 (Decriminalised Parking Enforcement)**
The Road Traffic Act and decriminalised parking enforcement were introduced to address the increase in illegal parking (through growing car ownership and use) and fears that police resources would not be able to accommodate the increased demand for enforcement.

5.4 **Traffic Management Act 2004 (Civil Parking Enforcement)**
The Traffic Management Act imposes a statutory duty on local authorities to reduce the cause of congestion and disruption by controlling parking and the highway network as a whole. Part 6 of the Traffic Management Act provides a single framework to make regulations for the civil enforcement of parking and waiting restrictions, bus lanes (where appropriate) and some moving traffic offences.

5.5 Flintshire County Council may review TROs in the following circumstances where funding allows:

- Implementation of additional parking restrictions or alteration of existing restrictions to address a potential road safety issue.
- Implementation of additional parking restrictions or alteration of existing restrictions to address a problem associated with traffic movement or make provision for specific users e.g. disabilities.
- New or amendments to existing TROs to provide additional on-street or off-street parking provision.

5.6 TROs may also be altered to allow the implementation of a traffic management scheme approved as part of the County Council capital programme or to facilitate a development and has been highlighted in any Section 106 or 278 agreement.

5.7 Requests for the introduction of restrictions or the alteration of existing restrictions will be considered in conjunction with the County Council's priorities on funding or where external funding has been secured to cover the costs incurred. Any such requests made during periods of moratoriums on expenditure will be retained on file for consideration in the event that funding becomes available.

5.8 Flintshire County Council may also review TROs in respect of off-street parking places. TROs can be made to vary the terms and conditions of use of a car park or to add or amend the car parks that are covered by an Order. Any proposed TRO will be consulted upon in accordance with the legislation outlined in 5.2 to 5.4 above.

5.9 Well-Being of Future Generations (Wales) Act 2015 - seeks to improve the social, economic, environmental and cultural well-being of Wales. The Act contains seven well-being goals which local authorities as well as other public bodies must seek to achieve in order to improve well-being both now and in the future. It means that for the first time, public bodies listed in the Act must do what they do in a sustainable way and make sure that when making their decisions they take into account the impact they could have on people living their lives in Wales in the future.

5.10 Active Travel (Wales) Act 2013 - seeks to make it easier for people to walk and cycle in Wales. The Act makes it a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel, and to build and improve their infrastructure for walking and cycling every year. It creates new duties for highways authorities to consider the needs of walkers and cyclists and make better provision for them. It also requires both the Welsh Government and local authorities to promote walking and cycling as a mode of transport.

6. PARKING POLICY

6.1. Fundamental to any parking policy is the need for efficient parking enforcement. This is to ensure that on-street parking supply is managed effectively, to prevent inappropriate parking that could cause congestion and increase danger for other road user, and to ensure the proper management of off-street car parks and time limited on-street parking.

6.2. This policy sets out the Council's position on the provision of effective car parking management. The aims and objectives of the policy are to:

- Prioritise the needs of disabled people, local residents, businesses, and their customers and manage parking capacity for both on-street and off-street facilities
- Promote sustainable travel choices through the availability and effective costing of car parking, where demand is identified in support of the highway network.
- Where appropriate, discourage the use of central parking spaces for long stay and seek to maximise the availability of short stay spaces and turnover of customers.
- Retain long stay parking places and offer competitively priced permits.
- Ensure all on-street and off-street restrictions are effectively enforced and the impact on surrounding residential areas is minimised.
- Prioritise parking enforcement in areas where the requirement is greatest and to be responsive to changing needs, local factors and demand; with particular regard to reducing congestion and increasing the availability of short-stay parking spaces.
- Provide parking dispensations and suspensions as appropriate
- Ensure the ability to keep roads clear of vehicles in contravention of a restriction, which create safety and obstruction issues. In doing so, this can reduce traffic delay, improve the reliability of bus services, enhance the environment for pedestrians and cyclists to provide easier access for emergency vehicles.

- Increase the turnover of short-stay spaces and encourage the appropriate use of long-stay spaces through better enforcement, which can result in less circulating traffic and help support the vitality and vibrancy of communities and town centres.
- Improve enforcement to help 'Blue Badge' holders by ensuring that dedicated spaces are not used inappropriately.

6.4 All off-street income generated from car park charges will be re-invested within the Streetscene and Transportation budgets to cover the operational costs of providing the service as well as maintaining the existing infrastructure.

