Notice of a public meeting of

Climate Emergency Policy and Scrutiny Committee

To:	Councillors Vassie (Chair), Baker (Vice-Chair), S Barnes, Cullwick, D Myers, Perrett and Wann
Date:	Tuesday, 13 December 2022
Time:	5.30 pm
Venue:	The George Hudson Board Room - 1st Floor West Offices (F045)

AGENDA

1. **Declarations of Interest**
   At this point in the meeting, members are asked to declare any personal interests not included on the Register of Interests, any prejudicial interests or any disclosable pecuniary interests which they may have in respect of business on this agenda.

2. **Minutes** (Pages 1 - 6)
   To approve and sign the Minutes of the meeting held on 4 October 2022.

3. **Public Participation**
   At this point in the meeting members of the public who have registered to speak can do so. Members of the public may speak on agenda items or on matters within the remit of the committee.

   Please note that our registration deadlines are set as 2 working days before the meeting, in order to facilitate the management of public participation at our meetings. The deadline for registering at this meeting is **5:00pm on Friday, 9 December 2022.**

To register to speak please visit www.york.gov.uk/AttendCouncilMeetings to fill in an online registration form. If you have any questions about the registration form or the meeting, please contact Democratic Services. Contact details can be found at the foot of this agenda.

Webcasting of Public Meetings

Please note that, subject to available resources, this meeting will be webcast including any registered public speakers who have given their permission. The meeting can be viewed live and on demand at www.york.gov.uk/webcasts.

During coronavirus, we made some changes to how we ran council meetings, including facilitating remote participation by public speakers. See our updates (www.york.gov.uk/COVIDDemocracy) for more information on meetings and decisions.

4. York: Local Area Energy Plan (Pages 7 - 140)

This report provides Members with the details of the Local Area Energy Plan.

5. City of York Council: Annual Carbon Emissions Report 2021/22 and York Emissions Inventory Report 2022 (Pages 141 - 168)

The Committee will consider two reports covering the corporate carbon emissions for City of York Council (CYC) and the Emissions Inventory for the City of York.

6. Pollinator Strategy Update (Pages 169 - 180)

The Committee will receive an update on the progress of the City of York Pollinator Strategy 2020 – 2025.

7. Work Plan 2022/23 (Pages 181 - 182)

To consider the Draft Work Plan for 2022/23.

8. Urgent Business

Any other business which the Chair considers urgent under the Local Government Act 1972.

Democracy Officer:

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For more information about any of the following please contact the Democratic Services Officer responsible for servicing this meeting:

- Registering to speak
- Business of the meeting
- Any special arrangements
- Copies of reports and
- For receiving reports in other formats

Contact details are set out above.

This information can be provided in your own language.

我們也用您們的語言提供這個信息 **(Cantonese)**

এই তথ্য আপনার নিজের ভাষায় দেয়া যেতে পারে। **(Bengali)**

Ta informacja może być dostarczona w twoim własnym języku. **(Polish)**

Bu bilgiyi kendi dilinizde almanız mümkündür. **(Turkish)**

یہ معلومات آپ کی اپنی زبان (بولی) میں بھی مہیا کی جاسکتی ہیں۔ **(Urdu)**

☎ **(01904) 551550**

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City of York Council | Committee Minutes

Meeting	Climate Emergency Policy and Scrutiny Committee
Date	4 October 2022
Present	Councillors Vassie (Chair), Baker (Vice-Chair), D Myers, Cullwick, Wann, Perrett and Melly (Substitute) Officers Claire Foale - Assistant Director Policy and Strategy Shaun Gibbons - Head of Carbon Reduction
Apologies	Councillor Barnes

8. Declarations of Interest (17:34)

Members were asked to declare, at this point in the meeting, any personal interests, not included on the Register of Interests, or any prejudicial or disclosable pecuniary interests that they might have had in respect of business on the agenda. None were declared.

9. Minutes (17:35)

Resolved: That the Committees minutes for the meetings on the 8 March 2022 and 20 July 2022 be approved and signed as a accurate record by the Chair.

10. Public Participation (17:35)

It was reported that there were seven registrations to speak under the Council's Public Participation Scheme. However, one speaker was unable to attend the meeting.

Debby Cobbett asked that the Council seek to present a more positive picture and feeling about what can be achieved in the process of achieving net zero. She highlighted the positive responses from residents in the Councils Big Conversation to tackle climate change and asked that the Council show more ambition and widen its approach to achieving a happier fairer York.

Flick Williams raised concerns about the reduced timetables for bus services and the danger of the loss of routes all together. She questioned whether the Council considered bus travel as an essential service in the city, noting that single decker buses had replaced some double deckers on park and ride routes reducing capacity. She questioned whether the Council was neglecting bus travel in favour of active travel routes in the city.

Kate Ravilious stated that for the Council to have an effective Climate Change strategy then it should be supported by bottom-up local data instead of top down statistics. They noted their concern that the Council was not counting Scope 3 carbon emissions within its strategy and noted their concern that the draft action plan was too vague and lacks detail on how actions would be achieved and raised concerns about the political leadership for its delivery.

James Pitt raised concerns about the effects of air pollution in the city. He questioned whether the Council was treating the climate emergency like it might emergencies of a different nature and requested that the Council inject some urgency into its actions.

Adam Myers noted that he felt the current draft of the Climate Change Strategy lacked strategic vision. He noted that groups such as Extinction Rebellion and the school pupil climate strikes had raised the awareness of action being required to tackle the climate emergency and that the Council could do more than lobby central government and encouraged the Council to seek collaborative action with other local authorities and institutions.

Chris Brace raised concerns that the impact of the duelling of the outer ring road and its impact on York’s scope 3 emissions would not be addressed as part of the Climate Change Strategy. He noted the need for decisive political leadership as the time to start delivering on the action plan and the strategy was ‘yesterday’. He also raised concerns that the Council was working with organisations such as Bio Yorkshire who he stated partnered with the power station Drax a large carbon emitter in the UK.

11. Presentation from York Civic Trust: A Transport Vision for York (17:59)

The Committee were joined by Antony May of the York Civic Trust and Johan Kuylenstierna from the University of York and Stockholm Environment Institute, who gave a presentation on their observations to the draft Climate Change Strategy and Action Plan, with a particular focus on Transport in the city.

Members first discussed the impact from major projects and scope 3 emissions. Officers confirmed that the outer ring road planning application would have a carbon impact assessment, covering both embedded and operational emissions, and provided assurance to the Committee that the requirement for carbon impact assessments were increasing for all major projects. Members noted the importance of linking carbon reduction plans and transport planning in the city so that the expansion of the outer ring road could be used to effectively reduce emissions rather than increase them. Officers confirmed that planning of several key strategies had been done in collaboration with one another to achieve desirable outcomes and that the Local Transport Strategy was expected to go to consultation in the new year.

The shortfall between the projected emission reduction and the net zero pathway for York was discussed. It was confirmed that sequestration of carbon would be required to potentially address a shortfall once all mitigation measures had been exhausted. It was noted that the Council was securing funding, such as £6.5 million from DEFRA for projects such as storing flood water.

How the Council had collected data was discussed, it was noted that data had played a crucial role in developing the Councils draft Climate Change Strategy and Action Plan. However, it was noted that no data set is able to provide a complete picture of local emissions and tools used had given a broader scope of York’s current emissions breakdown. Officers confirmed they were working with groups such as the York Civic Trust and Stockholm Environment Institute to develop more bottom up data which they hoped would give an even clearer picture of York which could better inform specific interventions.

The Tyndall Centre for Climate Change research, which stated York would require a cut of emissions of 13% year on year to reach net zero, was raised. Members discussed whether setting a 13% a year target would be appropriate for the Climate Change Strategy and assist the Council in achieving a reduction for the City. Guests and officers recommended that while early emissions reductions are important, our pathway is not likely to be linear – with greater reductions coming later in the decade as technology, finance and capacity improve. It was agreed that monitoring progress against the pathway, rather than a 13% annual target was a more appropriate measure of success.

Resolved:

i. That the Committee ask the Executive and Council to undertake all necessary investigations leading to the adoption of the transport actions set out in the Climate Change Strategy Action Plan, that sets out clear targets for each sub group, eg: public transport, electric vehicles, active travel etc;
ii. That the Committee ask the Executive and Council to adopt an analytical approach to the implementation of the adopted Climate Change Strategy and Action Plan which demonstrates the amount of carbon reduction which will be achieved year by year;
iii. That the Committee ask the Executive and Council to develop a longer list of interventions to consider in relation to the implementation of the adopted Climate Change Strategy and Action Plan so that if any one strand of action becomes less feasible, other actions can be identified which can achieve the same pace of reduction, noting that successive administrations would take the necessary political decisions.

Reason: To support the Council to reach net zero by 2030.

12. Climate Change Strategy (19:42)

The Committee welcomed the results of the Council's Big Conversation and thanked everyone who responded. They noted that the consultation had reached across communities and age groups in the city and acknowledged the strong level of support for action in York to address Climate Change. Members discussed how the Council could continue to engage with residents and partners across the city and discussed the role of the York Climate Commission. The Committee considered whether to ask large emitters in York to provide annual update reports on their emissions and actions to address them against measurable indicators.

Members discussed the cost of interventions as the cost of living continued to rise. Officers noted that there was a huge challenge to reach net zero by 2030, however, there were interventions that would either generate or save money especially in energy usage as the cost of energy rose. Other interventions were expected to be cost neutral and those that would cost money were stretch targets that the Council would explore as part of its action plan for potential funding and support to deliver.

A vision for how York will look in 10 years was discussed as the Committee welcomed the points made by public speakers that the Council could do more in their minds to set out a positive vision for the City. The objective of the 10 Year Plan was discussed which sort to link a series of strategies to create a vision for the city. Members discussed how the Council could support the building of a positive vision of how York could look in the future while taking interventions to reduce emissions. It was proposed that the Council look to ask residents in consultations on climate change how they would like to see York.

The Executive Summary and Five Core Principles within the Climate Change Strategy were debated as Members discussed potential amendments. The Committee asked that reference to the strategy aiming to deliver fairness and social justice and additional explanation be given to how York has reduced its emissions since 2005.

The Committee discussed encouraging cross party support for the Climate Change Strategy noting that it would go before Council for a decision and recommended that Councillors be invited to sign the strategy should it be adopted.

Resolved:

i. That the Committee ask that the Executive to invite large organisations operating in the city to provide an annual update on their climate impact using measurable indicators;
ii. The Committee asked that in future consultations on Climate Change with residents that the Council ask respondents for how they would like to see York in the future;
iii. That the Executive be asked to consider amends to the Climate Change Strategy as outlined below:
    a) That the Executive Summary to be amended to remove ‘in York, we lead the way’ with ‘York is committed to address this’ (The Climate Emergency);
    b) That the Executive Summary provide greater detail on 39% emissions reduction from 2005 with a range of reasons for this;
    c) That the five core principles within the Climate Change Strategy note the importance to delivering a strategy that delivers fairness and social justice and that a focus be noted on working with local and regional partners.
iv. That the Committee ask that Executive request that all Councillors sign the Climate Change Strategy if it is approved by Council.

Reason: To support the Council to reach net zero by 2030.

13. Work Plan 2022/23 (21:00)

The Committee discussed its work plan for 2022-23.

Resolved:

i. Noted the Committee work plan.

Reason: To ensure the Committee has a program of work.

Councillor Vassie, Chair
[The meeting started at 5.34 pm and finished at 9.01 pm].

13 December 2022

Climate Emergency Policy and Scrutiny Committee

Report of the Head of Carbon Reduction

Portfolio of the Executive Member for Environment and Climate Change

York: Local Area Energy Plan

Summary

1. In March 2022, the Executive Member for Environment and Climate Change approved the allocation of £90,000 from the 2021/22 Carbon Reduction Budget and £20,000 from 2022/23 budget to carry out a Local Area Energy Plan for York.

2. A Local Area Energy Plan (LAEP) is regarded as a critical enabler to decarbonisation, given that spatial planning is one of the biggest opportunities local authorities have to deliver net zero.

3. Over the last 8 months, the council has been working with the Energy Systems Catapult (ESC) and the York & North Yorkshire Local Enterprise Partnership (LEP) to produce a LAEP for York alongside a wider regional North Yorkshire LAEP.

4. A LAEP is a holistic spatial approach to decarbonising an area's energy system that provides decision-makers with the detailed information needed to support informed policy and investment decisions.

5. The LAEP is a report, spatial plan and pipeline of investable projects to support the energy transition, at best value, for the council and the city. It provides an optimised, cost-effective, and evidence-based pathway to achieving our target.

6. To decarbonise the energy system in York, the LAEP identifies the requirement for:
   - 73,000 heat pump installations
   - 20,000 new connections to a district heat network

- 44,100 homes retrofitted with insulation, glazing and draughtproofing improvements
- 91,000 fully electric vehicles
- 24% of homes generating their own electricity with rooftop solar
- 920MW of large-scale renewable generation

7. The decarbonisation of York's energy system will require investment of around £3.8billion and save 1.2 million tonnes of CO_2 cumulatively to 2050, equivalent to more than eight return flights to New York for every household.

Recommendations

8. Scrutiny Committee is asked to:

    i. Review the York Local Area Energy Plan
    ii. Provide any recommendations for the LAEP to the Executive Member for Environment and Climate Change

Reason
To support the accelerated delivery of decarbonisation to achieve the council ambition for York to be net zero by 2030.

Background

9. City of York Council (CYC) announced a climate emergency in March 2019; subsequently setting an ambition for York to be carbon neutral by 2030.

10. Achieving net-zero by 2030 will be extremely challenging. It will require combining a whole system approach with local stakeholder knowledge to deliver a comprehensive, data-driven and cost-effective plan for decarbonisation. This approach is at the heart of a Local Area Energy Plan.

11. There is no one-size-fits-all approach to achieving Net Zero. Every local area has its own unique characteristics. LAEP considers buildings, transport systems, local industry, energy generation and distribution assets, geographic and spatial constraints, and social factors including fuel poverty to produce a tailored place-based plan for decarbonisation.

12. The LAEP for York was produced in alignment with 3 other LAEPs for North Yorkshire. This approach ensured efficiency savings and will lead

to an integrated approach to infrastructure investment and delivery, leading to a more effective use of available funds to realise York's net zero 2030 ambition.

13. Local Area Energy Planning is a 7-step process:

i) Identify and Engage Stakeholders – The LAEP process and its outputs will need to be owned and led by one organisation but formulating and taking strategies forward will require collaboration with key stakeholders.

ii) Set Area Vision, Objectives and Targets – Our net zero ambition for York sets the framework for activity towards 2030. Ambitious but achievable interim targets must also be set to drive short-to-medium term change and allow progress to be tracked.

iii) Create and Understand the Local Area Energy System – Informs what changes are required to make the necessary low carbon transition and providing a baseline from which the future local energy scenarios can be built from.

iv) Investigate Future Local Energy Scenarios – Creating cost effective and robust scenarios of future local energy system infrastructure to enable decisions to be made on energy network and system choice.

v) Produce a Local Area Energy Strategy – The output from the Local Area Energy Planning process. It consolidates the findings and outputs of the evidence base and represent the output of the collaborative and open dialogue from stakeholders to help plan the delivery of the energy networks and changes to homes and buildings needed to deliver a low carbon future.

vi) Lead and Implement – Implementation will need to be an iterative and collaborative process. A planning horizon over the next decade is likely to involve the need to consider several iterations of technological innovation and research-led development.

vii) Monitor and Review – Setting out the process to manage, monitor and review the strategy over time.

York Local Area Energy Plan

14. York's LAEP was produced through extensive desk-based research, data analysis, modelling and stakeholder engagement. It divides York into 'Zones' for analysis were identified based on areas served by primary substations, using data provided by the electrical network

(Northern Powergrid) that identifies buildings connected to secondary substations that are in turn connected to each primary substation.

15. The LAEP covers all major sources of emissions within York (over 90% of total emissions):

a. Buildings - 44,100 homes will require fabric upgrades so that 83% of all homes are insulated to their full potential. This can be achieved at an estimated cost of £185m and will reduce household energy bills and improve living conditions.

   Fabric upgrades can be ‘basic’ (draught proofing, loft and cavity wall insulation) or ‘deep’ (double or triple glazing, internal or external wall insulation, floor insulation and door upgrades). Basic upgrades are recommended across much of the housing stock built after 1914, whereas older homes are likely to require deep upgrades.

   Prioritising the delivery of building fabric upgrades in areas with high levels of fuel poverty will maximise the impact of bill savings and the health benefits of warmer homes, whilst also reducing the need for expensive upgrades to the electrical network.

b. Heating - 91% of homes in York have a gas boiler heating system. To achieve net zero, all of these will need to be replaced. Due to the timescale of our net zero ambition, it is recommended that heat-pumps are installed in 73,000 homes with a further 20,000 connecting to district heat networks.

   Gas heating systems in the majority of non-domestic buildings will also need to be replaced by a heat-pump or through being connected to a district heat network (with exceptions for when high temperatures are needed).

   High temperature industrial processes can be converted to hydrogen systems; however, these are not thought to be available until the mid-2030s.

c. Transport – The LAEP only considers decarbonisation of the energy system, the impact of reducing overall vehicle use will be considered in separate pieces of work.

   The Electrification of all remaining vehicles will be required to reach net zero. It’s estimated that this will be 113,000 electric cars and vans and charging provision will need to increase to service this number of EVs.

While 48% of households have off-street parking, suitable for home charging – which is thought to be the most cost-effective and convenient way of charging – prioritisation of additional public charging infrastructure will be crucial to ensure an equitable transition to low carbon transport.

d. Local Generation - Due to the necessary electrification of the heating and transport systems, York's annual demand for electricity is projected to increase from 773 GWh to 1,273 GWh. Ground mounted and rooftop solar, alongside onshore wind will be able to meet all of this demand; with the modelled potential for 1,240MW of generation capacity in York for £840m investment.

   If fully developed, 105 MW of domestic solar PV could be installed, contributing 91 GWh/year; available non-domestic roof space could host up to 215 MW of PV capacity if fully developed contributing 207 GWh/year of electricity; and around 3,900 hectares of land could be suitable for ground-mounted solar, which is enough space to host 950 MW of capacity; 800 hectares of suitable land was identified for wind turbines in areas of Hambleton and Ryedale, immediately adjoining the York area boundary, sufficient to build 28 MW of capacity.

e. Networks, Storage and Flexibility - A total investment of £20m in capacity upgrades is estimated across the high and low voltage networks to accommodate the changes in this pathway.

   The amount of headroom currently available on the high-voltage network varies significantly across York. Some zones have very little headroom available whereas other have sufficient capacity for small, near-term projects.

   The low voltage network has areas that are likely to see significantly more peak demand increase than others. Innovations in flexibility have the potential to delay and reduce the scale of electricity network reinforcement but network reinforcements will still be needed.

16. To accelerate delivery, the LAEP identifies a number of priority projects. Priority Projects are either:

- Low regret - common under various scenarios but may require further enabling action before they can be progressed
- Quick wins - which can be carried out in the near term without major blockers
- Focus zones - specific areas within the LAEP boundary that have a cluster of near-term components

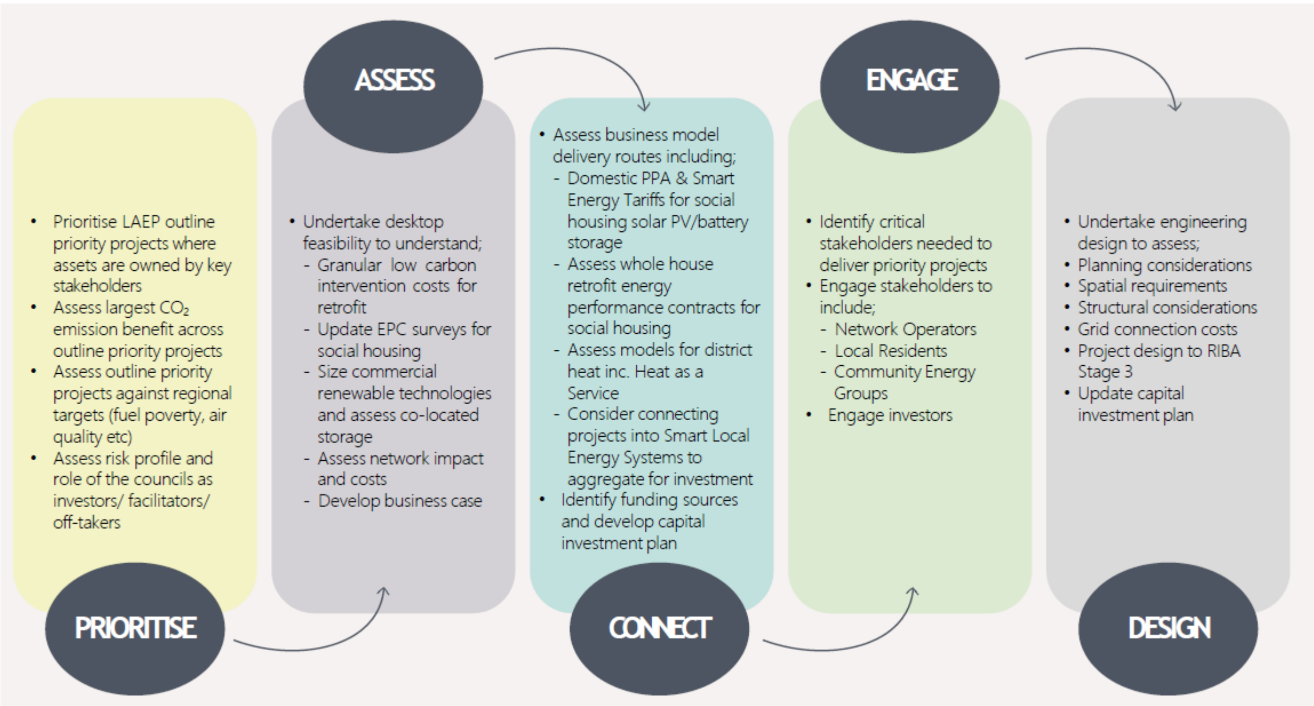
Local Area Energy Plan – York 2030 Annex

17. As York's LAEP was produced alongside the North Yorkshire LAEPs the document is set for net zero 2040. However, due to York's net zero 2030 ambition, additional information has been provided to show the acceleration of action needed to meet this timescale.

18. In most areas of work, the overall target remains the same. The differences are primarily expressed in terms of the delivery rates of various technologies and interventions. Changes/upgrades would need to happen at a significantly faster rate with network upgrades and availability of hydrogen posing significant risks to the 2030 ambition.

Next Steps

19. The LAEP report concludes stage 5 of the full LAEP process. The next stage is to lead and implement; with the report setting out a suggested process for this:



20. Should devolution for York & North Yorkshire take place, it will provide an opportunity to take forward projects identified in the LAEP.

21. Creation of a LAEP Delivery Group with leadership groups for different sectors could help coordinate actions, ensure a wholistic approach, provide a central contact point, support decision making and help with the identification and removal of barriers. This could be a role fulfilled by York Climate Commission.

22. Continued stakeholder outreach could be considered to ensure that local communities are engaged in the challenge of reaching Net Zero, feel that their voices have been heard and are supportive of the change required.

Implications

- **Financial** – Financial implications are noted within the content of the report. All projects will be subject to individual feasibility studies and business cases. None of the projects included have been accurately costed.

- **Human Resources (HR)** – There are no HR implications associated with the report.

- **Equalities** – Consideration needs to be made to the equalities impact of a transition to a decarbonised energy system. All projects would require individual Equalities Impact Assessments.

- **Legal** – There are no legal implications associated with the report.