6.5 Parking enforcement can be a highly emotive and contentious subject. The Council has committed to provide a service which is consistent, fair and equitable, and one which operates in a transparent manner.

6.6 Flintshire County Council are a member of the British Parking Association (Appendix 2) and are one of the authorities that utilises the resources of the The Wales Penalty Processing Partnership (WPPP) (see **Appendix 1**). The Partnership is hosted by Denbighshire County Council, which works on behalf of all the authorities to support the enforcement operation by dealing with challenges, payments and processing of all penalty charge notices that are issued.

7. MAIN PRINCIPLES

7.1. **Off-street public parking:**
Short-stay parking is prioritised on sites within an acceptable walking distance of shopping and commercial centres to ensure adequate accessibility. Long-stay parking is prioritised on sites further away from shopping and commercial centres. Long-stay commuter parking is reduced where good sustainable transport alternatives exists.

7.2. **On-street parking:**
The authority will provide on-street, limited waiting parking facilities where it is considered safe to do so without undue interference with moving traffic, residents, businesses, and other urban objectives.

7.3. On residential roads, priority will be given to meeting residents' parking needs.

8. CAR PARK LOCATIONS

8.1. Flintshire currently has forty-nine off-street car parks that are subject to car parking management. Thirty-six car parks are controlled through pay and display, and an additional six car parks are 'permit holders only' car park, with thirteen car parks being free of charge. All car parks are subject to a legal parking Order.

8.2. Each car park stipulates the conditions of use on signage boards so that any customer is aware of their duty to comply with these orders when using the car park and before exiting the car park.

8.3. The car park locations and number of available spaces are detailed in **Appendix 3**

9. DISABLED PARKING PROVISION AND BLUE BADGE ENFORCEMENT

9.1. Blue Badges allow people with mobility difficulties or a health condition that affects their mobility to park closer to where they need to go. Applications for Blue Badges can be from a driver, a passenger or an organisation.

9.2. Blue Badges are valid for a maximum of three years depending on the conditions of the application.

9.3. Flintshire County Council has provision of disabled parking in on-street and off-street car parks in accordance with Equality Act requirements. Local conditions and demand are also considerations in determining the volume and location of spaces provided.

9.4. Enforcement Officers will carry out checks of blue badges whilst on patrols and any misuse of the badge will be addressed accordingly.

9.5. Within residential areas Advisory Disabled bays will be considered outside people's property where residents with Blue Badges can often find it difficult to park at or near their homes. These types of bay markings are only advisory and therefore cannot be enforced should non-blue badge holders park within them. Where applications meet the appropriate criteria, an advisory bay will be marked on the highway free of charge. The Council reserves the right to request information again, should it be suspected that circumstances have changed and the requirements for the bay are no longer met. The Council may remove the bay if the requested information is not satisfactorily provided and/or the bay is no longer required.

10. PARKING ENFORCEMENT

10.1 The Civil Parking Enforcement Team's primary focus is on engagement and education of the public, ensuring that, when out on patrol, the residents of Flintshire are understanding of the law and their own personal responsibilities.

10.2 Officers patrol all areas of Flintshire where parking restrictions exist, and which are covered by a traffic regulation order (TRO). This includes double and single yellow lines, loading and unloading areas, disabled bays, limited waiting areas, taxi ranks, and any Council controlled off-street parking areas (car parks).

10.3 Enforcement officers will issue Penalty Charge Notices (PCNs) to drivers who have parked in contravention of any regulations in force at that time. Parking illegally or in the wrong place on the highway network or Council run car parks may result in a Penalty Charge Notice (PCN) being issued (see **Appendix 2**).

10.4 All officers have clear guidelines to work with and are committed to providing a service that is consistent, fair and equitable and one which operates in a transparent manner.

10.5 Income from the payment of PCNs is used to finance the operational costs of the council's parking service.

10.6 When enforcement officers patrol at car parks this adds to the security of the area at that time, but the authority does not accept and is not responsible for any damage to or theft from cars whilst parked in the car parks, all motorists and users park at their own risk.

11. RESIDENTS' PARKING

11.1 Flintshire will consider the parking needs of residents in areas, which are affected by non-residential parking. Potential sites will be identified with an aim to:

- Balance the conflicting demands for kerb space.
- Manage the displacement of parking.
- Develop robust and fair policies as the available kerb space in many areas will not be sufficient to cater for all demands from residents and other users.

A separate policy is in place for resident parking schemes:

https://www.flintshire.gov.uk/en/PDFFiles/Roads-and-Travel/Policy-for-resident-parking-schemes.pdf

12. ENVIRONMENTAL IMPACT AND ACTIVE TRAVEL

12.1 Welsh Government as part of the Active Travel (Wales) Act 2013 "the act" placed a duty upon Local Authorities to produce maps of existing active travel routes and related facilities in the designated settlements within their local area (the Existing Routes Map) and to submit these maps to Welsh Ministers for approval. The designated settlements within Flintshire include Buckley, Broughton, Connah's Quay, Deeside Industrial Park, Flint, Gorsedd, Holywell, Hope, Leeswood, Mold, Northop Hall, Penyffordd, Sandycroft, Shotton and Walwen.

12.2 In producing the first Existing Route Map (ERM) Flintshire County Council concentrated on arterial walking and cycling routes that provide access from large residential areas primarily to schools, employment sites, transport hubs, health facilities, shopping and retail facilities within each designated settlement.

12.3 Following a mapping and audit exercise of existing walking and cycling facilities, a series of draft ERM's was developed, which depicts walking and cycling routes within the county that met the requirements set out within the statutory toolkit and was therefore considered suitable for 'Active Travel Journeys'.

12.4 Section 3.44 of the Statutory Guidance for the delivery of the Active Travel (Wales) Act 2013 specifies the Consultation process that Local Authorities should follow and Section 3.54 of the Guidance states that Welsh Government, in approving the ERM's, will consider whether the appropriate consultation in line with the Guidance has been carried out. (Appendix 1)

13. MANAGEMENT OF OFF-STREET PARKING PLACES

13.1 SHORT-STAY PARKING:
The Authority will give priority to and manage the provision of short stay parking where viable, as follows:

- Short stay visitors to the town centre are less likely to travel at peak periods i.e. contributing to reduced congestion, improved performance of the road network.
- Short stay parking generates a high turnover of spaces allowing more visitors to be accommodated per space.
- Availability of short stay spaces is essential to maintaining the commercial viability of the town and community centres.

13.2 LONG-STAY PARKING:

The Authority will manage the provision of long stay parking in the town centre through effective pricing to encourage the use of more sustainable transport. Also, by a system of differential charging to promote the use of peripheral car parks where such parking is to be accommodated:

- Commuters travel at peak periods and area a major contributor to congestion of the highway network.
- Commuter parking monopolises parking spaces for the entire working day.
- Transport objectives may be achieved more easily through parking policy interventions aimed at the commuter. It is more practical, for example, for the commuter to change their travel patterns than it is to continually expand the road network and parking stock.
- Long stay parking provision in connection with bus or rail commuter travel is supported in order to reduce the level of dependency on the motorcar as a means of commuting to work.
- Contract parking (parking permits) contracts will be made available on selected car parks for regular long stay customers, made available at competitive rates.
- Support the reallocation of long-stay parking either by redevelopment for other uses or reallocation to short or variable stay, where justified by provision of park and ride sites, or improvements in public transport accessibility (where applicable).

14. PARKING CHARGES

14.1 All off-street car parks where Pay and Display charging is in place will be clearly signed on a noticeboard within the car park and detailed on the Council's website. It is the motorist's responsibility when entering the parking place to adhere to the regulations in place. Failure to do so may result in a Penalty Charge Notice being issued.

14.2 Parking charges will be set as part of the council's annual review of the fees and charges policy.

15. PAYMENT METHODS

15.1 Flintshire County Council provides cash payment options using the pay and display machines with some machines also accepting card and contactless payments.

15.2 All car parks provide a cashless digital payment system as an alternative method of payment to the pay and display machines. The digital payment system improves the customer experience and compliments the existing method of payments offered.

15.3 In line with other local authorities, this cashless digital solution can be accessed anywhere anytime on any occasion. The current cashless solution offers 24-hour support service, 365 days, with a live agent availability for customer support.

15.4 Subject to availability of funding, the Council will look to explore the opportunities for introducing new ticket machines in the future with contactless functionality

16. PERMITS

16.1 Flintshire will offer, at a cost, a number of different permit options. These permits will be car park specific (non-transferable amongst other car parks or vehicles).