- **Crime and Disorder** – There are no crime implications associated with this report

- **Information Technology** – There are no IT implications associated with this report

- **Property** – There are no property implications associated with this report

Contact Details

Author:	**Chief Officer Responsible for the report:**
Shaun Gibbons Head of Carbon Reduction Corporate Strategy shaun.gibbons@york.gov.uk	Claire Foale Assistant Director Policy and Strategy
	Report Approved ✓ **Date** 05/12/2022

Wards Affected: **All** ✓

For further information please contact the author of the report

Background papers

https://modgov.york.gov.uk/documents/s157446/EMDS%20Local%20Area%20Energy%20Plan%20March%202022.pdf

Annexes

Annex A: Local Area Energy Plan – Overarching Report

Annex B: Local Area Energy Plan – York Chapter

Annex C: Local Area Energy Plan – 2030 Ambition

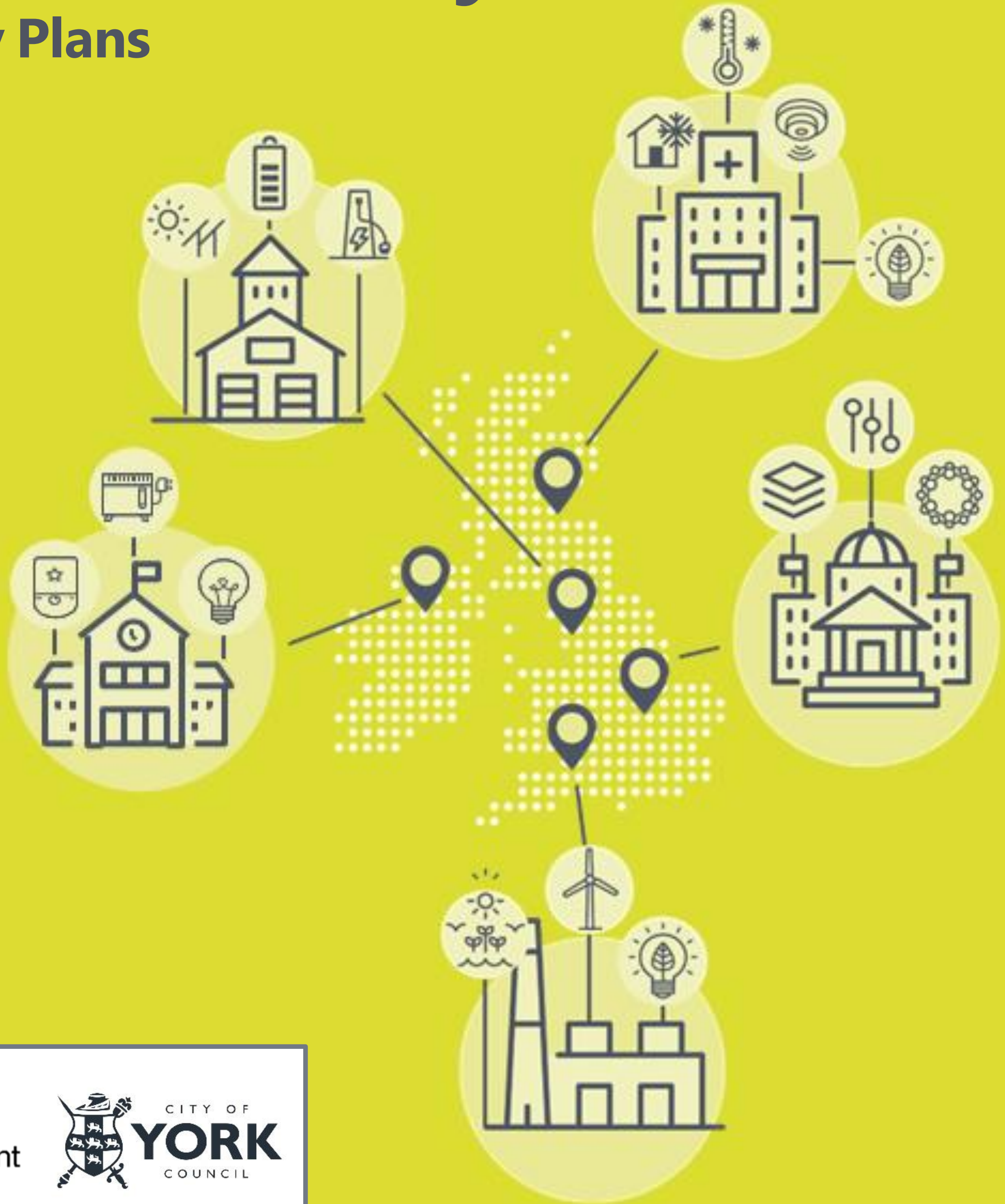
Annex D: Local Area Energy Plan – Modelling Approach

Annex A

North Yorkshire & City of York

Local Area Energy Plans

CATAPULT Energy Systems



York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP

HM Government

CITY OF YORK COUNCIL

LOCAL AREA ENERGY PLAN

Acknowledgements

These plans were prepared by Energy Systems Catapult, on behalf of the York & North Yorkshire Local Enterprise Partnership (Y&NY LEP) and City of York Council.

The North Yorkshire elements of this plan have been funded by the UK Government through the UK Community Renewal Fund. The UK Community Renewal Fund is a UK Government programme for 2021/22. This aims to support people and communities most in need across the UK to pilot programmes and new approaches to prepare for the UK Shared Prosperity Fund. It invests in skills, community and place, local business, and supporting people into employment. For more information, visit https://www.gov.uk/government/publications/uk-community-renewal-fund-prospectus.

The City of York elements have been funded directly by City of York Council.

Contributors

The development of the LAEPs has been supported with contributions to the Steering Group by the local authorities, national park authorities, and gas and electricity network operators in the region (see logos). The Steering Group have been instrumental in shaping the LAEPs, supporting data gathering, examining model assumptions and providing local economic and political context, and proofing he draft documents.

Further support was provided by a Technical Advisory panel, made up of local and regional energy experts, and a Peer Challenge Group, made up of people with expertise in adjacent disciplines such as fuel poverty, social inclusion, skills and economic development and biodiversity.

Contents

Executive Summary

Context & Current State

*In 2019, the UK government amended the Climate Change Act (2008), that previously legislated for a reduction in greenhouse gas emissions of 80% by 2050 compared to 1990 levels, to be net zero. The change is significant - no longer can anything be considered 'too difficult' to tackle – every source of emissions must be accounted for and addressed.**

Reaching net zero will be a monumental task requiring significant, far-reaching action across the entire country at every level. The national government will be required to set policy and provide targeted funding to support the transition, and individual householders and businesses will need to make decisions about their heating systems, modes of transport, and behaviours. However, local areas will arguably be the keystone in this transition. Local and regional authorities and other stakeholders will be required to plan their area's transition to net zero accounting for the infrastructure and economic challenges and opportunities that are borne of it.

To meet this need and further the decarbonisation of local areas, Energy Systems Catapult (ESC) pioneered the local area energy planning (LAEP) approach to deliver a comprehensive, data-driven and cost-effective plan for decarbonisation of the energy system. Importantly, the approach requires working closely with stakeholders to build upon progress being made and incorporate existing plans.

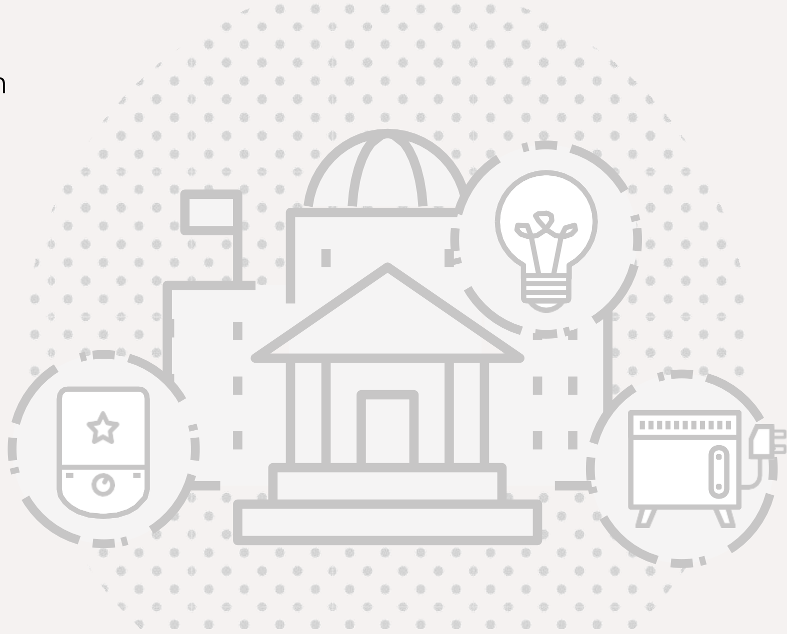
To ensure a strategic and coordinated approach to decarbonisation across the region, Y&NY LEP have led the development of York & North Yorkshire's Routemap to Carbon Negative, which is underpinned by the Carbon Abatement Pathways study. When completed, these gave Y&NY, and their local stakeholders, an understanding of the high-level measures that were required, the policies that needed to be established and adopted by which they could reach net zero by 2034, and carbon negative to 2040. Some of the detail included in these are the number of homes that require energy efficiency upgrades, the heating systems that need to be replaced and an indicative amount of renewable energy generation required.

When combined with the local area energy plans (LAEPs) in this report, Y&NY should have a good understanding of 'why' action needs to take place, 'what' needs to be done, and 'when' and 'where' this needs to happen. By including stakeholders in the process of developing these plans and future work on the feasibility of projects, the 'who' and 'how' will become clearer over time.

Decarbonisation of the energy system requires transformation and targeted investment. However, much of the investment to reach net zero is envisaged to come from households when they replace their current systems e.g. switching from a fossil gas boiler to a heat pump, or traditional internal combustion engine vehicle to an electric vehicle (EV). Beyond this, private finance and local/central government will be important to realise the overall goal.

Although local goals and targets for decarbonisation have been adopted by local governments, following a consultation on local government reorganisation, it was proposed that the current county, district and borough councils would be replaced by a new single unitary council for North Yorkshire alongside the City of York unitary council in April 2023. Existing North Yorkshire local authorities have already been working together to make progress towards decarbonisation, and the merger into a single authority cannot stall this progress.

Devolution is also being sought for York & North Yorkshire, creating a new combined authority to cover the two unitary council areas. This will bring more opportunities for local decision making, including on major investments and priority decarbonisation projects.



* https://es.catapult.org.uk/guide/guidance-on-creating-a-local-area-energy-plan/

Scenarios & Pathways

Scenarios

To carry out the modelling and analysis required to produce a LAEP, the York and North Yorkshire region was split into 44 geographical areas or 'zones' based on their connection to the electricity network (these do not follow any typical political or geographical boundaries).

Following discussions with key stakeholders, zoning was agreed, and three future scenarios were identified for consideration:

- A high ambition scenario with a 2030 net zero target for the energy system.
- A medium ambition scenario with a 2040 net zero target for the energy system.
- A low ambition scenario with a 2050 net zero target for the energy system, in line with the UK as a whole.

All of the scenarios were created to be complimentary to the Carbon Abatement Pathways from previous work. Aiming for a net zero energy system by 2050 (a 'low' ambition scenario) would result in the 2034 net zero target being missed regardless of the speed of decarbonisation in other areas not considered by the LAEP.

Further to this, a "do nothing" scenario was modelled where no decarbonisation actions take place, providing a counterfactual for cost and carbon impacts of the scenarios to be calculated.

This plan centres on the medium ambition scenario, aiming to reach a net zero energy system by 2040, but draws comparisons to the other scenarios throughout. Eliminating carbon emissions in a local area requires the replacement of heating systems in most private homes and businesses, and for every petrol and diesel vehicle to be taken off the road, supported by large investments in infrastructure and the development of large land areas for renewable generation. The investment, skilled trades, supply chain capacity and co-ordination across a wide range of actors required to reach this goal even by 2040 will require a step change across society from today's status quo. The ambition aligns with the Routemap to Carbon Negative and, once the dacarbonisation of elements outside of the LAEP's energy system boundaries are taken into account, will still result in a target regional net zero date of 2034 The pathways to net zero bring an abundance of opportunities to stimulate the local economy and create local employment.

Pathways

Pathways have been developed for each of the LAEP areas and identify the key projects and decision points on the route to a net zero energy system. Some key short-term aspects of these pathways are*:

- Begin roll-out of building fabric measures and heat pumps to rural, off-gas grid dwellings.
- Begin to replace gas boilers with heat pumps in dwellings outside of urban areas.
- Begin roll-out basic building energy efficiency upgrades for dwellings, starting with a focus on social housing and fuel poor areas, with a view to scale up to owner-occupied homes.
- Develop a scheme to widely deploy rooftop PV.
- Provisions to enable and encourage the installation of electric vehicle chargers at homes, public spaces, workplaces and commercial destinations.
- Provide suitable land to be developed for large scale renewable generation projects.
- Decide the scale of the proposed district hea network.

As part of the pathway to net zero, some near-term projects have been identified for further feasibility study or 'low regret' deployment.

* Note: Not all of these are applicable to all areas, these are simply a snapshot of some of the steps of the various pathways.

Buildings

Across the York & North Yorkshire region, there are approximately 386,000 dwellings. To reach a net zero energy system, around 216,000 of them will require energy efficiency upgrades to reduce the amount of energy being used to heat them. This is in addition to commercial and industrial buildings. The 216,000 dwellings requiring energy efficiency upgrades are split across the region with 71,000 dwellings in 'Harrogate & The Dales', 61,000 in the A1 Corridor, 44,000 in City of York, and 40,000 in 'The Vale, Moors & Coast'.

The level of energy efficiency upgrade is not consistent across the LAEP areas with older dwellings with solid walls requiring 'deep' upgrades e.g. solid wall insulation, triple glazing, door upgrades etc. More modern dwellings typically require only 'basic' upgrades e.g. loft insulation, cavity wall insulation, draughtproofing etc.

Flats pose a different challenge to houses in that they often aren't able to install loft insulation, wall insulation, floor insulation as a single dwelling within a block. Therefore, these have been excluded from receiving energy efficiency upgrades as part of this report. Yet, options are available where flats can be considered as blocks and loft insulation added to top-floor dwellings, floor insulation added to ground-floor dwellings, and wall insulation added to the building as a whole. Similarly, heating systems can be considered on a block-level rather than individual to increase the cost-effectiveness and reduce the space requirement for equipment in each flat.

Energy efficiency upgrades were found to be 'low regret' almost universally under all scenarios modelled. There is also no upper limit to the amount of energy efficiency upgrades that should take place – they simply become less cost-effective in some circumstances – yet, they always have benefits to the energy system as a whole by reducing the peak demand, as well as reducing energy bills for the occupants and often improving comfort and health outcomes.

All newly built dwellings are expected to be designed and constructed to a standard where they are not going to require insulation upgrades before the chosen net zero target. There is also an opportunity to bring forward the use of low carbon heating systems for new builds from the current 2025 date, to avoid more expensive retrofitting at a later date.

In total, domestic building fabric upgrades are expected to be a large proportion of the cost of achieving a net zero energy system in York & North Yorkshire. For 'The Vale, Moors & Coast' the cost will be approximately £110m (an average of around £2,760 per dwelling upgraded, although the cost for a specific dwelling will vary significantly depending on its individual requirements). However, this is the lowest of the LAEP areas with City of York, A1 Corridor, and 'Harrogate & The Dales' expected to cost around £185m (£4,200/dwelling), £235m (£3,850/dwelling), and £450m (£6,500/dwelling) respectively.

In total, almost £1bn is required to upgrade the energy efficiency of the housing stock across York & North Yorkshire.

Heating

The decarbonisation of heat is one of the greatest challenges in the transition to net zero. Low carbon heating technologies have improved significantly over recent years with regards to their market penetration, consumer awareness, and cost. Compared to the more 'traditional', higher emission forms of heating, they are still very much on the periphery. This outlook is required to change significantly in order for York & North Yorkshire to achieve a net zero energy system.

Currently, the predominant heating system in each LAEP area is fossil gas boilers. In the City of York, this accounts for over 90% of all heating systems currently installed in dwellings. Across the 'The Vale, Moors & Coast' and 'Harrogate & The Dales' areas, the proportion is lower, yet still very high, at 77% and 76% respectively. The A1 Corridor has the lowest proportion of fossil gas boilers at 55% of dwellings.

Oil boilers are the second most common heating system currently across York & North Yorkshire, with as many as 15% of dwellings getting their heating from this technology in 'Harrogate & The Dales'.

To decarbonise these dwellings, air source heat pumps (ASHPs) are the most likely technology to be installed. ASHPs use the heat from the ambient air to evaporate a refrigerant which is then compressed, increasing its temperature. This heat is then extracted for use in the dwelling, making the refrigerant condense ready to go around the cycle again.

This process makes ASHPs, and ground source heat pumps (GSHPs, which work in the same way but use heat from the ground rather than the air), incredibly efficient, getting 3-4 times the amount of heat out than the electricity put in.

The deployment of heat pumps will be substantial – with around 355,000 needing to be deployed across York & North Yorkshire by 2040. The largest proportion of the installations will take place in the 'Harrogate & The Dales' LAEP area, with 124,000 being required. A further 92,000, 77,000 and 62,000 will be needed in the A1 Corridor, 'The Vale, Moors & Coast', and City of York LAEP areas respectively.

Although lower in population, the rural off-gas areas are 'low regrets' i.e. those that will need to transition to heat pumps regardless of developments in other low carbon heating technologies.

District heat networks (DHNs) are systems of highly-insulated pipes carrying hot/warm fluid. This can then heat hundreds or thousands of buildings in an area in a cost-effective way. DHNs can also be low or zero carbon depending on the way in which the heat is generated e.g. large heat pumps or waste heat from industry. For a DHN to be cost-effective, there needs to be a high number of buildings requiring heat in a small area i.e. a 'high heat density'.

Therefore, DHNs are expected to be deployed in dense urban areas such as York and Scarborough. DHNs in York and Scarborough could heat 20,000 and 11,000 dwellings respectively, in addition to many non-domestic buildings in the vicinity. Smaller DHNs have been considered for more densely packed parts of 'Harrogate & The Dales' and A1 Corridor, for example, in Northallerton.

For non-domestic buildings much of the space heating can be decarbonised using heat pumps, however there is a sizeable proportion of high-temperature and/or process heat required where heat pumps are not going to be suitable. Before the mid-2030s and potentially longer term, this is an issue as hydrogen will not be available at scale, meaning that this part of the economy will continue to rely on fossil gas and produce carbon emissions. If decarbonisation is required before hydrogen is available at scale, on-site generation of hydrogen via electrolysis could be considered although it is likely to be at a higher cost than fossil gas.

After the mid-2030s, hydrogen is expected to become a viable option to decarbonise the remaining non-domestic buildings. Assuming that hydrogen infrastructure is sufficiently developed beyond the mid 2030s, it may also be worth considering extending the hydrogen offering to nearby dwellings.

Transport

Sales of plug-in cars and vans in the UK are growing rapidly, with 1 million plug-in cars on the road in 2022. The number of chargepoints is also growing quickly; at the end of September 2022, there were 34,860 charging points across the UK which is a 36% increase compared to September 2021.

Even though sales of electric cars and vans are growing, to meet the Sixth Carbon Budget commitment, ending the sale of Internal Combustion Engine (ICE) vehicles in 2030 to ultimately meet the net zero emission target by 2050, bold and aggressive rollouts of vehicles and infrastructure are needed. This will need to be even more aggressive locally to meet earlier net zero targets.

Transport for the North scenarios* anticipate all 514,000 cars and vans in Y&NY will be 100% electric by 2050. To achieve net zero earlier than 2050, the transition to 100% electric vehicles would need to be brought forward to be in line with the net zero energy system date significantly increasing the difficulty of meeting the target.

Once fully electric, these vehicles will consume approximately 840 GWh of electricity per year across the whole region.

Delivering a chargepoint network that is visible, accessible, connected, secure and interoperable will be vital in giving users confidence in transitioning to electric mobility. Furthermore, public charging infrastructure will need to be built ahead of the mass market transition as it will create the right conditions to enable it. The EV Energy Taskforce made a series of recommendations on how to enable the roll out charging infrastructure ahead of need; from options for financial support including blended public and private capital and utilisation-linked loans, to anticipatory distribution network investment, underpinned by local area energy plans and support for local authorities in the form of tools and resources.

The charging infrastructure mix is expected to be diverse to be able to meet user needs. It is still expected that where available at home, off-street charging will cover the majority of charging needs. The mechanisms for deploying off-street charging for rental and council owned properties will need to be explored to encourage at home charging.

For users without access to off-street parking a range of solutions might be available. On-street slow chargepoints, slow chargepoints at secure car parks and local rapid hubs are all options that are being explored and deployed across the country. Suitability of each type of near home charging is dependant on a range of factors. Local resident preferences are a critical factor; from private users to fleet or van drivers, their charging needs, and therefore the charging infrastructure they will need vary. Land and network connection cost and parking availability are among factors that could make one area more appealing than the other. This highlights the need for local area assessments that consider local resident needs, network constraints and transport demands.

Other public chargepoint locations such as shopping centres and supermarkets will also support users and will complement home and near home charging. Finally, a network of rapid charging at motorways and major A roads will also be needed to support longer journeys and fleet vehicles.
In all cases the exact number and type of chargepoints will be influenced by user behaviour and preferences. Changes in how users travel will affect the charging infrastructure needed. Moreover, shifting to a mobility as a service model would require a different set of chargepoints to be rollout. Finally, the length of time vehicles are parked at a chargepoint will also affect the number of chargepoints needed.

* https://transportforthenorth.com/future-travel-scenarios/

Local Generation

To decarbonise heat and transport across York & North Yorkshire, a significant number of heat pumps need to be deployed and electric vehicles purchased. Both of these technologies will require large amounts of zero carbon electricity to ensure that they are not producing emissions. However, the scale of deployment and therefore the demand for electricity in the region is expected to occur ahead of the decarbonisation of the national grid in 2035. This means that zero carbon electricity will need to be generated locally in order to meet the demand.

The electricity demand is likely to have increased by between 21% in the 'The Vale, Moors & Coast' region and 68% in the City of York by 2040 when compared to current levels.

In the LAEPs for each area, rooftop and ground-mounted solar have been considered to demonstrate the scale of local renewable capacity which would decarbonise the York & North Yorkshire region ahead of the country as a whole. A high-level assessment was also conducted to give an indication of the maximum contribution of onshore wind to the future energy system.

Domestic rooftop solar could provide a large contribution. It is estimated that around 320 MW of rooftop solar capacity would be cost-optimal (subject to full feasibility and site visits) in the City of York with a further 163 MW in 'Harrogate & The Dales', 159 MW in the 'The Vale, Moors & Coast, and 123 MW in the 'A1 Corridor'. Collectively therefore, there is the potential for around 765 MW of domestic rooftop solar PV capacity across the region. Deploying all of this capacity would cost upwards of £600m. At the time of writing (Autumn 2022) however, the cost of domestic solar PV is being driven by the increased cost of importing panels, their scarcity as people look to reduce their reliance on 'grid bought' electricity, and increased installation costs due to the high demand. There are also obvious social benefits to installing domestic solar PV, especially for residents in fuel poverty who would immediately see a reduction in their electricity bills. By adding in-home battery storage, more of the generated electricity could be consumed by the household, reducing the reliance on the network during peak times and reducing the amount of electricity purchased. The economic case for batteries can be marginal in the 2022 energy market, but is likely to change with the emergence of novel incentives such as time-of-use tariffs, falling battery costs, and additional increases in electricity prices.

Large-scale solar farms are also considered to be a cost-effective way of generating significant amounts of zero carbon electricity. Indeed, due to their scale, they are often the most cost effective. Within York & North Yorkshire, there are many land parcels which – using our high-level method of identification – seem to be worthy of further investigation.

If the land areas identified are deemed to be suitable, 512 MW (10% of maximum potential) of ground-mounted solar could be deployed in 'The Vale, Moors & Coast', 890 MW (88% of maximum potential) within the City of York boundary, 547 MW (5% of maximum potential) in 'Harrogate & The Dales', and 609 MW in the A1 Corridor could be deployed. Together with 346 MW of onshore wind deployment in 'The Vale, Moors & Coast', 666 MW in 'Harrogate & The Dales' and 318 MW in the A1 Corridor, and the rooftop solar deployment, York & North Yorkshire could generate as much electricity as it requires on a net annual basis.

There are concerns though about what this amount of generation would do to the electrical network, since the power would be predominantly generated in mid-summer when heat pumps are not required for heating and therefore demand is low. Currently, seasonal storage for this quantity of electrical power is not deployable.

Networks

Electricity Network & Flexibility

To meet the new demand from electric heating and transport, there will be a need to upgrade the electrical network, since total peak electricity demand could increase to as much as 2.5x current levels. The high and low voltage networks may have sufficient capacity to accommodate most or all of the electrification in this plan in some areas, but many areas are likely to see a need for capacity upgrades.