Details of the permits available per car park are detailed in **Appendix 2.**

16.2 Permits Types

a) Long Stay Car Parks – Permits in our Long Stay Car Parks can be purchased. They will be chargeable per year pro-rata per vehicle. The cost will be calculated at 200 days multiplied by the long-stay tariff. The permit is valid for one vehicle only and would not guarantee that a space will be available for use. Should the car park be full or the permit holder used a different car park, the conditions of that car park would have to be adhered and the appropriate fee paid.

   Only 20% of bays in each long stay car park will be available for the issuing of permits; permits will be issued on a first come, first served basis. All other requests will be held on a waiting list.

b) Permit Holder Car Parks - Annual Permits can be purchased for permit holder only car parks, this permit purchases a bay, and is only valid for that specific bay, it would not be acceptable to park in an alternative bay.

c) Business Permits - Within each area one long-stay town centre car park is assigned as a reduced rate business permit car park, offering parking for people working within the community. To apply for this permit evidence must be provided by the employer to support the application.

d) Residential Permits – Off-Street (Car Park) residential permits are offered to residents living within the immediate vicinity of the car park, who do not have adequate on street parking provision. One permit will be offered at a reduced rate. The cost of this permit will be the same as the cost of the on-street residential parking permit. All permit requests must provide proof of residency at the address and that of the vehicle, utility bill and logbook.

   Only 20% of bays in each long stay car park will be available for the issuing of permits; permits will be issued on a first come, first served basis. All other requests will be held on a waiting list.

17. CAR PARK PROVISION

Information is provided in **Appendix 3** for a detailed breakdown of parking provision by location.

18. MOTORCYCLE BAYS

Motorcycles are permitted to be parked within any regular space within a car park and where applicable a Pay and Display ticket must be purchased and retained by the rider. There are, however, some dedicated solo Motorcycle Bays available within the following car parks:

- New Street Car Park, Mold
- High Street Car Park, Holywell
- Black Horse Car Park, Buckley

19. ELECTRIC VEHICLE (EV) CHARGING

19.1 The installation of publicly accessible EV charge points is intended to encourage the uptake of electric vehicles. One key benefit of this is that it will enable existing, and future, EV users to contribute towards tackling the issues of climate change and air pollution.

19.2 There are currently fifteen charge points installed at eight Council car parks across Flintshire. All charge points are 'dual-headed', meaning that 30 sockets are available across the network. (Please see **Appendix 3** Car Park Provision). The aims are to increase these facilities over the coming years, subject to availability of funding. This may include the introduction of EV chargers for residential properties with no or limited off-street parking, subject to funding and feasibility.

20. COACH PARKING

There are currently five coach parking spaces at New Street car park in Mold, which are available on a first come first served basis. Coaches can use these spaces free of charge.

21. MOTORHOMES AND CARAVANS

There is no current provision for specific motorhome or caravan overnight parking within any of Flintshire's car parks.

22. MAINTENANCE

22.1 Flintshire County Council is responsible for maintaining all council-owned car parks. Although routine inspections capture most of the defects that occur, sometimes damage can occur in between inspections. Service users can notify the Council and report any issues so remedial work can be carried out.

22.2 In conjunction with this, any faults with pay and display machines are often identified by service users and can be logged via the Contact Centre on telephone number 01352 701234 or via the website:

https://www.flintshire.gov.uk/en/Do-it-Online/Report-It/Report-it.aspx

23. USE OF PARKING SPACES FOR EVENTS AND BUSINESSES

23.1 For requests to use of a car park for any other purpose than to park vehicles, the Council reserves the right to place a charge and reclaim its costs from the event organiser or business.

23.2 Flintshire County Council will provide two free uses of one long-stay car park to Town and Community Councils per annum to support community events taking place.

For business and commercial enquiries please contact:- streetsceneadmin@flintshire.gov.uk

23.3 The charging structure for utilising an area of the car park will be calculated as follows:

- Up to 50% of the car park – number of spaces used x long stay tariff x number of days

- Over 50% of the car park – total number of spaces in the car park x long stay tariff x number of days.

For both the above there would also be a £100+VAT administration fee which includes pre and post inspections of the car park.

Placement of a compound within a car park area will be charged from a minimum of £220+VAT per week, dependant on the size of area required.

23.4 To support an event Flintshire County Council requires sight of public liability insurance, risk assessments and any required licences drafted before supporting events to take place on its land.

23.5 It is required that the car park is left in a clean and tidy condition as any damage or cleansing of the car park after use will be recharged on to the organiser.

23.6 It is the responsibility of anyone utilising the car park to stand the costs of any signs, barriers, insurances, waste disposal etc. that are associated with the proposed event or works.