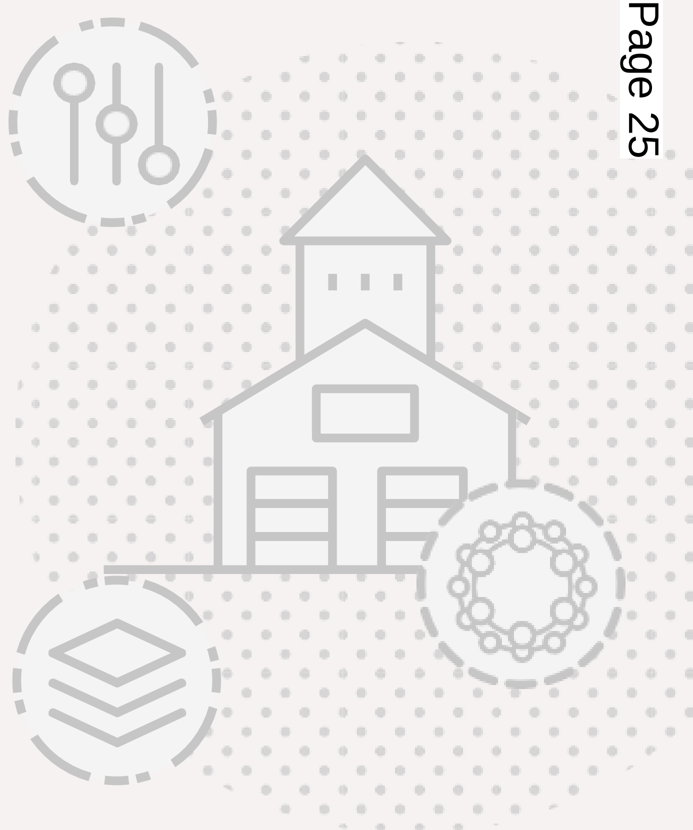
In these LAEPs, network costs are estimated based on meeting increased demand with capacity upgrades, however it may be possible for flexibility services to reduce the investment required in conventional capacity upgrades.

Smart appliances which can shift the times they use electricity without any loss in performance (particularly EV chargers and heat pumps) can provide this flexibility.

Gas Network & Hydrogen

Although much of the current fossil gas demand for heating is expected to become electrified across the whole York & North Yorkshire region, the gas network still has an important part to play in the future energy system. As highlighted earlier, there are some areas of the non-domestic sector that will be hard to electrify and therefore will remain on fossil gas in the short-to-medium term before considering a transition to hydrogen in the mid-2030s. This provides an opportunity for nearby properties to also connect to a hydrogen network if they are yet to transition to an electrified heating technology.

However, many of the proposals for hydrogen will depend on the Government's policy position which they are expected to lay out in 2026.



Introduction

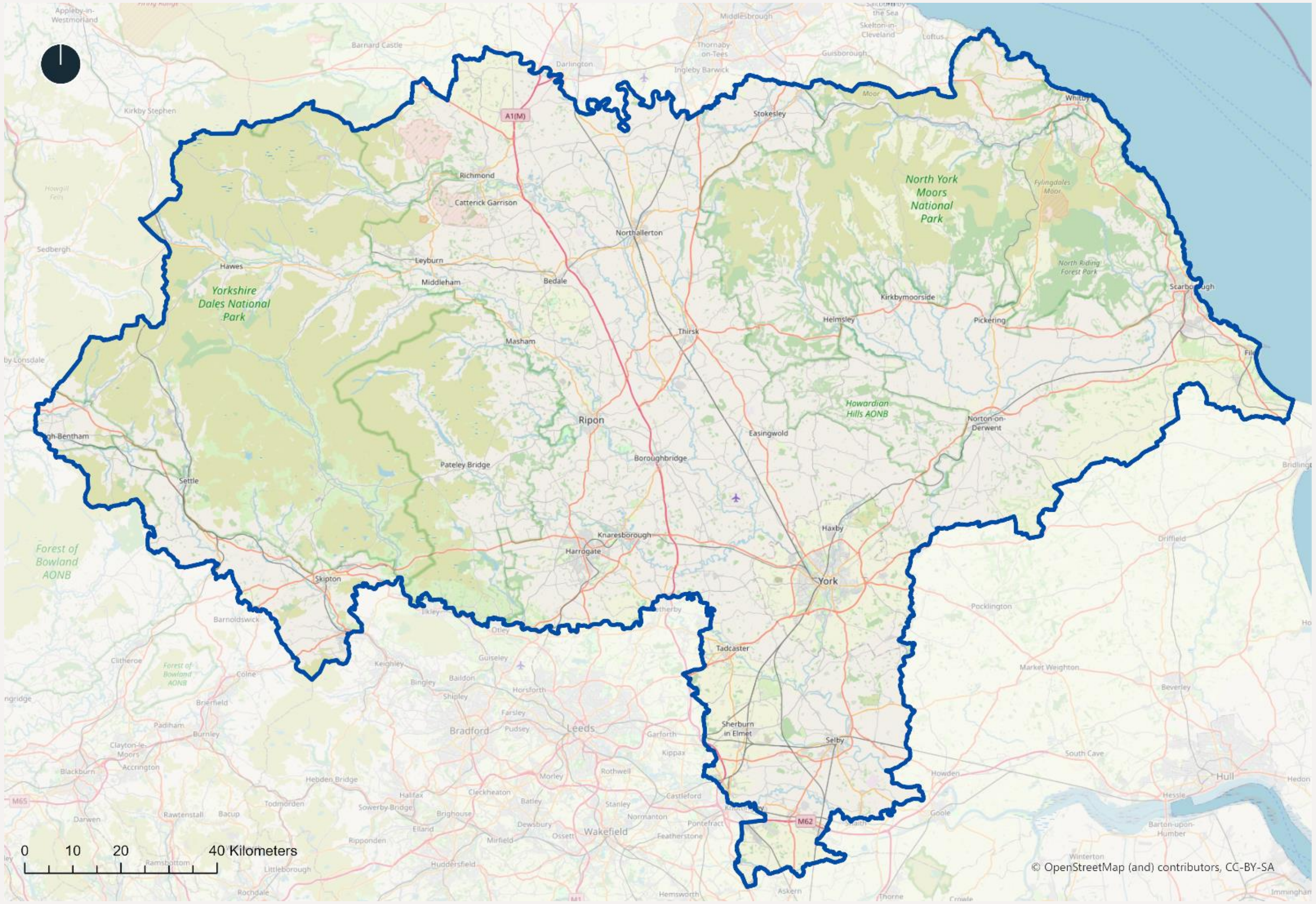
Introduction

Four Local Area Energy Plans (LAEP) have been produced for North Yorkshire and the City of York Council. The purpose of the LAEPs are to support the Y&NY region in meeting its net zero and carbon negative goals, enabling transition to an affordable and decarbonised energy system as well as supporting wider socio-economic goals.

The Y&NY LEP has set an ambitious target of achieving net zero by 2034 across the whole region, and to be England's first 'net negative' region by 2040. These ambitious targets put the Y&NY region well ahead of the national plan to achieve net zero by 2050.

North Yorkshire covers a large and predominantly rural area with two National Parks as well as densely urban areas such as the City of York. It covers a total of 8,325km^2, and is home to over 800,000 people. The geographic area covered by the LAEPs is shown in the figure (right).

Previous work focussed on the region has helped the Y&NY LEP, City of York Council, and other stakeholders understand the scale of the challenge to reach net zero. Undertaking LAEP builds on the existing strategies and action plans within the region and takes these to a spatial level to identify what changes needed to be made and where.



A further benefit of local area energy planning is the 'whole systems approach' which allows a future energy system to be considered which is most cost-effective as a whole, e.g. 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 future plans, a LAEP is built on a common evidence base. The outputs can then be used reliably by stakeholders from council planners to network operators to community groups, knowing they are working towards a common goal built on strong foundations.

What is a LAEP?

A LAEP sets out the change required to transition an area's energy system to net zero in a given timeframe. This is achieved by exploring potential pathways that consider a range of technologies and scenarios, and when combined with stakeholder engagement leads to the identification of the most cost-effective preferred pathway and sequenced plan of proposed actions to achieving an area's net zero goal.

The scope of the LAEP covers the current energy consumption and associated greenhouse gas emissions, as well as the projected consumption in a defined area to 2050, primarily focussing on the area's built-environment (all categories of domestic, non-domestic, commercial, and industrial buildings) and some aspects of energy used for transportation.

A LAEP provides a level of detail comparable to an urban masterplan. It provides a proposed future plan for an area rather than providing a detailed schematic that sets out how each part of the area would be designed and built. More detailed work would be required to deliver specific elements of a LAEP[1].

Definition of LAEP[2]:

- LAEP is a data driven and whole energy system, evidence-based approach that is led by local government developed collaboratively with defined stakeholders. It 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.
- LAEP results in a fully costed and spatial plan that identifies the change needed to the local energy system and built environment, detailing 'what, where and when and by whom'.
- LAEP provides the level of detail for an area that is equivalent to an outline design or master plan; additional detailed design work is required for identified projects to progress to implementation.
- LAEP defines a long-term vision for an area but should be updated approximately every 3–5 years (or when significant technological, policy or local changes occur) to ensure the long-term vision remains relevant.
- LAEP identifies near-term actions and projects, providing stakeholders with a basis for taking forward activity and prioritising investments and action.
- LAEP scope addresses electricity, heat, and gas networks, future potential for hydrogen, the built environment (industrial, domestic, and commercial) its fabric and systems, flexibility, energy generation and storage, and providing energy to decarbonised transport e.g., electricity to electric vehicles and charging infrastructure.

[1] As an example, a LAEP identifies 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 / design company, along with assessment of commercial viability and delivery mechanisms.

[2] https://es.catapult.org.uk/report/the-future-of-local-area-energy-planning-in-the-uk/ and https://es.catapult.org.uk/guide/guidance-on-creating-a-local-area-energy-plan/

[3] A number of emissions sources are not included in the scope of a LAEP, but are included in the Routemap to Carbon Negative, including: land use and agriculture, negative emissions, industrial emissions not related to building fabric and heating; transport demand reduction, modal shift and public transport; and circular economy activities

Note: Some technologies such as batteries, storage, wave and hydro, and offshore wind have not been included in the LAEP modelling. It is likely that these technologies will play an important part of the future energy mix of both the local area and the UK as a whole.

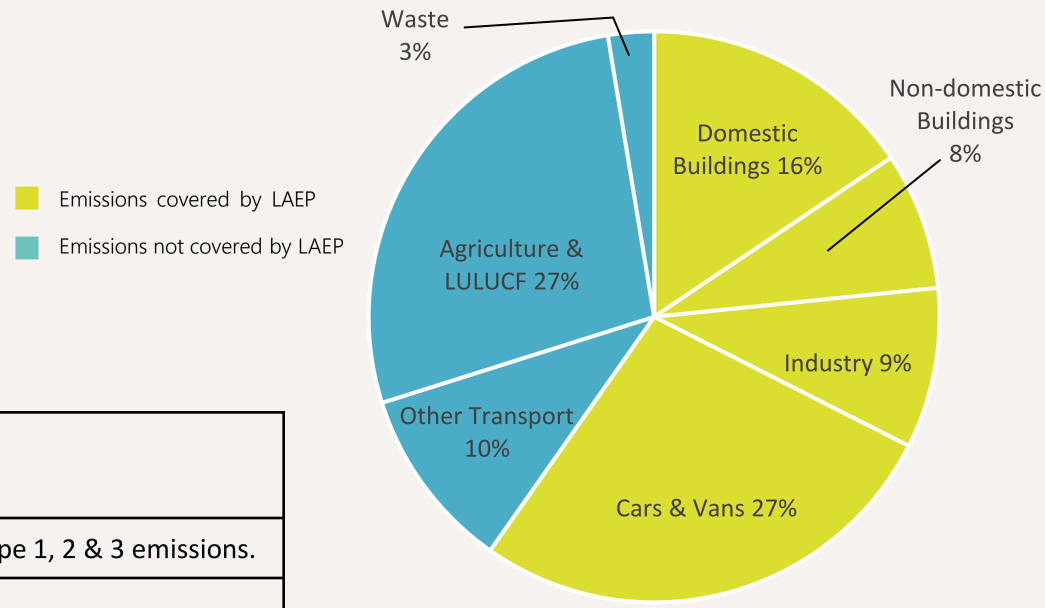
Emissions and Net Zero Targets

In 2020, the Y&NY region's emissions totalled 7.7 $MtCO_2e$[1]. The chart (right) shows Y&NY region's emissions broken down according to their sources, such as buildings and transport. To be a net zero region by 2034, all of these emissions must be eliminated, not just those covered by this LAEP.

The Y&NY region currently comprises several local authorities and other regional bodies that each have their own targets relating to net zero as outlined in the table below. After April 2023, these local authorities will merge as part of local government reorganisation and emissions targets will need to be agreed by the proposed North Yorkshire Council.

Local Authority	Climate Emergency Declared	Targets
Craven District Council	Yes	Carbon neutral by 2030 including scope 1, 2 & 3 emissions.
Hambleton District Council	No	Carbon neutral by 2030.
Harrogate Borough Council	No	Aligned to the West Yorkshire Combined Authority target of net zero by 2038.
Richmondshire District Council	Yes	Net zero carbon Council by 2030, whole district by 2034.
Ryedale District Council	Yes	Net zero carbon emissions by 2050.
Scarborough Borough Council	Yes	Carbon neutral by 2030.
Selby District Council	No	Carbon neutral before 2050, with aspirations of achieving this by 2030.
City of York Council	Yes	Net zero carbon emissions by 2030.
North Yorkshire County Council	Yes	Net zero Council by 2030.
York & North Yorkshire LEP	No	Net zero region by 2034 and net negative by 2040.
Yorkshire Dales National Park Authority	Yes	95% reduction by 2030 (2005 baseline)

Approximate proportion of Y&NY's 2020 CO_2 emissions covered by this LAEP



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The delivery of these plans will require all stakeholders in the areas to work towards the collective goal of net zero. The local authorities and other regional bodies are likely to be best placed to convene experts including the network operators, community groups, investors, and delivery partners under a governance structure to take forward the recommendations in these LAEPs through to delivery.

The graph on the next page shows all emissions (i.e., everything in the chart above) as pathways out towards net zero.

[1] CO_2e represents an amount of a greenhouse gas emissions whose atmospheric impact has been standardized to that of one unit mass of carbon dioxide (CO_2), based on the global warming potential (GWP) of the gas. Mt is millions of tonnes.

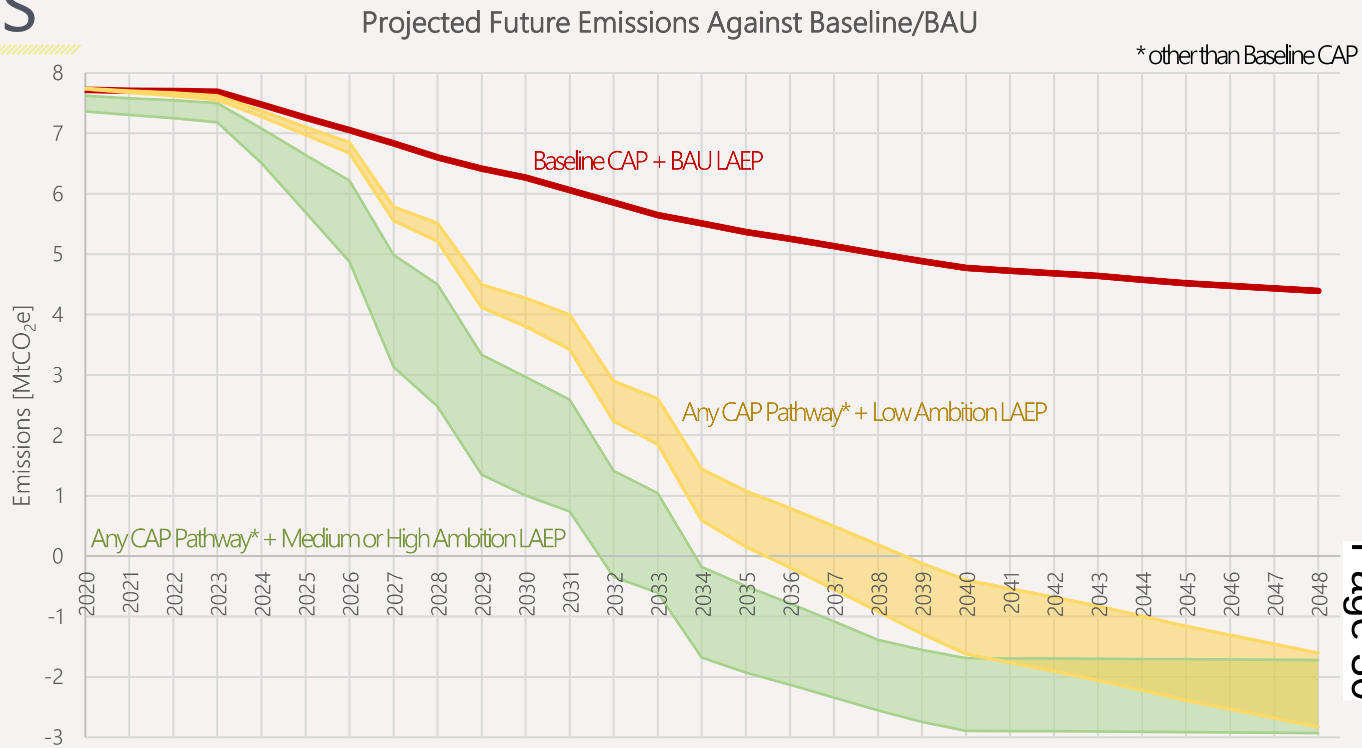
Emissions Pathways

In creating local area energy plans for North Yorkshire and City of York, a number of future scenarios and emissions trajectories have been considered in combination with the Carbon Abatement Pathways (CAP). North Yorkshire and City of York therefore have multiple pathways to follow to reach their goal of net zero by 2034 and to become the first net negative region in England by 2040. The CAP are named 'Max Ambition', 'High H2' 'Balanced', and 'Baseline'; ESC has used 'High', 'Medium' and 'Low' ambition.

The 'Low' ambition scenario progresses slower than the region's ambitions, aiming to achieve a net zero energy system by 2050 – aligned with the national net zero target of 2050. The 'Medium' ambition pathway aims to achieve a net zero energy system by 2040, and 'High' ambition aims to achieve a net zero energy system by 2030.

When these pathways are combined, only the 'Baseline' CAP and the 'Low' ambition LAEP scenarios fail to meet net zero in time to meet the 2034 net zero target. The 'Low' ambition scenarios do however still reach net negative before 2040.

It should be noted that the CAP includes negative emissions from carbon capture and storage at the Drax power station to offset emissions elsewhere. Since ESC considers the Drax power station to be a 'national asset' rather than a local one, the power generated and its associated emissions are considered to be accounted for at a national level. This therefore produces an inconsistency as any negative emissions, in ESC's opinion, would also be accounted for at a national level.



In the graph, above, the green area represents the combinations of CAP and LAEP pathways that would reach net zero by 2034 – in line with the Y&NY target. The yellow area represents areas that reach 'net negative' by 2040, but miss the 2034 net zero target. These are compared against a red line which represents the status quo in both the CAP and LAEP pathways.

https://www.ynylep.com/Portals/0/adam/Stories/VqQDBytZGUuDihbMTz2ZZQ/Body/North-West-Yorkshire-Emissions-Reduction-Pathways.pdf

The figures in the Routemap to Carbon Negative fall within the green area of the graph above. This is due to the figures in the majority being from the Max Ambition CAP scenario with some elements of the other pathways.

The LAEPs will therefore focus on a 'Medium' ambition scenario unless otherwise stated, as this, plus a 'Balanced' pathway from the CAP will produce a net zero Y&NY region in 2034.

Each scenario has associated early actions and long-term scale-up activities to reach the target in a cost-effective way, along with key enabling actions and decision points to stay on track and navigate future uncertainty.

In the near-term, the LAEPs illustrate the proposed activities for the region to progress towards net zero by identifying 'easy wins', 'focus zones' and specific 'outline priority projects' which could be taken forward into a feasibility stage.

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Creating North Yorkshire & City of York LAEPs

The Y&NY region was broken into four sub-regions to align with the criteria of the Community Renewal Fund (CRF).

These sub-regions are:

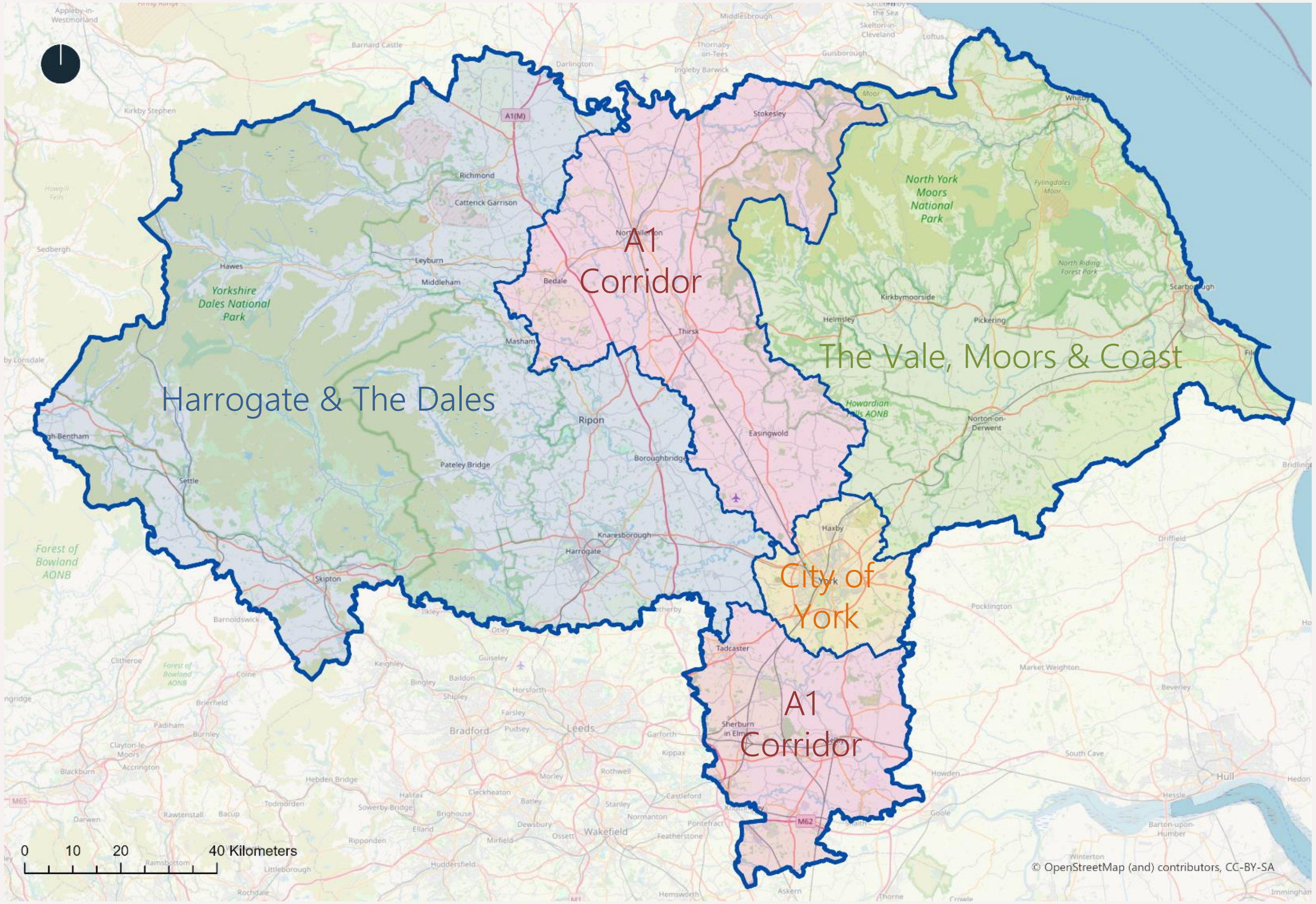
- A1 Corridor (pink)
- The Vale, Moors & Coast (green)
- Harrogate & The Dales (blue)
- City of York (yellow)

These were then sub-divided into several 'zones' to allow for a better understanding and assessment of options for decarbonisation.