24. SALE OF GOODS AND SERVICES

24.1 The sale of goods and services from a car park is prohibited under the current Parking Orders; this also includes the sale of any motor vehicles. Any prior considerations and permissions must be granted in writing by Flintshire County Council.

25. AUTHORISED PERSONNEL

25.1 Only appointed Civil Parking Enforcement Officers wearing the issued uniform and identified by a unique CPEO number will issue PCNs to a vehicle that is contravening a parking restriction.

25.2 CPEOs will adhere to the observation times in the WPPP Procedures and shall not offer any discretion thereby treating every vehicle the same as the next to ensure they act in a fair and consistent manner.

Appendix 1 - Accessible and Supportive Information

Flintshire County Council
https://www.flintshire.gov.uk/en/Resident/Streetscene/Pay-and-Display-Car-Parking.aspx
https://www.flintshire.gov.uk/en/Resident/Streetscene/Parking---fines-and-enforcement.aspx
https://www.flintshire.gov.uk/en/Resident/Streetscene/Parking-permit.aspx
https://www.flintshire.gov.uk/en/PDFFiles/Roads-and-Travel/Policy-for-resident-parking-schemes.pdf

British Parking Association
https://www.britishparking.co.uk/

Wales Penalty Processing Partnership
https://www.wppp.org.uk/

Council Fees and Charges
https://www.flintshire.gov.uk/en/Resident/Fees-and-Charges/Fees-and-Charges.aspx

Active Travel
https://www.gov.wales/active-travel-act-guidance

Llwybr Newydd: Wales transport strategy
https://www.gov.wales/llwybr-newydd-wales-transport-strategy-2021

Highway Code – Parking Control Signs and Road Markings
https://www.gov.uk/guidance/the-highway-code/waiting-and-parking-238-to-252

Blue Badges
https://www.gov.wales/parking-blue-badges-road-offences

Appendix 2 - Permit Types & Applications

BUCKLEY	PERMIT TYPE	ADDITIONAL PERMIT TYPE
Bistre Avenue Car Park	Resident, Annual, Staff	
Precinct Way Car Park	Resident, Annual, Staff	Business Annual
Argoed Road Car Park	Resident, Annual, Staff	
CONNAH'S QUAY	**PERMIT TYPE**	**ADDITIONAL PERMIT TYPE**
Maude Street Car Park	Resident, Annual, Staff	
High Street Car Park	Resident, Annual, Staff	Business Annual
FLINT	**PERMIT TYPE**	**ADDITIONAL PERMIT TYPE**
Allt Goch Car Park	Resident, Annual, Staff	Business Annual
Bolingbroke Heights Car Park	Resident, Annual, Staff	
Pavilion Leisure Centre Car Park	Resident, Annual, Staff	
Railway Station Car Park	Resident, Annual Only	
Richard Heights Car Park	Resident, Annual, Staff	
Swan Street Car Park	Resident, Annual, Staff	
Chapel Street Car Park	Resident, Annual, Staff	
HOLYWELL	**PERMIT TYPE**	**ADDITIONAL PERMIT TYPE**
Bevans Yard Car Park	Resident, Annual, Staff	
Halkyn Road Car Park	Resident, Annual, Staff	Business Annual
Plas Yn Dre Car Park	Resident, Annual, Staff	
High Street Car Park	Resident, Annual, Staff	
MOLD	**PERMIT TYPE**	**ADDITIONAL PERMIT TYPE**
Griffiths Square Car Park	Resident, Annual, Staff	
Love Lane Car Park	Resident, Annual, Staff	Business Annual
New Street Car Park	Resident, Annual, Staff	
Town Hall Car Park	Annual	
QUEENSFERY	**PERMIT TYPE**	**ADDITIONAL PERMIT TYPE**
Pierce Street Car Park	Resident, Annual, Staff	
Station Road Car Park	Resident, Annual, Staff	Business Annual
SHOTTON	**PERMIT TYPE**	**ADDITIONAL PERMIT TYPE**
Plymouth Street Car Park	Resident, Annual, Staff	
Charmleys Way Car Park	Resident, Annual, Staff	
Ash Grove Car Park	Resident, Annual, Staff	Business Annual
Alexandra Street Car Park	Resident, Annual, Staff	