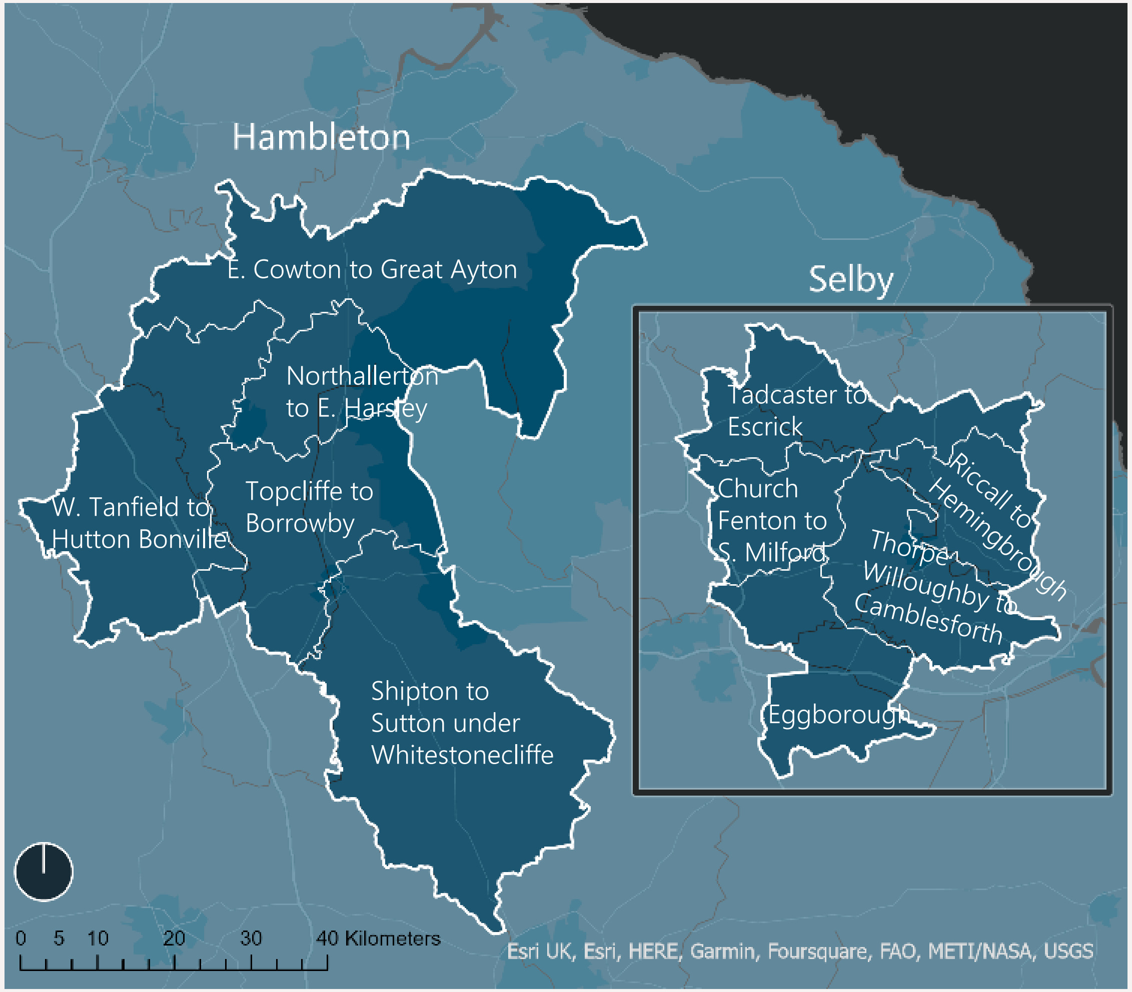
Zones for analysis were identified based on areas served by primary substations, using data provided by the electrical network (Northern Powergrid) that identifies buildings connected to secondary substations that are in-turn connected to each primary substation.

The zones therefore do not follow other standard geographical boundaries such as LSOAs, MSOAs, constituencies, or electoral wards.

The following four sections of this report provide further detail on the LAEPs for each of the sub-regions.

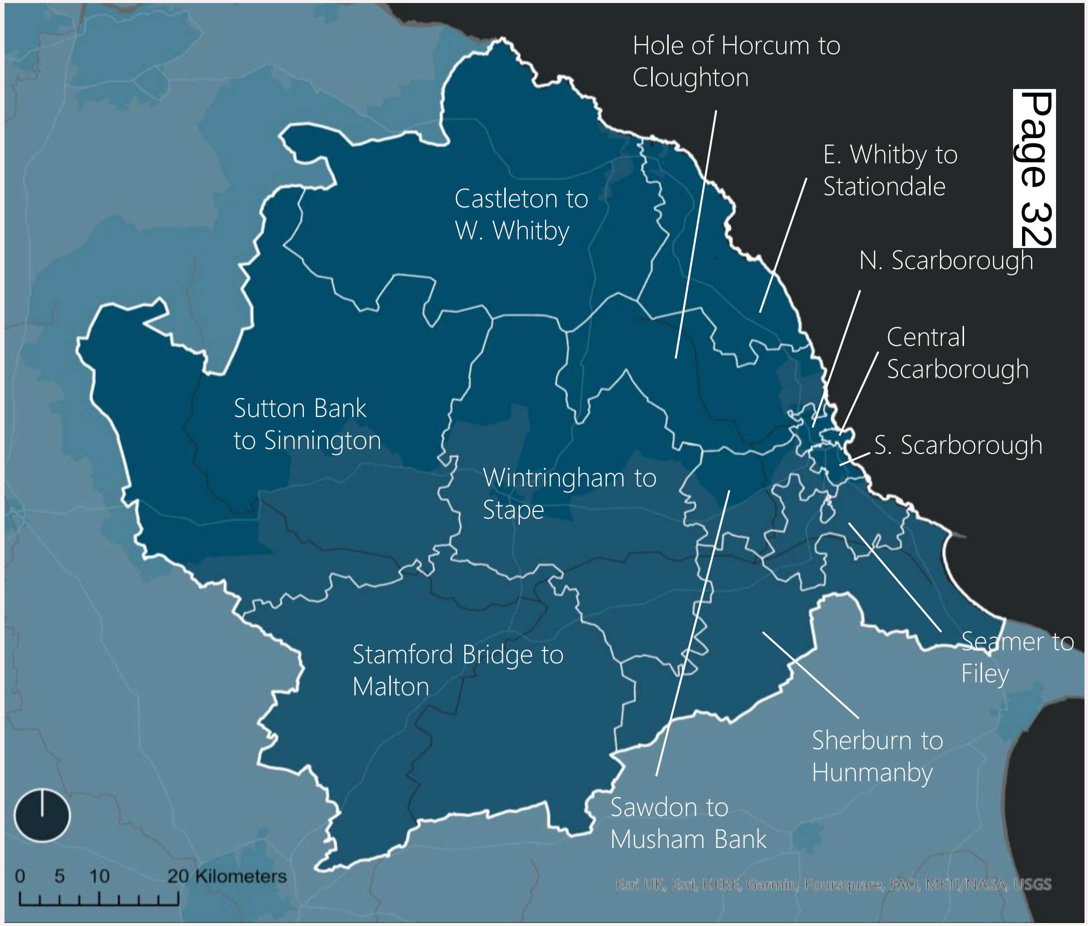


Zones – A1 Corridor and The Vale, Moors & Coast



Zones of the A1 Corridor (above)

Zones of the The Vale, Moors & Coast (below)



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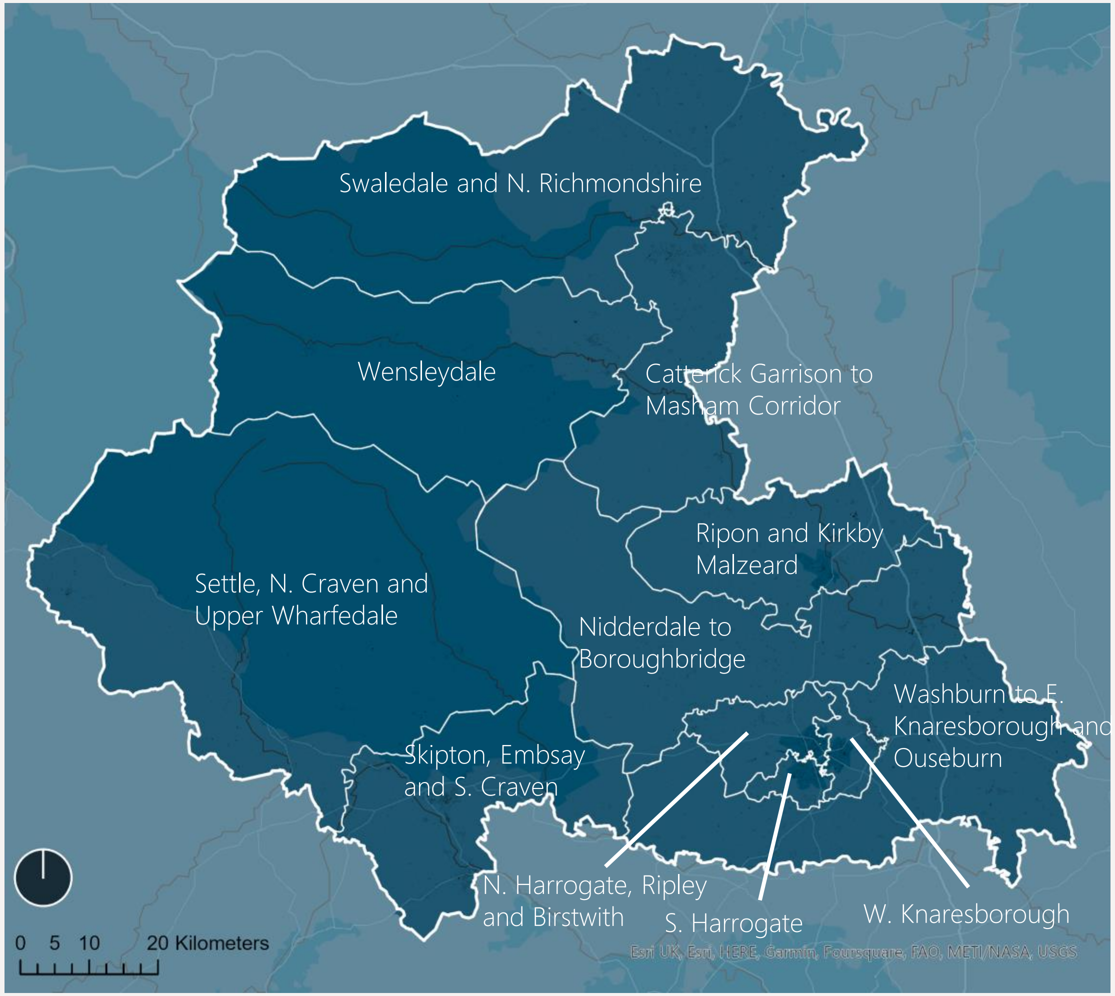
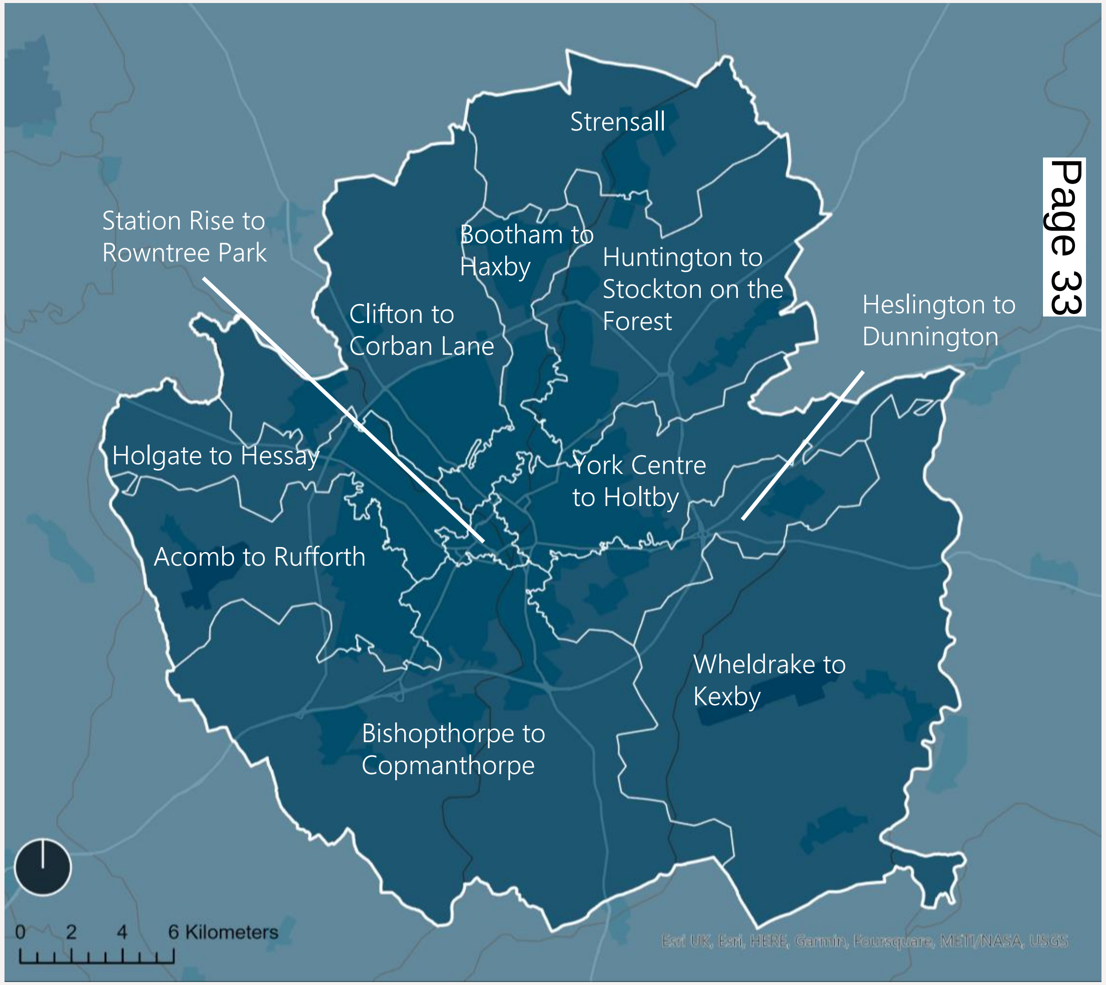
Zones – Harrogate & The Dales and City of York



Zones of the Harrogate & The Dales (above)
"The Dales" refers to the current council areas of Richmondshire and Craven.

Zones of the City of York (below)



A1 Corridor
Local Area Energy Plan

CATAPULT Energy Systems

York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP

HM Government

LOCAL AREA ENERGY PLAN

The Vale, Moors & Coast

Local Area Energy Plan

CATAPULT Energy Systems

York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP

HM Government

LOCAL AREA ENERGY PLAN

Harrogate & The Dales

Local Area Energy Plan

CATAPULT Energy Systems

York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP

HM Government

LOCAL AREA ENERGY PLAN

City of York
Local Area Energy Plan

CATAPULT
Energy Systems

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CITY OF YORK COUNCIL

LOCAL AREA ENERGY PLAN

Implementation

Overview of Implementation

Recognising the scale of the transition needed to support Y&NY region's net zero ambitions, the LAEPs are broken down into:

- Near-term components made up of "Quick Wins" which can be carried out in the near-term without major blockers, and "Low Regrets" projects which are common under various scenarios but may require further enabling action before they can be progressed
- Long-term components made up of "Enabling Actions" which need to be carried out ahead of time to pave the way for later solutions, and "Decision Points" where the most appropriate solution is chosen at some point in the future once more information is known. These decision points may be needed before widespread scale-up and deployment of solutions.

Some of these are summarised opposite, which along with other components feed into The Pathway. The Pathway is followed by a series of Next Steps which highlight the aspects the Y&NY region should consider to progress the LAEPs; working with the Key Stakeholders to determine roles in supporting the implementation of these LAEPs.

QUICK WINS	LOW REGRETS	ENABLING ACTIONS	DECISION POINTS
Energy efficiency upgrades in social housing.	EV charger roll-out for those with off-street parking.	Investigate financial models to encourage solar uptake.	Scale of the district heat network (where applicable).
Install solar PV on council buildings and land.	Energy efficiency upgrades and heat pumps in rural off-gas grid areas.	Work with experts to plan the DHNs and establish a business case.	Off-street EV charging at hubs, kerbside charging, or other.
Roll-out public charging infrastructure.	Ground-mounted PV deployment on land of low arable quality.	Develop ownership and finance models for low carbon generation.	Extension of hydrogen into dwellings near to industrial uses.
Replacement of council fleet vehicles with EVs.	Energy efficiency upgrades for private rental dwellings.	Information and engagement campaign around heat pumps.	Local and political appetite for large solar and onshore wind.

Next Steps

Taking LAEP Forward

The local area energy plans (LAEPs) for the Y&NY region have highlighted initial ‘low regret’ outline priority projects for consideration. In order to take these projects forward and assess the role the local authorities in the proposed combined authority and the LEP wish to play in the future low carbon energy system, ESC has developed an initial approach illustrated on the next page, followed by specific actions.

Prioritise

The first stage recommends stakeholders work to prioritise the projects identified within the LAEPs and commission desktop feasibility studies to assess their viability in meeting the regional aims and objectives. Prioritisation of the LAEP projects should be influenced by areas currently within direct control, for example social housing or land assets and public buildings owned by the councils. Resources are available at Net Zero Go[1] to assist with this.

Projects should then be assessed in line with regional targets to assess impact on fuel poverty, air quality, local economic growth plans, etc.

Prioritisation should also include understanding the role each tier of local and regional government wishes to play as decarbonisation projects are further developed.

For example, they could work with partner organisations to assess their risk profiles, and desired roles in any future energy system before matching outcomes against different types of local energy business models. Prioritised projects should subsequently undergo desktop feasibility studies to assess their viability and to understand the low carbon interventions and renewable technologies required in further detail. This could include sizing commercial renewable technologies, assessing co-located storage options, consideration of network connection requirements and an initial outline business case.

Assess

In the next phase of energy project development, various options can be assessed with the aim of exploring investible delivery mechanisms. Dependent on project type, a partner organisation with experience of innovative business modelling can assess how technologies can be connected and delivered to residents in a way that matches the risk profile of each stakeholder and the role they wish to play. This could include assessing different types of Smart Energy Tariffs that incorporate costs for retrofit for social housing, exploring ways for councils to invest into infrastructure projects while ensuring commercial revenues are secured or assessing business models where the councils are off-takers or customers.

Connect

Further consideration should be given to how technologies and projects can be connected together through Smart Local Energy Systems (SLES), which can aggregate to unlock private investment and create numerous co-benefits. Once a firm Capital Investment Plan has been formed and initial sources of investment and funding have been identified, the design phase needs to firm up assumptions made during desktop feasibility.

This involves working with partner organisations with engineering expertise to assess spatial, planning and structural considerations. Connection costs should be fully understood and a finalised capital investment plan produced.

Engage

Engagement is another key part of taking outline priority projects identified in the LAEPs forward. Key stakeholders need to be identified and consideration should be given to how residents are consulted and bought into the potential benefits of decarbonising homes and estates. A partner organisation with strong digital engagement experience and relationships with network operators can support this process.

[1] https://www.netzerogo.org.uk

Unlocking Investment

PRIORITISE

- Prioritise LAEP outline priority projects where assets are owned by key stakeholders
- Assess largest CO_2 emission benefit across outline priority projects
- Assess outline priority projects against regional targets (fuel poverty, air quality etc)
- Assess risk profile and role of the councils as investors/ facilitators/ off-takers

ASSESS

- Undertake desktop feasibility to understand;
  - Granular low carbon intervention costs for retrofit
  - Update EPC surveys for social housing
  - Size commercial renewable technologies and assess co-located storage
  - Assess network impact and costs
  - Develop business case

CONNECT

- Assess business model delivery routes including;
  - Domestic PPA & Smart Energy Tariffs for social housing solar PV/battery storage
  - Assess whole house retrofit energy performance contracts for social housing
  - Assess models for district heat inc. Heat as a Service
  - Consider connecting projects into Smart Local Energy Systems to aggregate for investment
- Identify funding sources and develop capital investment plan

ENGAGE

- Identify critical stakeholders needed to deliver priority projects
- Engage stakeholders to include;
  - Network Operators
  - Local Residents
  - Community Energy Groups
- Engage investors

DESIGN

- Undertake engineering design to assess;
- Planning considerations
- Spatial requirements
- Structural considerations
- Grid connection costs
- Project design to RIBA Stage 3
- Update capital investment plan

Energy Systems Catapult is well placed to help York & North Yorkshire LEP, City of York Council, and other stakeholders to move from LAEP towards design and delivery.

Taking LAEP Forward

Devolution for York & North Yorkshire alongside the creation of the new North Yorkshire Council provides an excellent opportunity to take forward projects identified in these LAEPs. The propsed combined authority could provide a coordinated, centralised approach which learns from previous work in the area and leverages the knowledge, data and skills this has created whilst enabling economies of scale and efficient working.

Creation of a LAEP Delivery Group with leadership groups for different sectors can:

- Help to coordinate actions across the York & North Yorkshire region to drive change.
- Ensure that different aspects of the energy transition are considered together to ensure appropriate action is taken. For example, ensuring that if electricity network reinforcement is required for EV charging, consideration is given to any future requirement to support electrification of heat to avoid two phases of works.
- Provide a central contact point for stakeholders such as gas and electricity network operators and other delivery partners helping them to understand priorities, opportunities and constraints across the area and to work effectively in supporting and delivering the proposed combined authority's vision.
- Enable larger scale procurement to reduce costs.
- Help with identification of skills gaps and provision of local training to fill them.
- Provide opportunities to identify approved and trusted suppliers to support private investment that builds upon public investments.
- Provide a central resource to support local residents when making decisions about their homes and travel options.
- Ensure that a consistent approach is taken to tracking progress and updating plans.

As part of this work, creation of a Citizens Panel could be considered to ensure that local communities are engaged in the challenge of reaching Net Zero, feel that their voices have been heard and are supportive of the change required.

Domestic Buildings

The proposed creation of the York & North Yorkshire combined authority provides an opportunity to build on existing local schemes such as Warm & Well in North Yorkshire, which are already delivering help to vulnerable people by addressing cold, damp homes, and fuel poverty. Opportunities exist to build on existing partnerships and to take learning from these schemes in areas such as working with local residents, identifying appropriate interventions, and building local supply chains to scale delivery of decarbonisation of homes to whole local areas.

Areas where existing local projects and knowledge could be leveraged include:

- Accessing funding through the Local Authority Delivery Scheme, Social Housing Decarbonisation Fund, National Energy Action, ECO and the National Grid Warm Homes Fund.
- Using other funding streams such as Boiler Upgrade Scheme.
- Widening the target clients and areas for activities such as York Energy Advice to cover a wider pool of residents and the whole of York & North Yorkshire.
- Using existing resident contacts from energy efficiency, oil buying and collective switching schemes to target communication around retrofit and low carbon heat schemes. Residents who have been involved in these types of schemes are likely to be more engaged with energy issues and may be more receptive to approaches regarding retrofit and low carbon heating opportunities.
- Comparing across all the different schemes that have been run in local areas to identify best practice and opportunities to share data, methods and approaches to applying for funding.
- Use of social housing asset registers and registers of private landlords (such as HMO registers and landlord forums) to understand these market sectors and identify retrofit options.
- Learning from previous schemes such as 'Hitting Hard' run by Scarborough Borough Council and Richmondshire District Council to build similar schemes across the whole of York & North Yorkshire.

In addition, consideration should be given to:

- Designing schemes for social housing so that a package can be offered to owner-occupied in the same area, with the potential to reduce costs for both housing providers and owner-occupiers whilst also increasing coverage.
- Considering where existing and new schemes can be aligned with the wider energy strategy and targeted towards heat pump and retrofit priority zones
- Applying lessons learnt on supply chains and accessing grant funding from existing schemes to help fuel poor and social housing tenants to scale up to include private rented and owner occupied homes.
- Improving understanding of local delivery capacity and identifying skills gaps and associated training needs.
- Considering learning from funding initiatives such as the Energy Repayment, Home Appreciation and Empty Property Loans set up under Hambleton's Private Sector Housing Assistance Policy Funding to help develop future options for similar combined authority schemes.
- A survey of existing MCS registered local suppliers to understand the scale of delivery possible with the existing supply chain.
- Working closely with local network operators to ensure timely delivery of the introduction of low carbon heating systems. For example, experience from BEIS' Electrification of Heat programme is that geographically clustered DNO approvals for heat pumps are easier for DNOs to manage and are processed more quickly than dispersed applications.

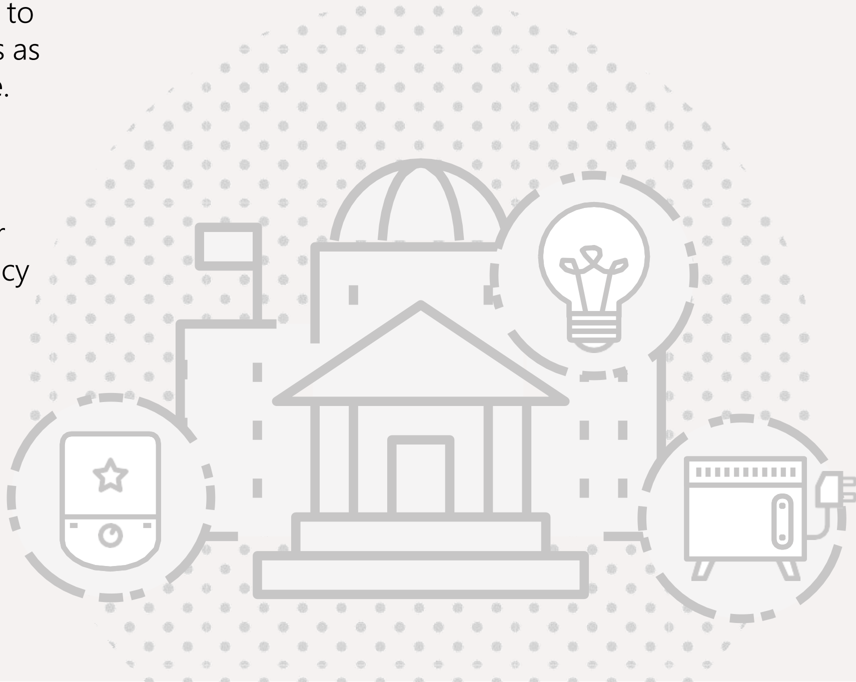
Non-Domestic Buildings

A similar approach to that adopted for domestic buildings can be applied to commercial and public building energy efficiency and decarbonisation, with learning and scaling up from existing projects and programmes to achieve scale. For example:

- Using experience from previous applications to the Public Sector Decarbonisation Scheme (PSDS) to identify approaches that have worked well to improve future applications.
- Developing site decarbonisation strategies in preparation for future PSDS funding rounds.
- Using learning from public sector building energy efficiency and decarbonisation programmes to develop other programmes to support local businesses in their own energy efficiency and decarbonisation.
- Using links with local businesses through the Federation of Small Businesses and West and North Yorkshire Chamber of Commerce to engage them with support programmes to help them decarbonise.
- Considering how local business might be supported to access funding through schemes such as the Renewable Heat Incentive.

In addition, the proposed combined authority should consider a programme to gather better data on commercial and industrial buildings including:

- Construction types
- Current energy use
- Surveying small industry sites to understand the current technologies on all sites and applicability of low carbon options alongside identification of where is hydrogen is likely to be required to generate high temperatures as alternative approaches are not appropriate.
- Exploiting Northern Gas Network's* and National Atmospheric Emissions Inventory data on large gas users, to target particular sites for discussions around energy efficiency and decarbonisation.



* Note that there may be data sharing and commercial considerations which restrict how much of this information can be made available such that a partnership arrangement might be the best approach

Transport and Local Generation

Transport

In order to help enable the switch to electric vehicles and build on local studies, several actions should be considered:

- Providing information on low emission vehicles for car owners. For example, the EV Experience Centre in Milton Keynes provided impartial help and advice on electric vehicles to local residents.
- Focusing on charge points in public locations and areas without off road parking to enable and encourage uptake of electric vehicles.
- Targeting public sector activity and funding towards providing charging infrastructure for rural areas, where the private sector could struggle to build a business case due to lower charge point utilisation and where problems with network constraints or high connection costs could be additional barriers.
- Proceeding with electrification of vehicles owned and operated by local councils starting with cars and vans before exploring decarbonisation options for heavy vehicles (which may use alternative approaches such as BioLNG in preference to electrification).
- Using learning from these schemes to provide help and support to local businesses with understanding options and decarbonising their own vehicle fleets.
- Considering if reduced cost charge points could be offered to local businesses by leveraging investments in publicly funded charge points.
- Working with local bus operators as part of the introduction of bus franchising under the devolution deal to encourage introduction of low emission bus services.
- Working closely with Northern Powergrid (NPg) to ensure that network constraints do not hamper widescale introduction of electric vehicles, and that they are aware of which areas are being targeted for the introduction of electric heat solutions so that planning can account for both changes.

Local Generation

Local, low carbon energy generation is likely to be at a variety of scales from individual domestic solar PV installations to large wind farm and ground mounted solar developments. Several actions can be taken to encourage uptake across this spectrum.

- Understanding the number and size of local suppliers and the scale of delivery possible with the existing supply chain.
- Engaging with residents to understand public attitudes to low carbon generation and to garner support for new installations.
- Identifying funding opportunities and developing schemes to encourage uptake.
- Supporting new community energy schemes by working with existing local schemes and providing contacts, learning and coordination. This could be in combination with the North East and Yorkshire Net Zero Hub.
- Exploring opportunities to leverage investments in solar PV for social housing and public buildings to provide support and to reduce costs for private investments
- Coordinating with NPg to ensure that viable schemes are not held back through problems relating to network connection issues.

Networks, Storage and Flexibility

The most important aspect of taking forward the Y&NY region's LAEPs with respect to energy networks will be ensuring regular communication and coordination with and between network operators to ensure that they are aware of what is planned, where it is planned, and when it is planned to happen. This should provide significant benefits in ensuring that any network preparations that are required to enable different projects do not prevent those projects from progressing. There are also specific actions that should be considered for different individual energy networks.

Electricity Networks

A York & North Yorkshire Local Energy Market* may prove valuable in supporting roll out of heat pumps, electric vehicles, solar PV, energy storage and flexibility across York & North Yorkshire. It is proposed that a project to understand and investigate options is undertaken.

Heat Networks

BEIS' Heat Networks Delivery Unit (HNDU) has funding available for heat network feasibility studies. This should be accessed to progress development in heat network focus areas. It is suggested that the knowledge and experience of local staff who have already worked with HDNU is used to support future work in this area.

It will be important to engage with local sites that have been identified as potential anchor loads or heat providers for heat networks, as well as local resident associations when starting to build the case for new district heat networks. This will ensure that sufficient scale can be achieved to make developments commercially viable.

In the absence of individual site energy demand data, the information used to identify heat network focus zones has been based on a series of assumptions around the energy use of different sites and buildings. It will be valuable to start gathering better energy data from target areas based on their actual energy use. This will be particularly important for larger sites that are likely to be integral to building the business case and technical design requirements of future heat networks.

Gas Networks

Opportunities and timelines for use of hydrogen in the Y&NY region will be heavily dependent on the plans of Northern Gas Networks. It is important that the new proposed combined authority maintains an ongoing discussion with them around these plans. This will be linked to the suggestion above to work with local industrial sites to better understand their decarbonisation options and needs.

Since options for future use of hydrogen are also being developed and discussed at a national scale, it is important that the proposed combined authority also monitors central government action in this area and engages with BEIS to ensure that local needs and priorities are sufficiently considered in the national decision making process.

* For example see: https://gmgreencity.com/projects-and-campaigns/local-energy-market/

Risks

Risks

There are risks and benefits associated with each of the technologies and options presented in these LAEPs. Due to these, the Y&NY region's actual transition is expected to vary from how it has been presented to reflect challenges and opportunities that have not been accounted for, or those that could arise in coming years. Therefore, before making any widescale and significant commitment to one option or technology over another, evaluation of multiple factors will be needed.

The key risks associated with these LAEPs are summarised below. Consideration of these aspects during implementation must be reflected, as outcomes may necessitate an update to these LAEPs. In addition, there may be additional market, policy and regulatory changes that could also result in a need to reconsider aspects of the pathway and LAEPs. Many of the actions identified in the Next Steps section of this document should also assist in mitigating some of these risks.

Risk	Description	Mitigation
Domestic and non-domestic heat decarbonisation using hydrogen	The LAEPs are based on projected figures for hydrogen availability, carbon content and cost; these have influenced the heat pump and heat network focus in a number of zones and are unlikely to accurately reflect future outcomes.	Concentration of early action in focus zones of least regret identified for heat pumps and district heating; moving forward, consideration of UK heat strategy and gas network plans will be needed before planning wider scale-up.
Domestic heat decarbonisation and resident acceptance	Transitioning away from fossil gas boilers to heat pumps or district heating will require innovative solutions to overcome resident acceptance of solutions that are more expensive to purchase and potentially disruptive.	Focusing implementation in off gas grid areas reduces risk associated with picking a technology type, where heat pumps would be a low regret solution. These areas could be used to test models and approaches that appeal to residents before considering wide scale up. Building on previous local projects such as North Yorkshire's Warm Homes to design new schemes that incorporate previous learning.
Level of district heating	The rationale of transitioning large numbers of homes to district heating is based on the ability to cost effectively provide district heating systems in comparison to other options. These LAEPs have only been able to consider the effectiveness of the proposed district heating areas at a high level, more detailed consideration will be needed.	Focussing on areas which have a high-density of buildings increases the likelihood that a district heat network will be cost-effective - more detailed studies are needed to confirm which zones have the highest potential. Heat networks could be lower risk than individual heat pumps for low income residents as the cost is less likely to fluctuate and the emissions, due to the technology choice, can be managed centrally and these aspects should also be taken into consideration in studies.

Risk	Description	Mitigation
Level of local generation (solar PV)	The significant level of solar PV proposed is primarily related to the requirement to cost effectively reduce carbon emissions ahead of the decarbonisation of grid supplied electricity and is most effective at reducing carbon in the earlier years of the plan. However, it presents many challenges related to the scale and speed of role out required.	Further consideration of the benefits to the Y&NY region, potential operating models, system design (e.g. considering smart local energy systems), land use and whether large volumes of locally generated renewable energy can and should be exported to the grid.
Non-domestic buildings and suitable solutions	The decarbonisation options that have been assessed are based on high level information regarding the buildings, their energy systems and the operation/processes of the site. More detailed information will be required to refine preferred solutions.	Identify an approach to better understand non-domestic building use, construction, heating systems and energy use and preferred decarbonisation solutions, potentially targeting areas where a high proportion of industrial site types have been identified; this could also inform consideration of hydrogen to this area.
Practicality and disruption associated with heat decarbonisation	Both heat networks and heat pumps can work in most of the building types in York and North Yorkshire although heat networks will only be an option in urban areas. However, replacing gas based boilers with these options presents challenges; for example, installation costs and the potential disruptive internal works associated with adapting/changing the heating distribution system.	Focusing initially on off gas grid areas for heat pumps and areas identified as least regret for heat networks; aligning with the associated hydrogen based risk. In addition, consider any wider roll out once UK heat strategy is in place. Building on lessons learnt in previous local schemes such as Scarborough and Ryedale's Heat Pump Programme.
Social and community benefits and impacts	Each heat decarbonisation option results in varying benefits and impacts; for example, heat pumps could result in lower energy bills than a hydrogen or heat network system but the installation cost would likely be notably greater without policy intervention.	Use socio-demographic indicators when considering implementation; alongside targeting where corresponding whole home based solutions, such as providing deeper retrofit and domestic solar PV systems can best support those residents in most need.
Funding and investment	The LAEP has identified some possible funding sources but these will only cover a proportion of the total funding required.	York and North Yorkshire will need to work with regional partners and central government to identify potential additional funding routes as well as learning from previous applications for funding to schemes such as National Grid's Warm Homes Fund and the UK Community Renewal Fund to ensure good quality applications for existing schemes.

Risk	Description	Mitigation
Ability to rapidly scale and implement measures; considering supply chain and impacts of implementation rates	The ability to achieve a net zero target ahead of the UK's 2050 target will require the scale up and deployment of measures far beyond current or historical rates; in addition, the benefit of measures (e.g. solar PV) also depends on the ability to install extremely quickly and at highly ambitious scales.	Consideration of the corresponding projections for implementation will be needed to determine if and how ambition can be met.
Electricity Network Capacity	Significant increases to local electricity demand through increased use of heat pumps and EV charging and increased local renewable electricity generation could both be impacted by local electricity network capacity	Regular discussion and engagement with Northern Powergrid to ensure they have as much time as possible to prepare and implement any network changes required. Ensuring that consideration is given to development of Smart Local Energy Systems and associated local energy markets when developing schemes to reduce the influence of network constraints where possible.
Skills availability	The level of change required across York and North Yorkshire to meet the ambition demonstrated in the LAEPs will require significant local delivery capacity which may not be currently available.	Improving understand of local delivery capacity, identification of skills gaps and provision of local training to fill them
Gas Network affordability and availability	As consumers are switched away from the gas network the costs for remaining users will rise. In addition, maintaining the gas network to supply sites (e.g. industrial) in areas that are expected to be heat pump or district heat prevalent may prove problematic if areas of the network start to be decommissioned.	Care must be taken to ensure that increasing gas network costs do not end up being paid by those least able to pay by ensuring these households are given affordable options to switch alongside more affluent ones. Regular discussion and engagement with Northern Gas Networks to ensure that they have as much time as possible to prepare and implement any network changes required and that their plans for introduction of hydrogen into local networks are understood and accounted for during planning.
Coordination	There are a large number of stakeholders (both inside and outside the local area) that will be involved in, and influenced by the transition of York and North Yorkshire to Net Zero. There is a risk that lack of coordination may result in transition being blocked, assets being stranded or costs increasing significantly.	Identification of key stakeholders with regular discussion and engagement, creation of a LAEP Delivery Group and working with neighbouring areas as well as national government to ensure a common understanding and good coordination.

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If there are any questions about the method or outputs in this LAEP, then please feel free to contact the Energy Systems Catapult team on:

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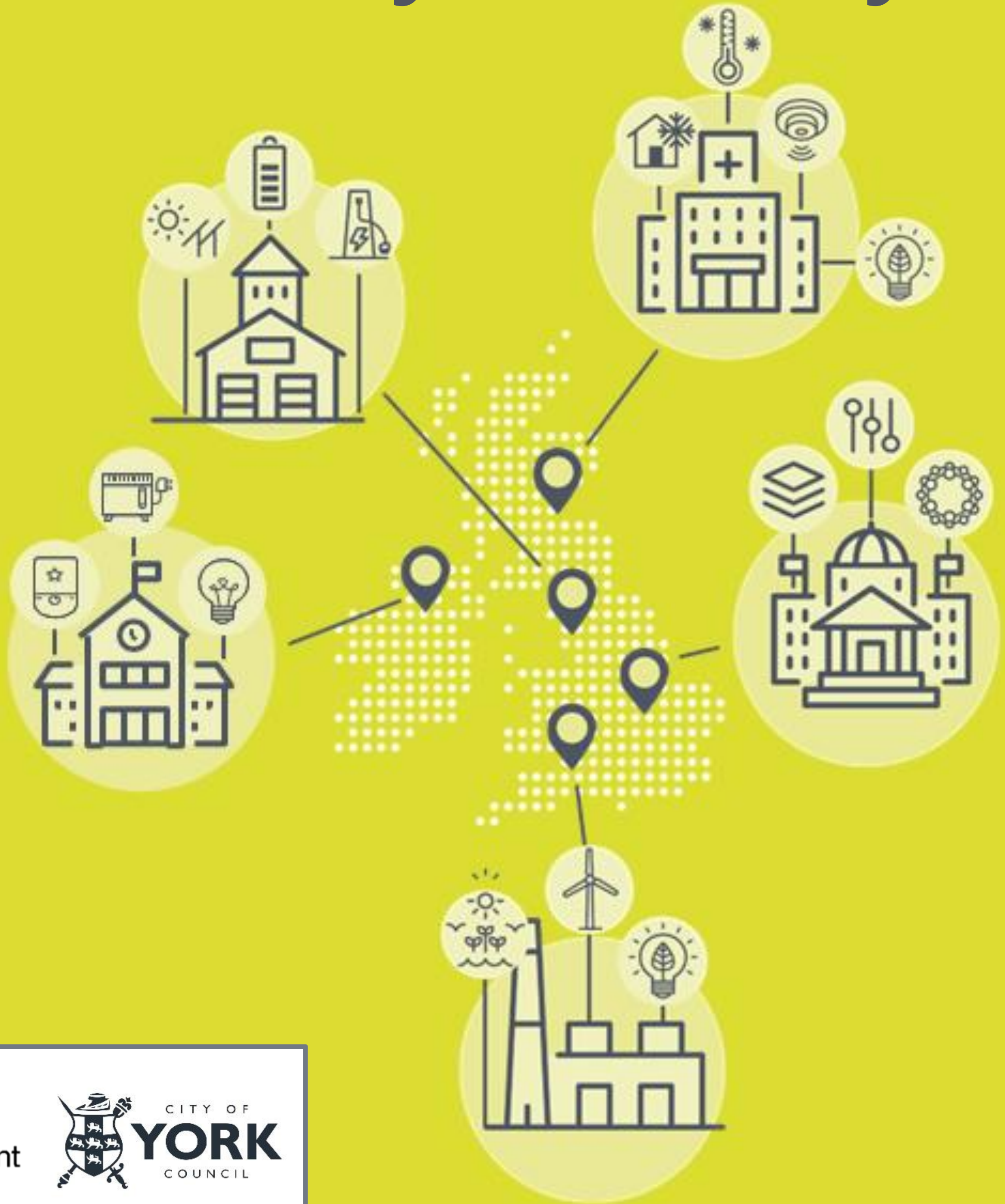
Annexe A – Stokesley Case Study

CATAPULT Energy Systems



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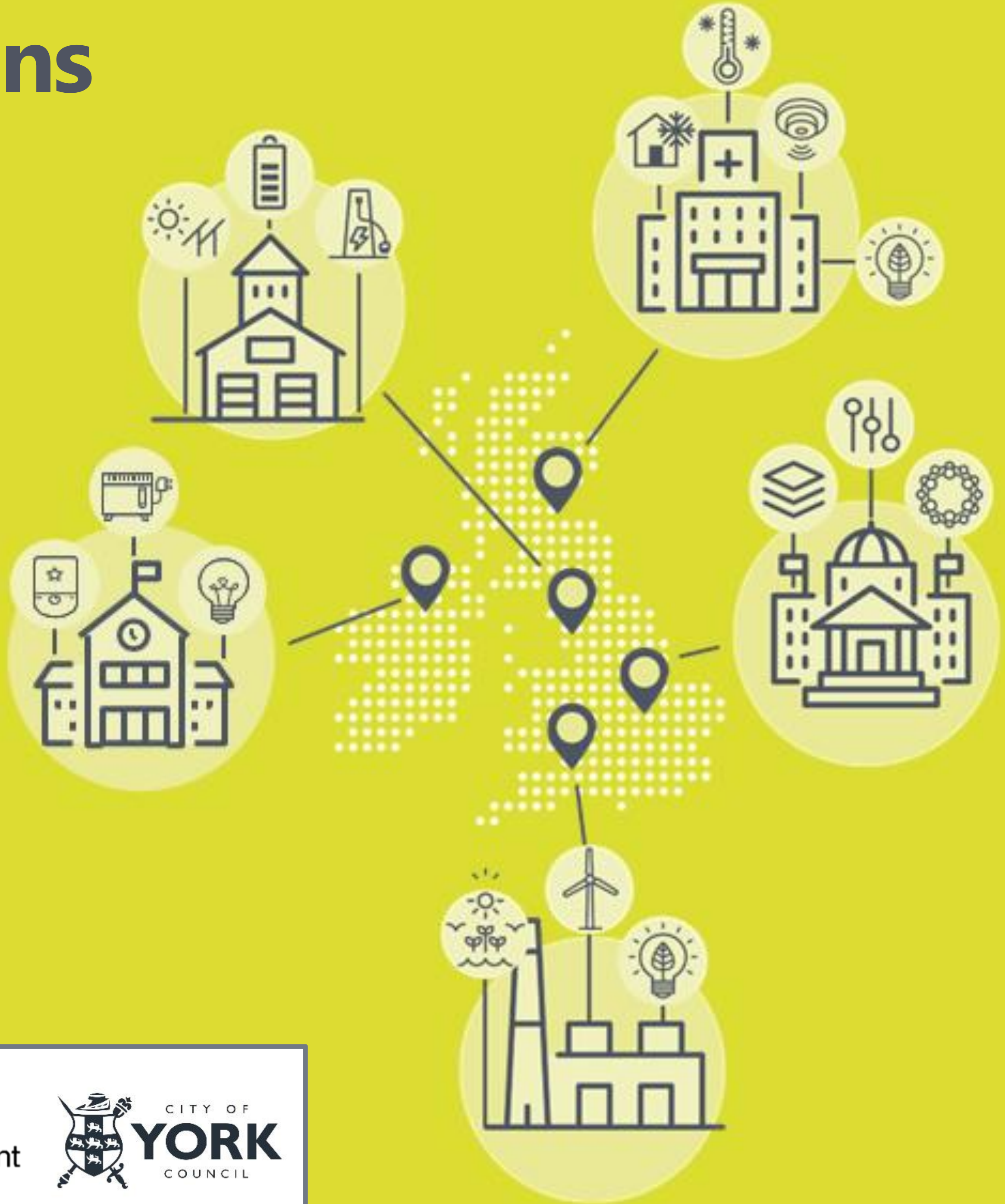
York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP | HM Government | CITY OF YORK COUNCIL

LOCAL AREA ENERGY PLAN

Annexe B – Method, Data & Assumptions

CATAPULT Energy Systems



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LOCAL AREA ENERGY PLAN

Annexe C – 2030 York

CATAPULT Energy Systems

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CITY OF YORK COUNCIL

LOCAL AREA ENERGY PLAN

City of York
Local Area Energy Plan

CATAPULT
Energy Systems

CITY OF
YORK
COUNCIL

LOCAL
AREA
ENERGY
PLAN

Summary

Summary

To reach a net zero energy system by **2040**, the York local area energy plan requires a capital investment of

£3.8 billion

Total (excluding electric vehicles and charging infrastructure)

Including:

£0.7 billion

in homes (including building fabric efficiency, heating systems and rooftop solar PV)

£0.5 billion

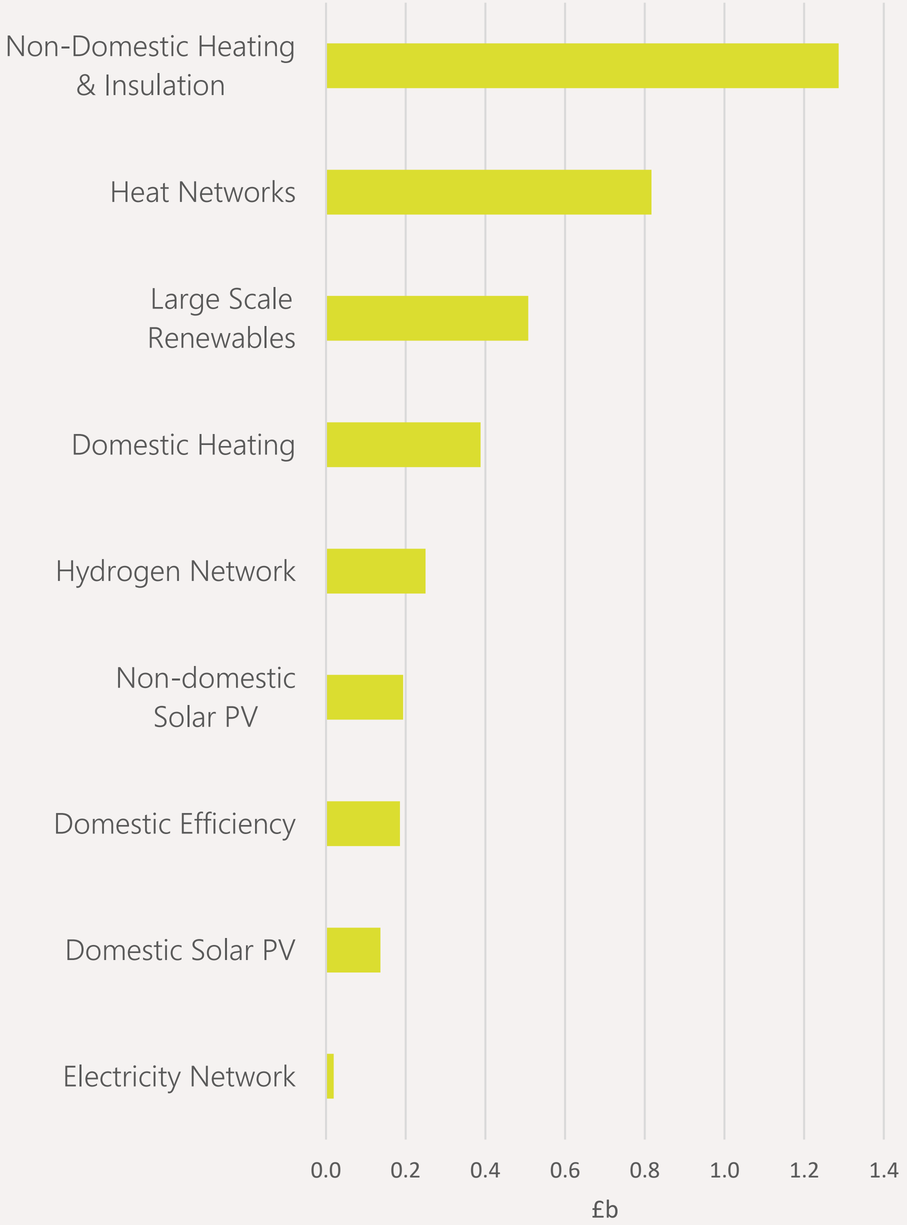
In large scale renewable generation

Saving:

1.2 million tonnes CO_2

From buildings cumulatively to 2050 against a business-as-usual pathway – equivalent to more than eight return flights to New York for every household.