Appendix 3 - Car Park Provision and Spacing

BUCKLEY

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Bistre Avenue	44	7	0
Precinct Way	115	13	4
Black Horse	20	2	0
Argoed Road	17	0	0
Brunswick Road	44	7	0
Lane End	8	3	0
Coppa view	9	3	0

BROUGHTON

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Broughton Hall	24	4	0

CAERGWRLE

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
High Steet	42	2	0

CONNAH'S QUAY

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Maude Street	38	3	0
High Street Car Park	*		
Millenium Cycle Way	33	2	0
Dock Road	21	3	0
Dock Road Layby	21	3	0

**Currently under development*

DEESIDE INDUSTRIAL PARK

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Green Lane West, Car Park (large)	51	9	6
Green Lane West, Car Park (small)	26	0	0

FLINT

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Allt Goch	77	4	4
Bollingbroke Heights	39	2	0
Feather Street	14	4	0
Pavillion Leisure Centre	61	5	0
Railway Station	*		
Richard Heights	49	5	0
Swan Street	51	9	0
Castle Street	54	4	4

**Currently under development*

HAWARDEN

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Tinkersdale	46	5	0

HOLYWELL

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Bevans Yard	11	6	0
Plas yn Dre	13	2	4
High Street Car Park	137	9	0
Station Road	0	6	0
Halkyn Road	90	6	0

HOPE

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Hawarden Road	Loose Surface Unmarked Bays		

MOLD

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
New Street	336	21	4
Love Lane	243	6	0
Grosvenor Street	27	2	0

King Street	62	2	0
Griffith Square	102	6	4
Meadows Place	26	5	0

MOLD – COUNTY HALL

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Llwynegrin Hall	23	5	0
Multi Storey Car Park	483	4	0
Main Entrance Car Park	72	15	0

QUEENSFERRY

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Station Road	71	5	0
Pierce Street	13	2	4

SHOTTON

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Alexandra Street	26	3	0
Ash Grove	57	2	0
Charmleys Lane / King George Street	80	8	0
Plymouth Street	17	2	0
Bridge Street	18	3	0

TALACRE

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Gamfa Wen	Loose Surface Unmarked Bays	1 Block Approx 6 spaces	0
Community Centre	Loose Surface Unmarked Bays	4	0

TREUDDYN

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Queens Street	22	3	0

TY DEWI SANT

CAR PARK	REGULAR SPACES	DISABLED SPACES	EV CHARGE SPACES
Entrance Car Park	11	2	0

NB. Wepre Park to be included on the above list, subject to approval

Mae'r dudalen hon yn wag yn bwrpasol

Appendix 2 - SWOT ANALYSIS

Wepre Park – Car Parking Charges

STRENGTHS	WEAKNESSES
• Protects the park from recurring pressures in times of financial constraints in local government budgets. • . • Encouragement of sustainable travel to the park, which will help contribute to the assessment of local well-being for Flintshire in the following ways: - Carbon footprint reduction - Air quality improvement • Health and wellbeing benefits through cycling and walking to the park	• Potential impact of displacement of vehicles to On-Street parking on Wepre Drive and surrounding streets, which currently have no restrictions in place leading to complaints from local residents.
OPPORTUNITIES	THREATS
• Improved traffic management and control in the park • Opportunity to reduce on street parking safety issues through the introduction of a traffic regulation order, restricting parking in Wepre Drive and other residential areas in the vicinity of the park. • Traffic enforcement will provide a safe, organised and well-structured area for visitors to park. • Safeguarding the car park for visitors as charges will discourage users who may be using the park inappropriately resulting in increased space availability. • The use of solar power machines (chip, contactless and phone pay) to enhance and protect the environmentally friendly ethos within the park. • Opportunities to offer a parking season tickets for regular visitors for convenience when visiting the park. • Opportunity to have double ticketing machine for advertising and promotional campaigns. E.g. promoting other tourism locations or free coffee at the visitor centre. Advertising can also be placed on the reverse of the ticket – better option to reduce the number of tickets bought/issued	• Initial reaction of the public and visitors to the park. • Capital layout costs to the Authority for implementing the parking charges. • The impact on the existing enforcement team needs to be assessed. The current team are at capacity and usually work between 8am – 6pm, Monday – Friday with skeleton staff Sat-Sun. Additional enforcement provision will be needed to provide effective control, this is built in as part of the cost model. • Risk of not achieving the projected income targets introduced to the service. • Not implementing may lead to budget and resource pressures in the park.

Mae'r dudalen hon yn wag yn bwrpasol