Total Capital Investment to 2040



York's energy system will have been transformed, with:

73,000

heat pumps installed in homes

At least 20,000 **new connections to a district heat network**

44,100

homes retrofitted with insulation, glazing and draughtproofing improvements

91,000

fully electric vehicles

24%

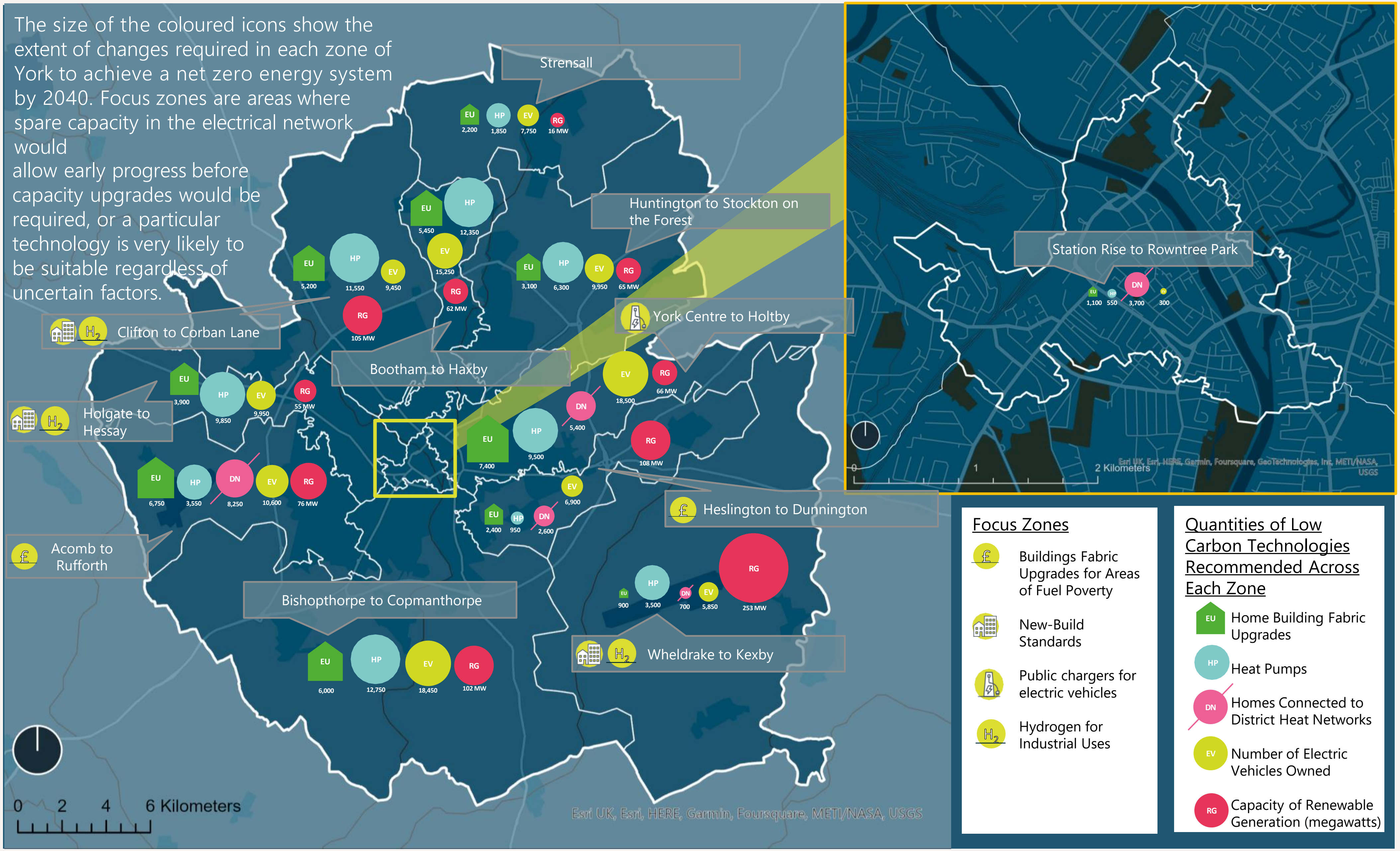
homes generating their own electricity with rooftop solar

920 MW

of large scale renewable generation

Plan on a Page

The size of the coloured icons show the extent of changes required in each zone of York to achieve a net zero energy system by 2040. Focus zones are areas where spare capacity in the electrical network would allow early progress before capacity upgrades would be required, or a particular technology is very likely to be suitable regardless of uncertain factors.



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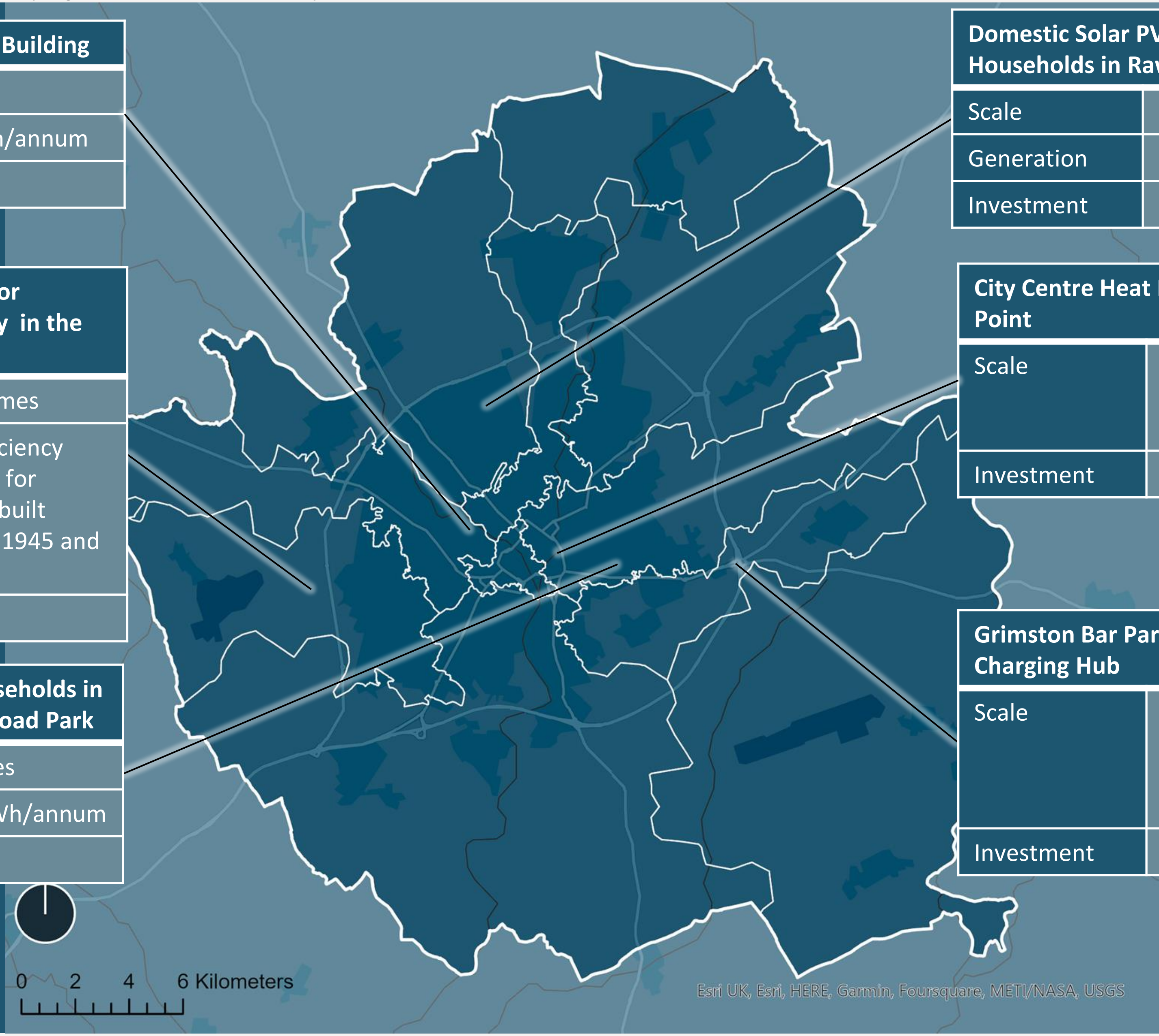
Outline Priority Projects Summary

Demonstrator and low regrets projects for near-term implementation



Rooftop Solar for Heritage Building

Scale	0.64 MW
Generation	290 MWh/annum
Investment	c. £575k

Building Fabric Upgrades for Households in Fuel Poverty in the Acomb to Rufforth Zone

Scale	1,000 homes
Type	Basic efficiency upgrades for terraced built between 1945 and 1979
Investment	c. £1.1m

Domestic Solar PV for Households in Fuel Poverty around Hull Road Park

Scale	500 homes
Generation	1,575 MWh/annum
Investment	c. £3.2m

Domestic Solar PV for Able-to-Pay Households in Rawcliffe

Scale	1,000 homes
Generation	3,200 MWh/annum
Investment	c. £6.4m

City Centre Heat Network Starting Point

Scale	2,400 homes 1,250 non-domestic buildings
Investment	£90m

Grimston Bar Park & Ride Solar Charging Hub

Scale	30MW ground-mount solar array and 50-100 public EV chargers
Investment	£16m

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Current State

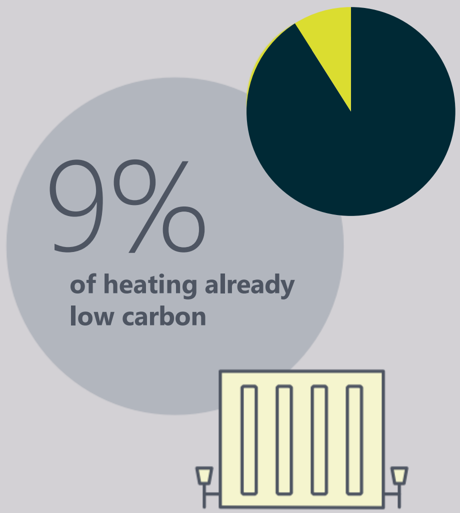
Setting the Scene: York Today

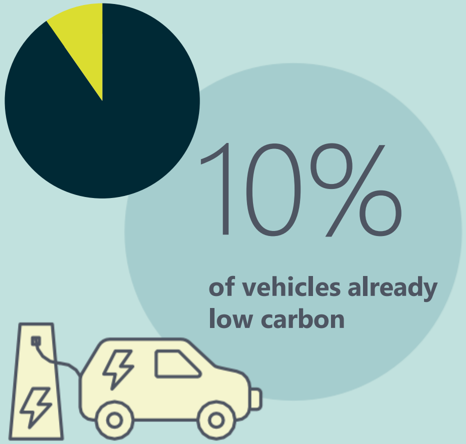
BUILDINGS

Currently 18% of the homes in York are insulated to a good standard, or do not have potential for further insulation.

HEATING

91% of buildings currently use gas for heating, and less than 1% use another form of fossil fuel such as oil. The remainder already use some form of low carbon heating such as heat pumps, biomass or electric resistive heating.



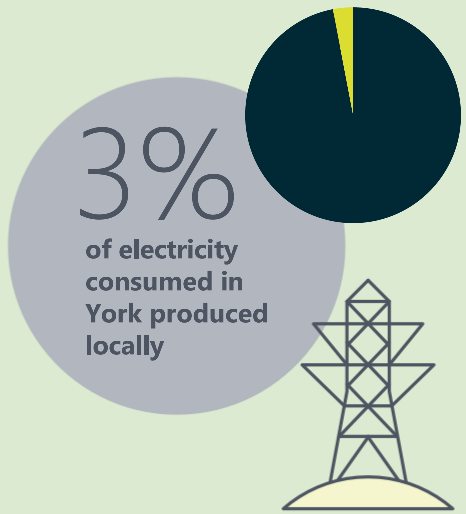


VEHICLES

Around 9,150 of the cars and vans currently registered in York are either plug-in hybrid or pure electric, making up 10% of those vehicles. The remaining 85,750 are petrol, diesel or hybrid.

ELECTRICITY

97% of electricity consumed comes from the National Grid. Solar panels on around 3% of homes and on some non-domestic buildings make a small contribution to local energy demand, as well as the Harewood Whin landfill gas generator.



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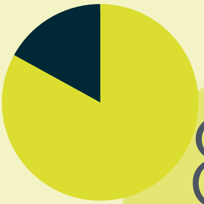
Destination

The Destination: York 2040



83%

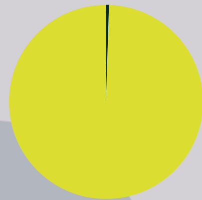
of homes insulated to their full potential by 2040 (including new builds)

BUILDINGS

Around 63% of York's total current housing stock will require building fabric upgrades, bringing the majority of homes up to a high standard of efficiency. The supply chain would need to provide upgrades to over 44,100 homes by the year 2040. New builds will also add to the proportion of well-insulated homes.

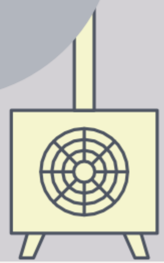
HEATING

Virtually all fossil fuelled heating systems need to be replaced in order to reach net zero. This can occur as current heating systems reach their natural end-of-life but scrappage (or similar) schemes will need to be considered to ensure that all heating systems are decarbonised before the target date.



99%

low carbon



100%

low carbon

VEHICLES

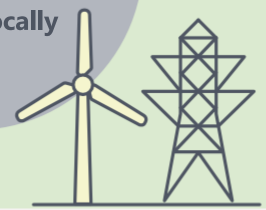
Electric vehicle use is projected to rise rapidly, and would need to reach 100% to hit the net zero target. Steps will need to be taken to cater for vehicle users with provision of public charge points, and to assist residents to install domestic chargers. These chargers will place new demands on the electrical distribution system.

ELECTRICITY

The push to generate low carbon electricity results in a greater proportion of York's energy being produced locally. There is enough land and roof space for solar PV and wind to generate all of the energy needed on an annual basis. In reality, there would likely be issues with generating this amount of electricity as large excesses would be produced, particularly in summer months

100%

generated locally



The Pathways

Three pathways to net zero were modelled to understand which of the recommended actions could be affected by different net zero target dates. The three ambition levels are described as:
Low: Aligning with the national 2050 net zero target
Medium: A balanced approach, achieving a net zero energy system locally by 2040, ahead of the UK as a whole.
High: An extremely ambitious push for a net zero energy system locally by 2030.

This plan focusses primarily on the medium ambition scenario, with key similarities and differences between the scenarios drawn out where appropriate. Actions that are common across these scenarios are considered to be 'low regrets' and can be undertaken as soon as possible. Actions that are not common and are identified later in the pathway will require decision points and early enabling actions to remove barriers.

The key similarities and differences between these ambition levels are summarised as follows.

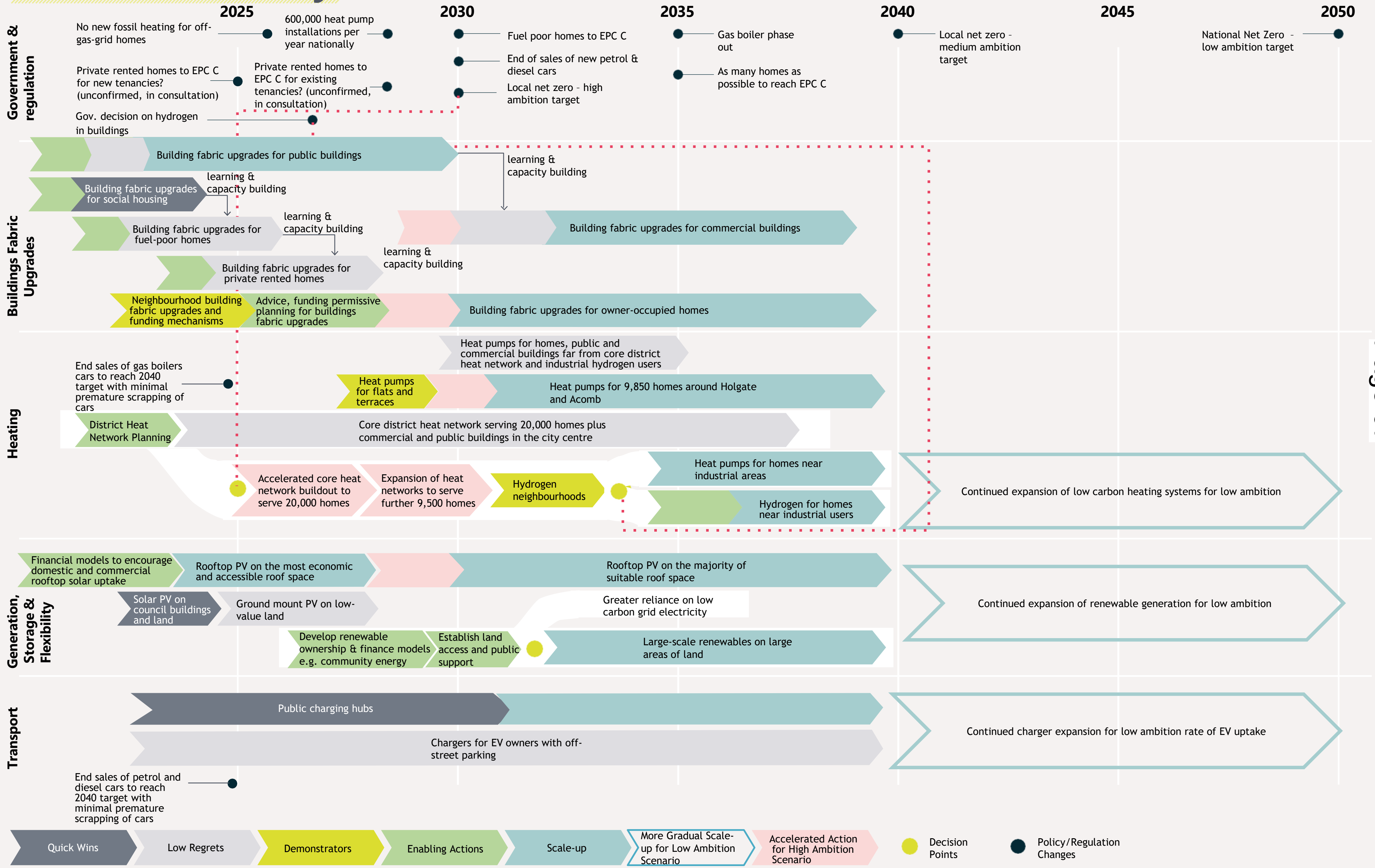
Low regrets

- Basic efficiency upgrades for almost every home which has upgrade opportunities.
- Heat pumps installed in homes which are far from any likely heat networks or industrial users of hydrogen
- District heat networks to serve public, commercial and private buildings in the areas of dense heat demand
- Electric vehicle chargers for homes with off-street parking and public charging points in key hubs such as retail parks, supermarkets, etc.
- Solar PV on rooftops and on low value areas of land

Key decisions

- Deeper building efficiency upgrades which will tend to have long payback periods, but can have additional benefits such as fuel poverty alleviation and employment creation
- Hydrogen to heat homes close to areas of industrial use instead of heat pumps: once more evidence is available on the viability, cost, emissions and policy around hydrogen for building heating in York, a decision can be made about homes in these areas. Hydrogen may be able to reduce the upfront cost and disruption of low carbon heating system installations.
- Further deployment of ground-mount solar PV to reduce emissions from consumption of grid electricity. In theory, very large areas of land could be used to produce most of York's energy requirements on an annual basis, though the development of this extent of land could be challenging. Visual impact of developments would need to be assessed as part of feasibility studies, as well as alternative land uses. Greater deployment of local renewables can bring economic benefits and accelerate decarbonisation, while greater reliance on decarbonised grid electricity can reduce the difficulties around developing large areas of land.

The Pathway


2025
2030
2035
2040
2045
2050
Government & regulation
No new fossil heating for off-gas-grid homes
600,000 heat pump installations per year nationally
Fuel poor homes to EPC C
Gas boiler phase out
Local net zero - medium ambition target
National Net Zero - low ambition target
Private rented homes to EPC C for new tenancies? (unconfirmed, in consultation)
Private rented homes to EPC C for existing tenancies? (unconfirmed, in consultation)
End of sales of new petrol & diesel cars
As many homes as possible to reach EPC C
Local net zero - high ambition target
Gov. decision on hydrogen in buildings
Buildings Fabric Upgrades
Building fabric upgrades for public buildings
learning & capacity building
Building fabric upgrades for social housing
learning & capacity building
Building fabric upgrades for fuel-poor homes
learning & capacity building
Building fabric upgrades for commercial buildings
Building fabric upgrades for private rented homes
learning & capacity building
Neighbourhood building fabric upgrades and funding mechanisms
Advice, funding permissive planning for buildings fabric upgrades
Building fabric upgrades for owner-occupied homes
Heating
Heat pumps for homes, public and commercial buildings far from core district heat network and industrial hydrogen users
End sales of gas boilers cars to reach 2040 target with minimal premature scrapping of cars
Heat pumps for flats and terraces
Heat pumps for 9,850 homes around Holgate and Acomb
District Heat Network Planning
Core district heat network serving 20,000 homes plus commercial and public buildings in the city centre
Accelerated core heat network buildout to serve 20,000 homes
Expansion of heat networks to serve further 9,500 homes
Hydrogen neighbourhoods
Heat pumps for homes near industrial areas
Hydrogen for homes near industrial users
Continued expansion of low carbon heating systems for low ambition
Generation, Storage & Flexibility
Financial models to encourage domestic and commercial rooftop solar uptake
Rooftop PV on the most economic and accessible roof space
Rooftop PV on the majority of suitable roof space
Continued expansion of renewable generation for low ambition
Solar PV on council buildings and land
Ground mount PV on low-value land
Greater reliance on low carbon grid electricity
Develop renewable ownership & finance models e.g. community energy
Establish land access and public support
Large-scale renewables on large areas of land
Transport
Public charging hubs
Continued charger expansion for low ambition rate of EV uptake
Chargers for EV owners with off-street parking
End sales of petrol and diesel cars to reach 2040 target with minimal premature scrapping of cars
Quick Wins
Low Regrets
Demonstrators
Enabling Actions
Scale-up
More Gradual Scale-up for Low Ambition Scenario
Accelerated Action for High Ambition Scenario
Decision Points
Policy/Regulation Changes

Buildings

Overview

A large proportion of dwellings across York are recommended for building fabric upgrades (also known as retrofit) to meet net zero. This is consistent across all ambition levels, with earlier targets requiring more rapid treatment of homes. The map shows how these fabric upgrade measures (insulation, glazing and draughtproofing) are likely to be distributed across the region. In total, 44,100 dwellings across York are recommended for upgrades at a cost of £185m. Upgrades are split into "basic" and "deep", explained on the following pages.

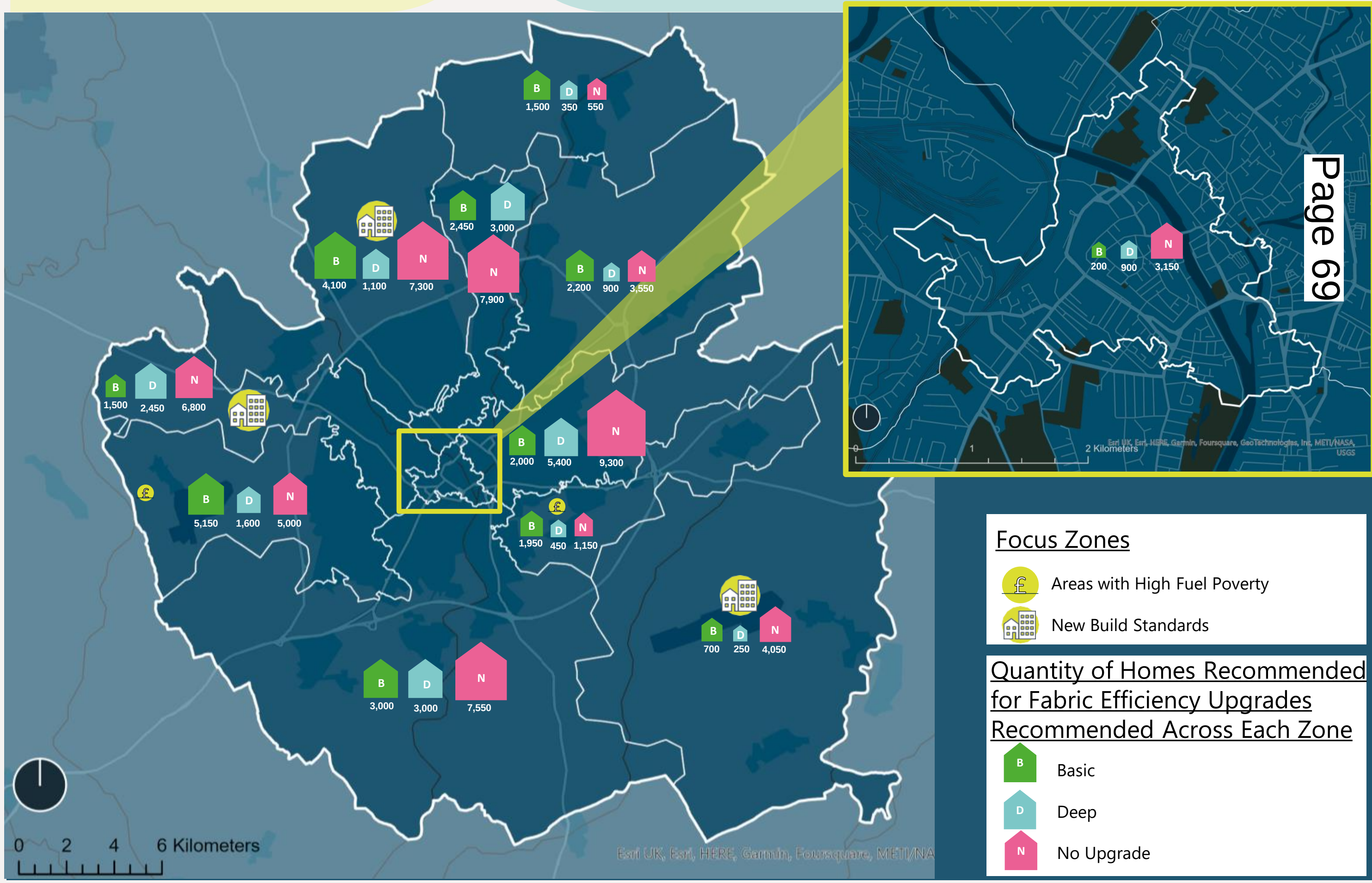
Prioritising the delivery of building fabric upgrades in areas with high levels of fuel poverty will maximise the impact of bill savings and the health benefits of warmer homes. These priority zones are shown on the map by the '£' symbol. Areas with large numbers of new build homes planned can prioritise building to net zero standards (e.g. Passivhaus), potentially encouraged a local design code or supplementary planning document.

While this plan outlines the lowest cost path to a net zero energy system, additional deep retrofits may be desirable to meet other local priorities, particularly fuel poverty alleviation and general energy affordability.

Previous schemes run by York City Council using funding from BEIS Home Upgrade Grant and Social Housing Decarbonisation Fund, as well as the development of a Housing Retrofit Action Plan can be learnt from and scaled up to help meet these high levels of roll out.

44,100
dwellings (63%) recommended for building fabric upgrades

over £185m
capital investment in domestic building fabric upgrades required

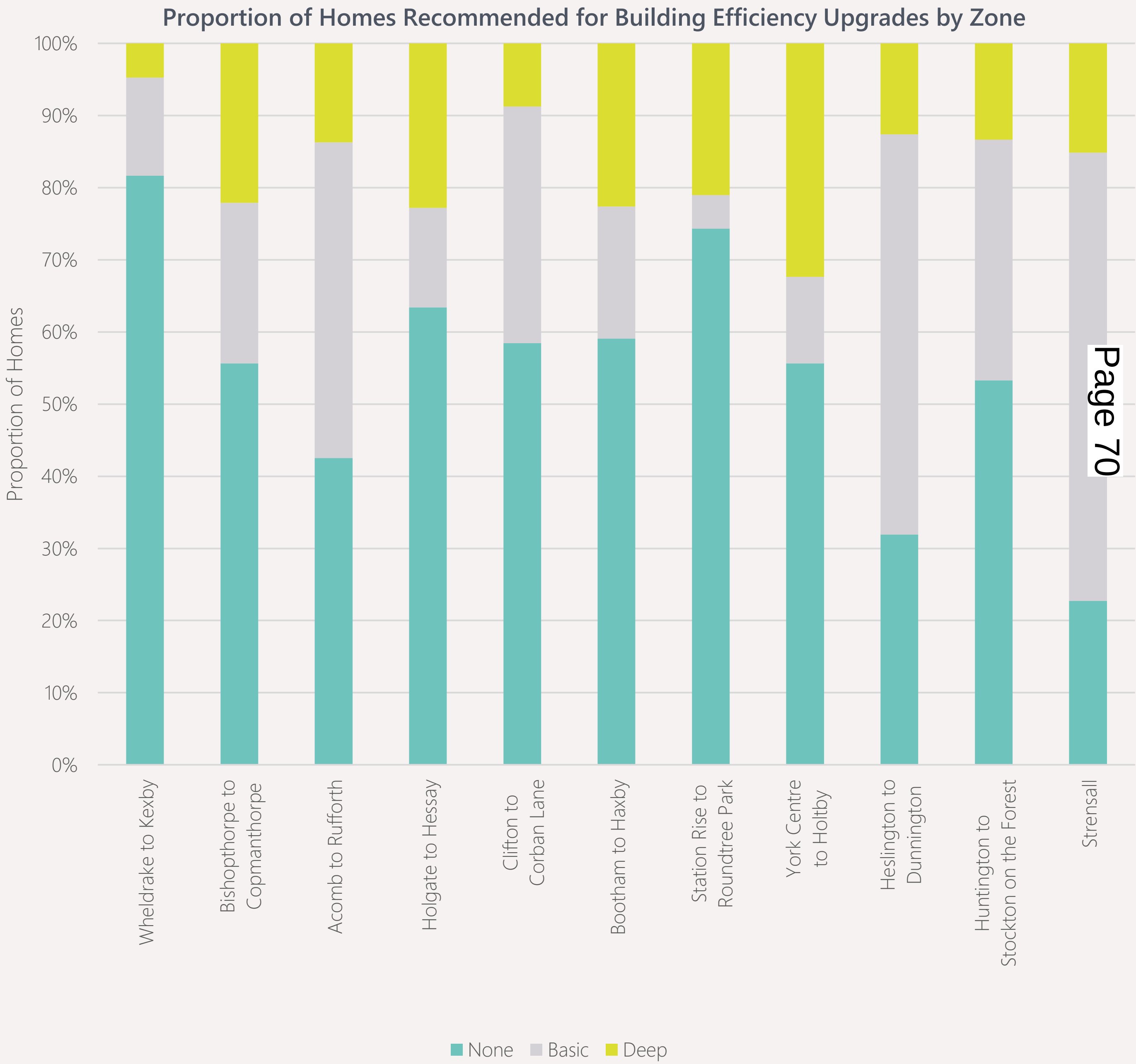


Zones and Dwelling Types

Building fabric upgrades are improvements to the fabric of domestic and non-domestic buildings to reduce heat loss. Upgrades can include draught proofing, loft and cavity wall insulation (referred to here as “basic” upgrades), double or triple glazing, internal or external wall insulation, floor insulation and door upgrades (“deep” upgrades). These measures can improve comfort and health of occupants, reduce bills, and make it easier to transition to low carbon heating systems, whilst also reducing the need to upgrade the electrical network. Since fabric upgrades can reduce the size and cost of heating system needed, it makes practical sense to complete them before heating system replacements take place, or at the same time to minimise disruption to occupants.

The graph shows the extent of upgrades recommended across each zone of York, which is influenced by the types of homes in each area. Where there is a high proportion of flats (such as the Station Rise to Rowntree Park zone) or new builds (such as the Wheldrake to Kexby zone), fewer upgrades are recommended. In contrast, there are areas such as the Strensall zone where the majority of homes look suitable for cost-effective fabric upgrades.

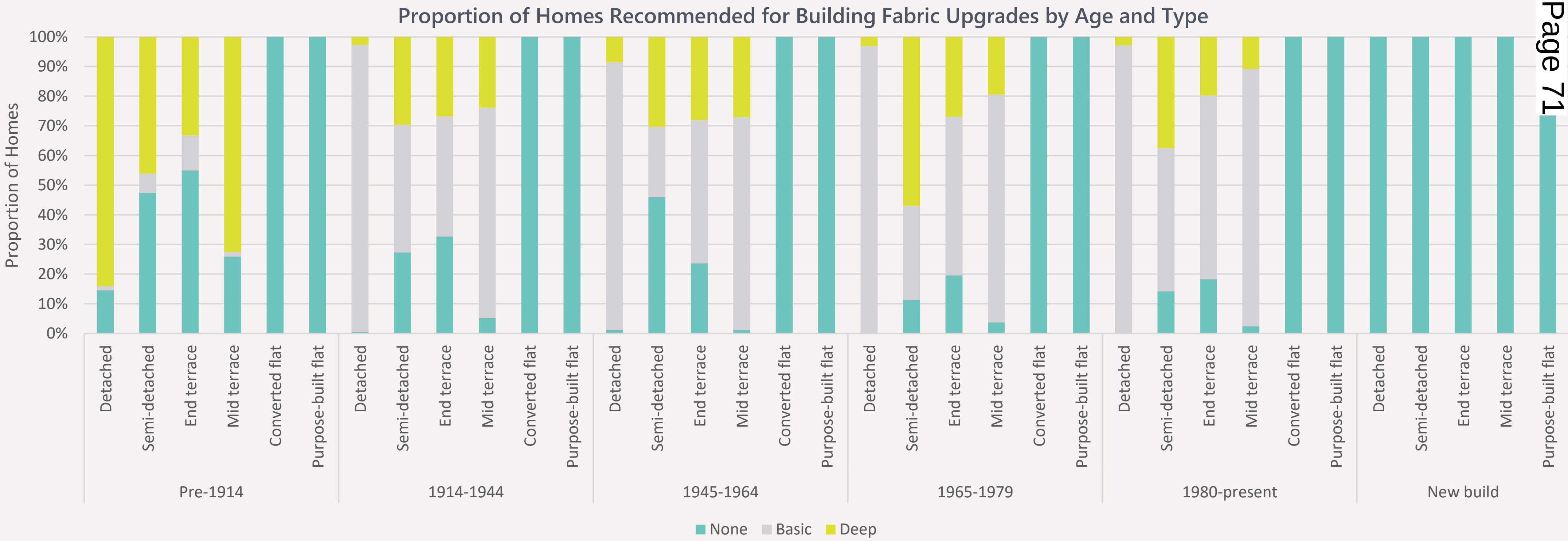
Homes which aren’t highlighted for upgrades by cost optimal modelling are not necessarily ruled out from benefiting from upgrades. Other factors such as prevalence of fuel poverty, or a focus on the health and comfort benefits of homes which are easier to keep warm could drive the decision to go beyond the suggested cost-optimum.



Zones and Dwelling Types

Building age and construction is a major factor in which types of efficiency upgrades are recommended. As shown in the graph below, basic upgrades are recommended across much of the housing stock built after 1914, whereas older homes are likely to require deep upgrades, which can be less cost-effective. This is due to the oldest group of homes having been built with solid walls, requiring either internal or external insulation, with cavity walls only becoming the norm from around 1930. Terraces, being the most common building type of the age bracket with solid walls, could make sense to tackle on a street-by-street basis, since attempts to insulate single homes within terrace rows are likely to be awkward and limited in their effectiveness. Deployment at this kind of scale could also prove vital for achieving acceptable costs, which is a major hurdle for solid wall insulation.

Modern buildings have little potential for cost-effective upgrades, and opportunities for individual flats are limited. While the modelling approach does not identify upgrade opportunities in any type of flat, some types of converted flats may have similar opportunities to houses, though there may be a need for multi-stakeholder buy-in. Purpose-built flats such as multistorey blocks will tend to require whole-building approaches.



Focus Zones

Focus zones highlight areas where particularly large numbers of a certain solution are recommended, directing efforts towards delivery at scale in that zone, often in advance of other parts of the plan. Focus zones can account for factors such as the socio-economic conditions in an area, network capacity, or characteristics of the building stock, which could bring specific advantages, learning opportunities or challenges to delivery in that location.

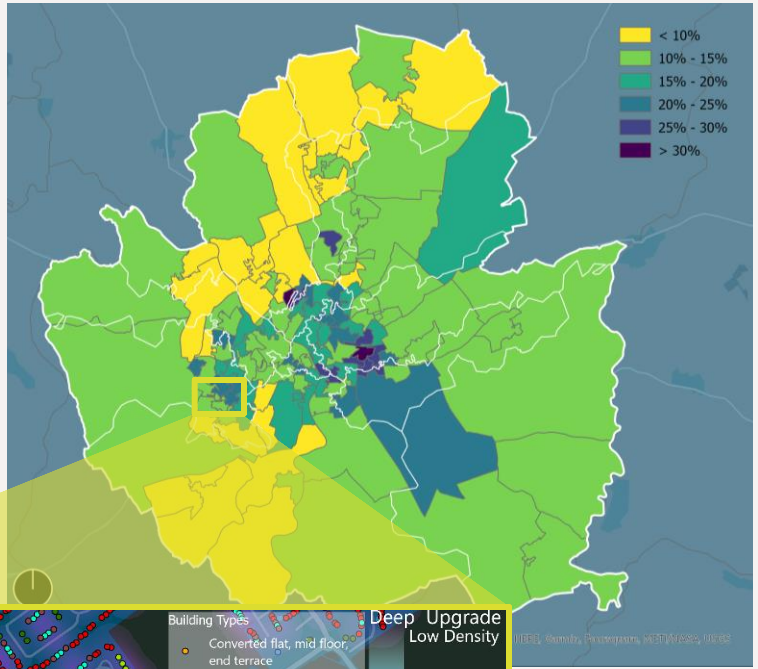
The Acomb to Rufforth zone & The Heslington to Dunnington zone

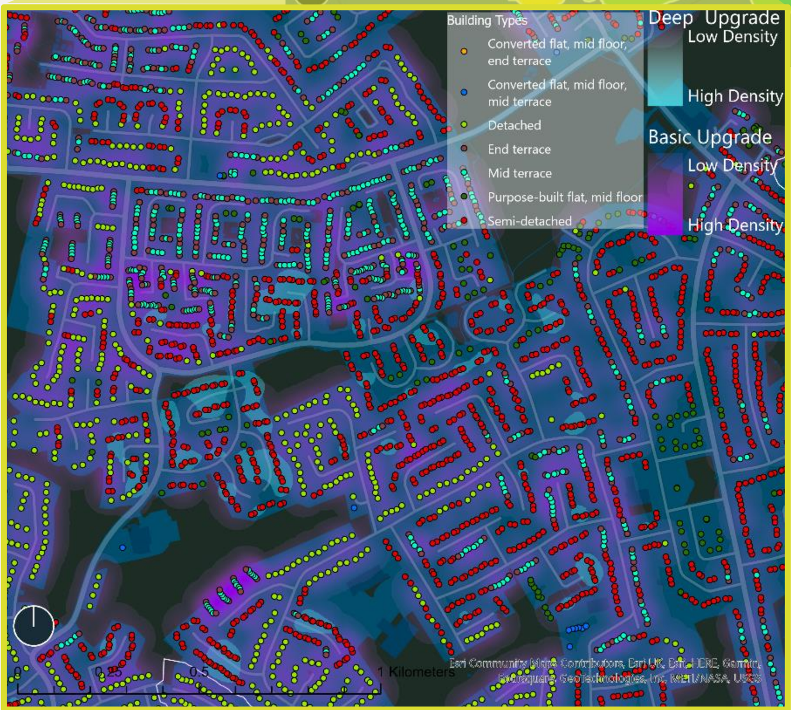
are focus zones because they have high levels of fuel poverty, coinciding with high potential for cost-effective fabric upgrades. Prioritising delivery of efficiency projects in this area would unleash the high potential for impact and benefits. Over 4,400 homes in the Acomb to Rufforth zone and 2,200 in the Heslington to Dunnington zone would benefit from basic upgrades, with almost 2,000 homes benefiting from deep upgrades across the two zones. In these zones, a large number of semi-detached homes built between 1914 and 1979 could be insulated (2,000 in the Acomb to Rufforth zone and 1,150 in the Heslington to Dunnington zone). Additionally, almost 1,000 terrace homes built between 1945 and 1979 in the Acomb to Rufforth zone are suitable for basic upgrades.

The York Centre to Holtby zone

is where the most deep fabric upgrades could take place. 1,700 terraces built before 1914 could be considered for deep upgrades, along with 1,400 semis built between 1914 and 1979.

Estimated Proportion of Dwellings in Fuel Poverty





An example area of homes in the Acomb to Rufforth zone suitable for upgrades

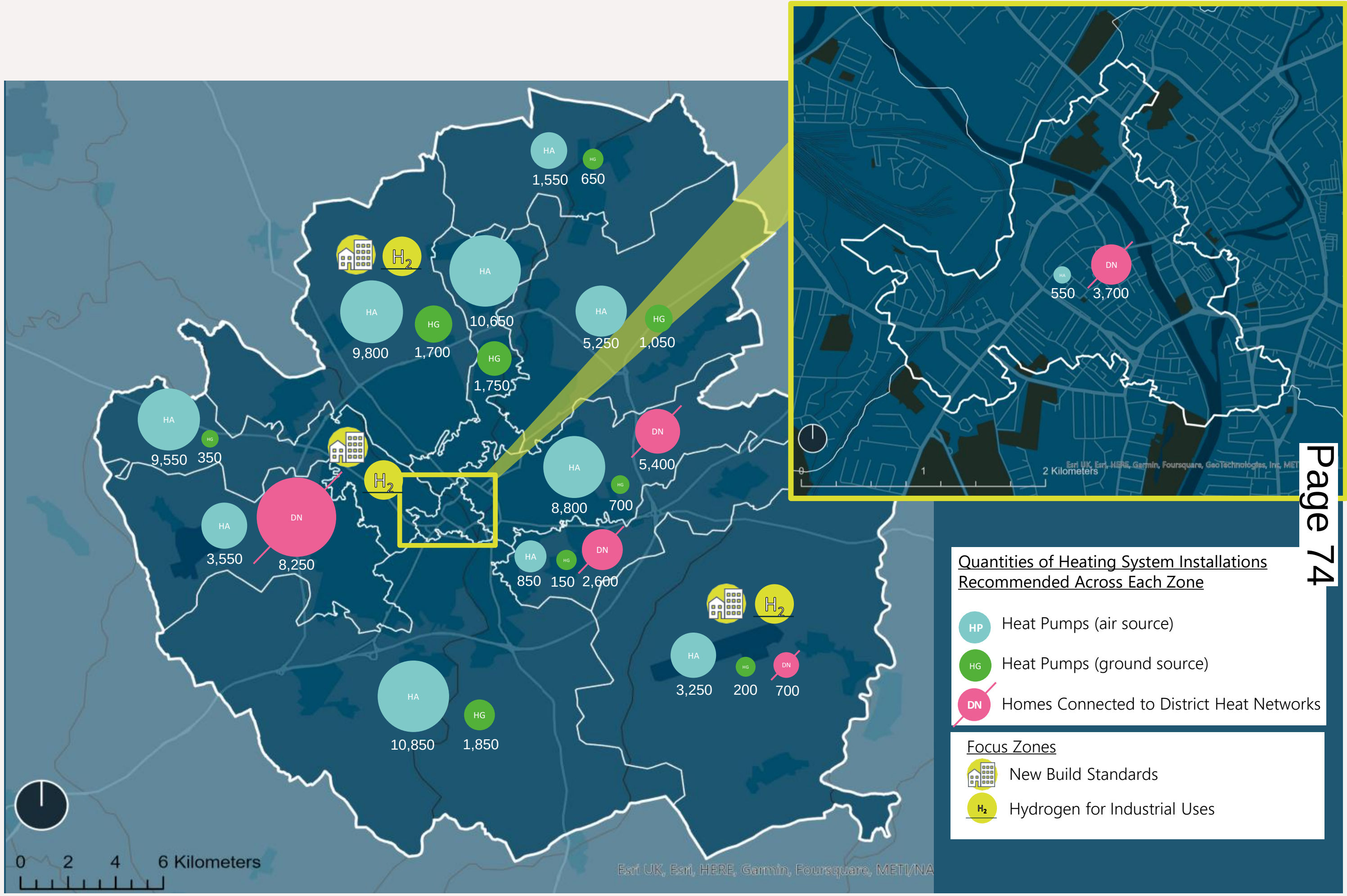
Heating

Overview

Gas boilers make up the majority of heating systems in dwellings (91%) and non-domestic buildings, with fossil fuel use in buildings accounting for 36% of emissions in York (excluding industry). To reach net zero, these will need to be replaced with low carbon heating systems. Heating systems can be replaced at their natural end-of-life, however supply chain capacity and household awareness will need to be built ahead of time to ensure the low carbon options are available, straightforward and attractive when replacements occur, which can often be during a break-down. The sale of new fossil fuel heating systems would need to end by 2025 to meet a 2040 net zero target, in order to minimise premature replacements of boilers (based on a 15 year lifespan). This is significantly more ambitious than any cut-off date likely to be imposed by central government, with 2035 currently being considered*.

Heat pumps are the most widely suitable technology for decarbonising heating within York, with growing evidence** that they can be installed in the full range of property archetypes. Heat networks can serve dense town centre locations (supported by some existing electric resistive heating).

Off-gas-grid homes using fossil fuel heating systems make up a very small minority (less than 1%) of households in York, and so are not considered as a separate stage of the plan. There may be opportunities to use hydrogen for heating homes near industrial users of hydrogen. Areas with large numbers of new build homes planned can prioritise building to net zero standards, avoiding the need for costlier retrofit later.



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73,000 dwellings recommended for heat pump installations

20,000 dwellings recommended for connection to district heat networks

c.£390m capital investment in domestic heating systems required

* https://www.gov.uk/government/publications/heat-and-buildings-strategy

** https://es.catapult.org.uk/news/electrification-of-heat-trial-finds-heat-pumps-suitable-for-all-housing-types

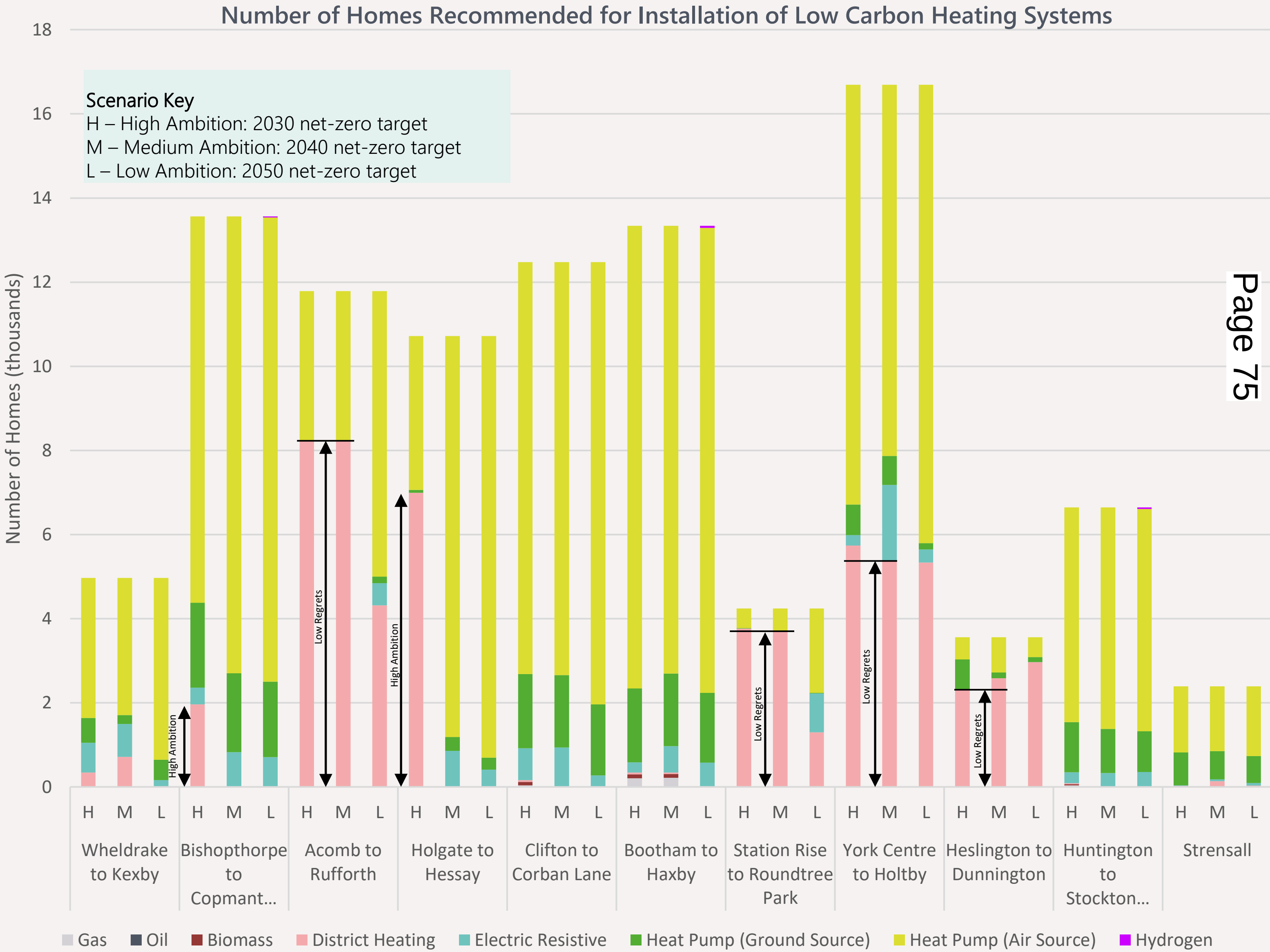
Domestic Buildings

The level of ambition of the scenario affects the type of heating system recommended for some homes, as well as the pace of installations, as shown in the chart. In particular, earlier net zero targets call for a larger heat network to make more efficient use of higher carbon grid electricity in the earlier years, whereas the later targets allow cleaner grid electricity to be used in slightly less efficient individual home heat pumps. Examples where the ambition level does or doesn't affect the heat network size are highlighted by the arrows in the chart. District heat networks could also be advantageous for homes with limited space for the additional equipment required with a heat pump system (e.g. terraces).

Ground source heat pumps can be a more advantageous option in rural areas than in urban areas, where larger properties and more garden space can make them a viable option. However, air source heat pumps would also be suitable for many of these properties, reducing installation costs in exchange for slightly higher running costs. Property specific consideration would be needed to determine the preferred solution. In addition, shared ground loop systems may also be an option for clusters of suitable properties

Hydrogen boilers could also provide a low-carbon replacement for fossil gas boilers, but they are dependent on a supply of hydrogen becoming available at acceptable cost and carbon emissions, explored in full on page 27.

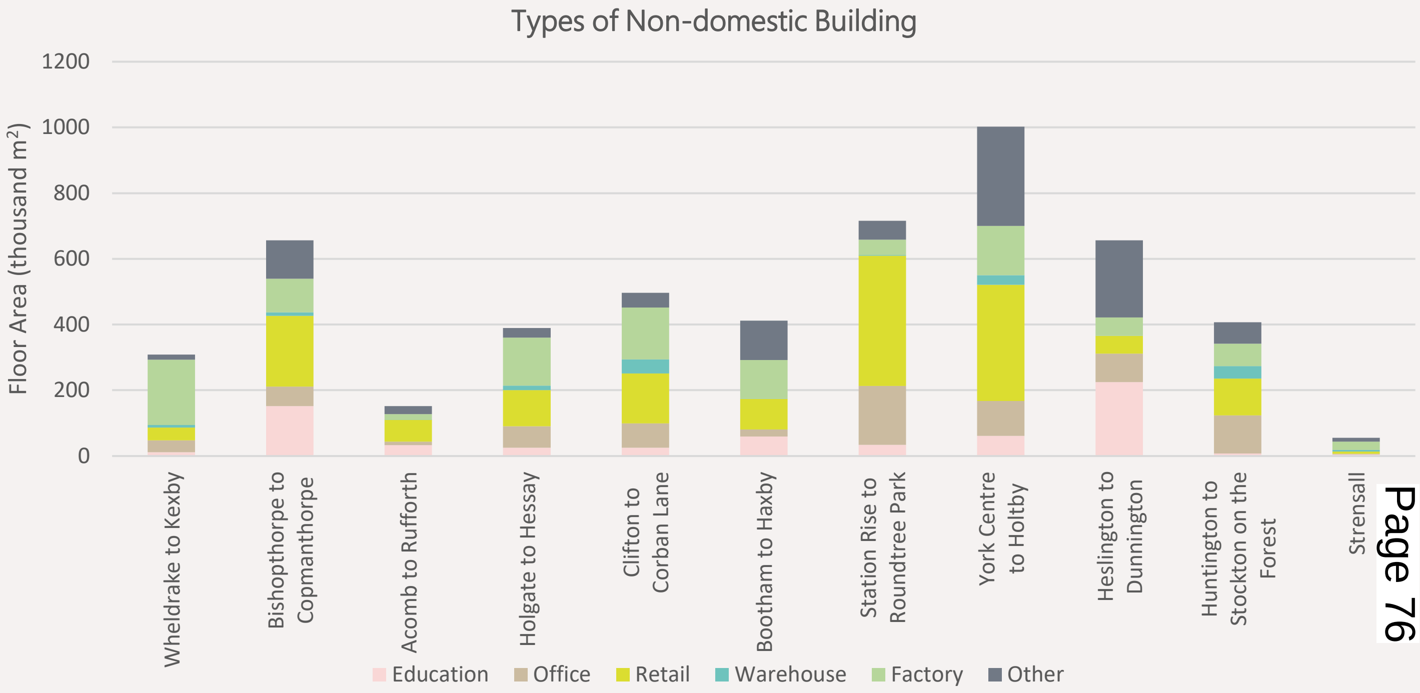
The most suitable choices of heating systems for each zone are largely consistent between different levels of ambition for the net zero target date, with only slight variation in places as shown in the chart. This indicates that choices of heating system are mostly low regrets. Where variation is seen, the case for picking one technology over another is more marginal, suggesting that either option would be sound, and local factors and preferences can drive the decision.

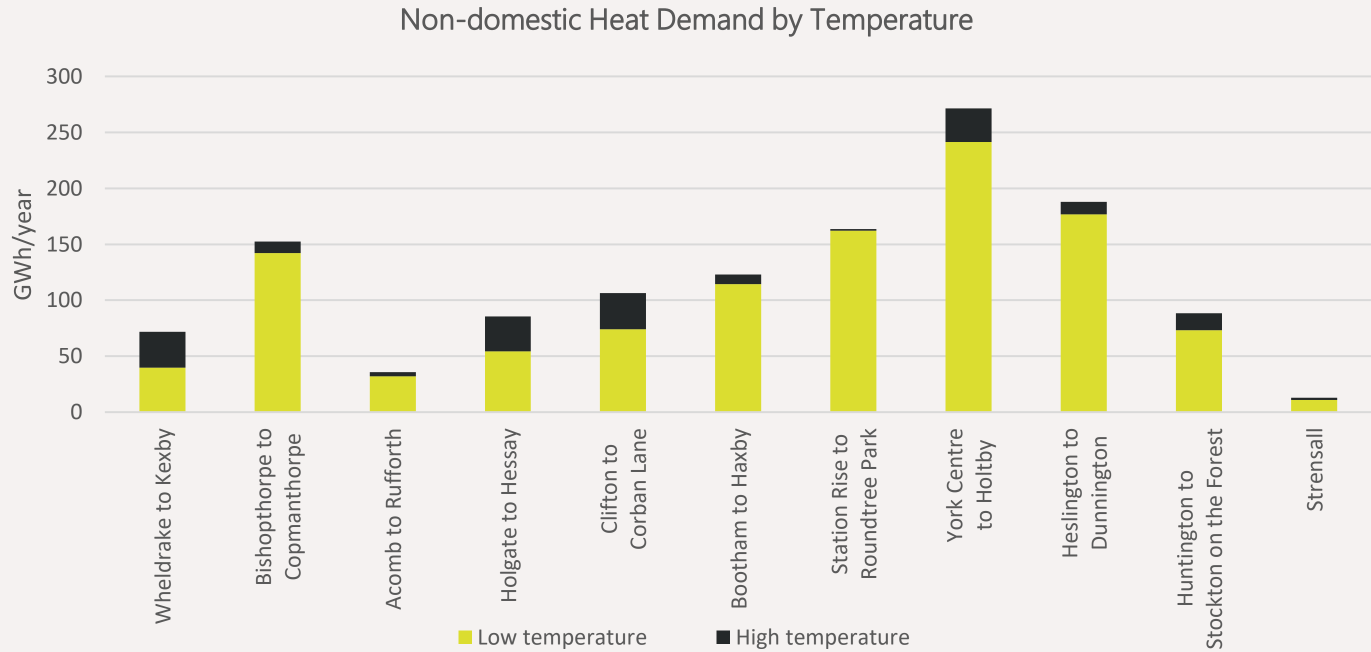


Non-domestic Buildings

Non-domestic buildings are categorised into a range of uses, shown in the chart (right). Much of the demand for heat in non-domestic buildings is low temperature heat for providing space heating and hot water to buildings, with similar decarbonisation options as domestics. However, a small portion of heat is likely to be required at high temperature for specialised industrial processes, as shown on the chart on the right.

High temperature heat is likely to be more difficult to electrify or provide with district heating, making a stronger case for hydrogen to replace fossil fuels for these applications. In the modelled pathways, hydrogen isn’t assumed to be available until the mid-2030s at the earliest, meaning that the high ambition scenario is unable to decarbonise high-temperature processes in time for the target, while the medium ambition scenario would require significant planning and rapid deployment for hydrogen becoming available shortly before the net zero target date. However, earlier decarbonisation of these processes could be achieved with local electrolysers to produce hydrogen in the absence of a pipeline supply.

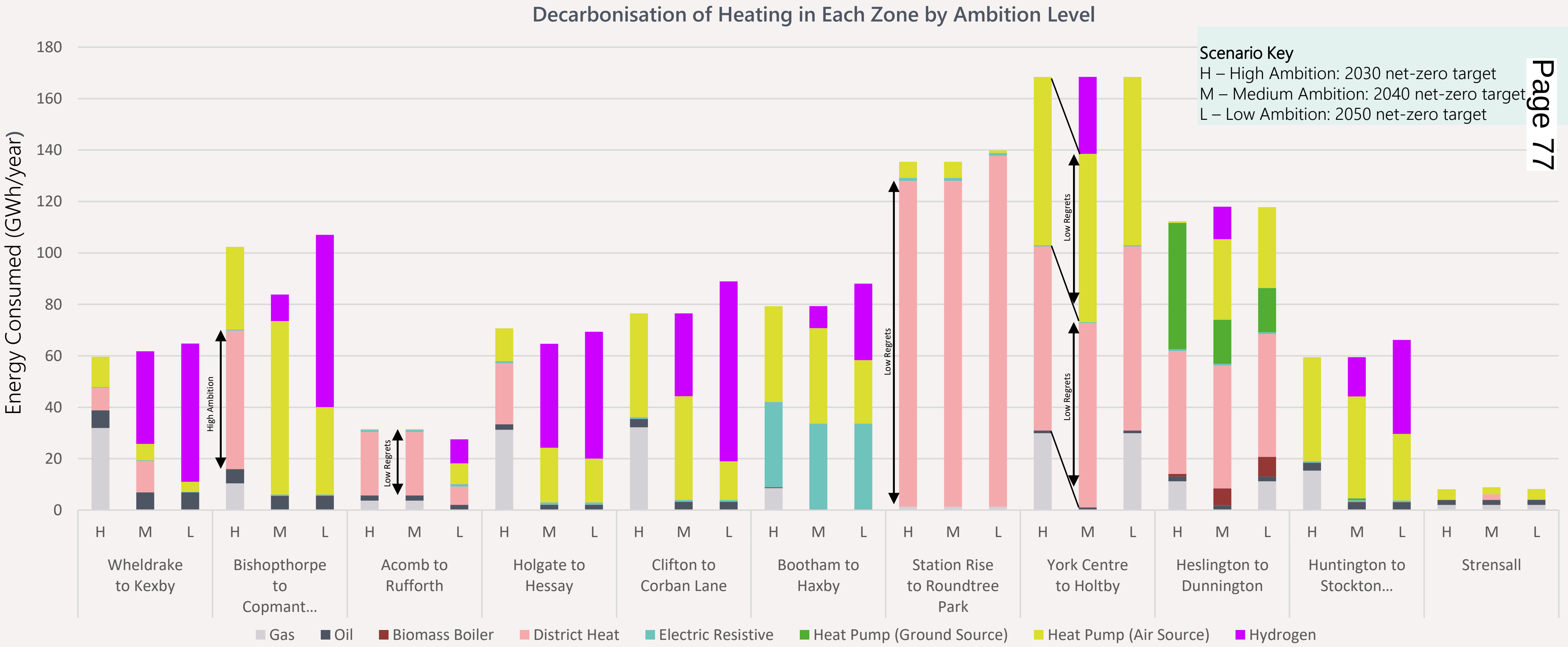




Non-domestic Buildings

The decarbonisation of low temperature heat, used to provide space heating and hot water in non-domestic buildings, follows a similar pattern to domestic decarbonisation, with many of the fossil fuel systems being replaced with heat pumps, or by connecting to district heat networks in dense central areas as shown in the chart. However, non-domestic buildings differ from homes, with significant amounts of space heating provided by hydrogen in the scenarios where it's available. More hydrogen is used in the lower ambition scenarios, as the later carbon target date leaves more time to wait for hydrogen availability before replacing heating systems. Building fabric upgrades are bundled with the heating system upgrades shown here, and other efficiency measures such as recommissioning and upgrades of building management systems, LED lighting and lighting control can be implemented at the same time, often improving the economics of the project.

In the high ambition scenario, pipeline hydrogen is not available in time for the 2030 target to replace gas use for high temperature applications, though on-site electrolysers could enable earlier conversion to hydrogen.



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Heat Pump Focus Zones

The Bishopthorpe to Copmanthorpe zone, Clifton to Corban Lane zone and Bootham to Haxby zone have the largest roll-out of air source heat pumps (10,850, 9,800 and 10,650 respectively) across the full range of ages and types of homes, from flats to detached, and from pre-1914 to new build. This will require significant supply chain scale-up, citizen awareness and buy-in, and attractive commercial offerings to compete with existing fossil fuel options. The map gives a sense of the distribution of air-source installations across York.

Bishopthorpe to Copmanthorpe and Clifton to Corban Lane have some spare capacity in the electrical distribution system, allowing roll-out to commence before encountering constraints (though upgrades are likely to be required to reach full heat electrification, especially when combined with electric vehicle charging requirements). The York Centre to Holtby zone also has substantial spare capacity, and with 9,500 heat pumps to be installed in total, this area would make a good heat pump focus zone from an infrastructure perspective.

Uptake of air source heat pumps across York

Heat Pump Focus Zones

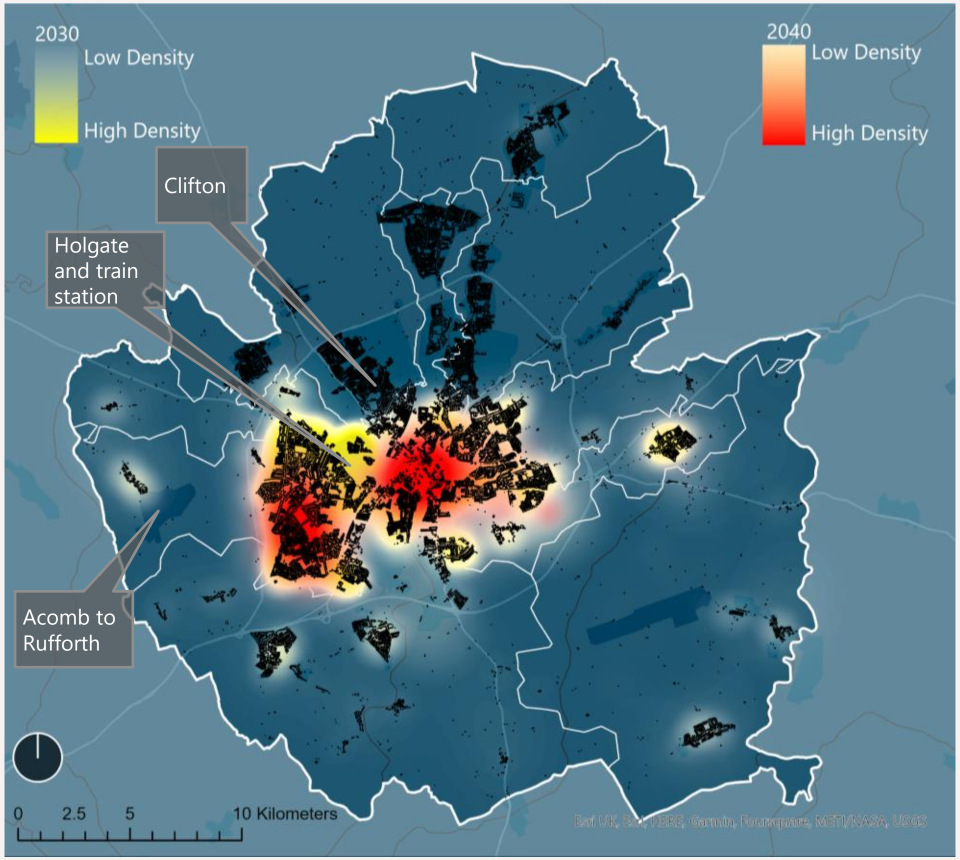
Example neighbourhoods in Wigginton and Haxby with high uptake of ground source heat pumps

Air source heat pumps are typically the most cost-effective heat pump type due to their lower capital costs compared to ground source heat pumps. However, there is an economic case for installing ground source heat pumps in some detached homes in the Bishopthorpe to Copmanthorpe zone, the Clifton to Corban Lane zone and the Bootham to Haxby zone (1,850, 1,700 and 1,750 respectively). For these large properties with available land, the higher heat demand can justify the higher upfront cost of ground source, since it achieves higher efficiencies and lower running costs. Additionally, lower peak demands can reduce network upgrade costs. The map gives an example of a neighbourhood where homes suitable for ground-source cluster together, which could form a demonstration neighbourhood.

When installing a low carbon heating system, it's advisable to carry out any basic building efficiency upgrades at the same time or beforehand to avoid needlessly oversizing the new heating system or incurring high running costs. The current requirement to qualify for the government's Boiler Upgrade Scheme (open till April 2025) is that there is no outstanding recommendation for loft or cavity wall insulation in the building's energy performance certificate*.

* https://www.gov.uk/guidance/check-if-you-may-be-eligible-for-the-boiler-upgrade-scheme-from-april-2022

District Heat Networks



Density of buildings recommended for connection to district heat network in medium ambition scenario (red) and high (yellow)

Heat supplied through underground pipes from a centralised energy centre, or a network of decentralised energy centres, tends to be the most suitable solution for denser urban zones, particularly where there are large numbers of buildings that require retrofit to make them suitable for heat pumps which is either too expensive or impractical (e.g. historic attractions). Heat networks cause less disruption in dwellings during installation compared to some other options, though there are wider considerations such as traffic disruption during pipe laying, and space restrictions in city centres, which are of particular issue in a medieval city like York.

The red shading in the map shows core district heat coverage, where buildings are connected to the network in both medium and high ambition scenarios, so are low regrets. The yellow shading shows the extended coverage in the high ambition scenario. From the map it is also apparent that the density of Clifton and its adjacency to the core heat network could make it suitable for expansion of the core heat network, as an alternative to using individual heat pumps in that area.

Areas in and around the city centre, as well as in the Acomb to Rufforth zone have the density which makes heat networks likely to be viable. Energy masterplanning has already been undertaken for the York Central development, a major brownfield redevelopment site. The options studied include connection of the new residential and commercial buildings around the train station, as well as the railway museum, to a new district heat network which could be supplied by a water source heat pump.

This development could form the origin of a larger network, expanded to cover more of the city. The compatibility with net zero targets of investing in new gas-fired assets such as a CHP to serve this network should be carefully considered, as the grid energy displaced by a CHP will be increasingly low carbon in the years ahead*. If a CHP is selected as the heat source, the design of the network should ensure its future compatibility with heat pumps (e.g. pipes sized for low flow temperatures).

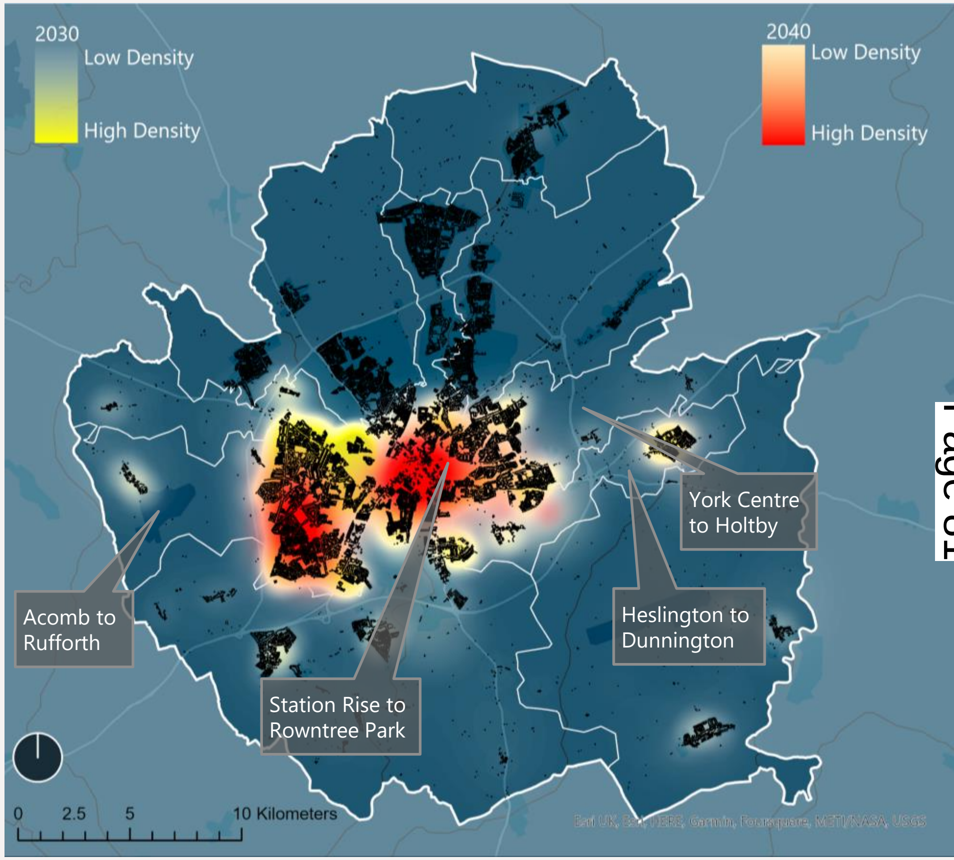
https://www.cibse.org/knowledge-research/knowledge-portal/an-operational-lifetime-assessment-of-the-carbon-performance-of-gas-fired-chp-led-district-heating

District Heat Networks

Heat networks could serve over 20,750 homes (55%), concentrated predominantly in the zones listed below. The Green Heat Network Fund* will have quarterly application rounds from March 2022 until 2025 and could provide funding for heat networks in York.

York sits on a productive aquifer** which has the potential to provide significant quantities of low carbon heat for heat networks. Heat network development projects should consider working with York Hospital, the University of York and Nestle all of which have large demands for heat and may be both anchor loads and providers of heat for use in networks.

Zone	No. Homes Connected	Domestic Peak Demand (MW)	Non-domestic Peak Demand (MW)	Total Peak Demand (MW)
Acomb to Rufforth	8,215	16.6	9.8	22.7
Station Rise to Rowntree Park	3,685	8.5	42.1	48
York Centre to Holtby	5,385	11.5	21.9	30.2
Heslington to Dunnington	2,585	5.5	16.1	20.3



Density of buildings recommended for connection to district heat network in medium ambition scenario (red) and high (yellow)

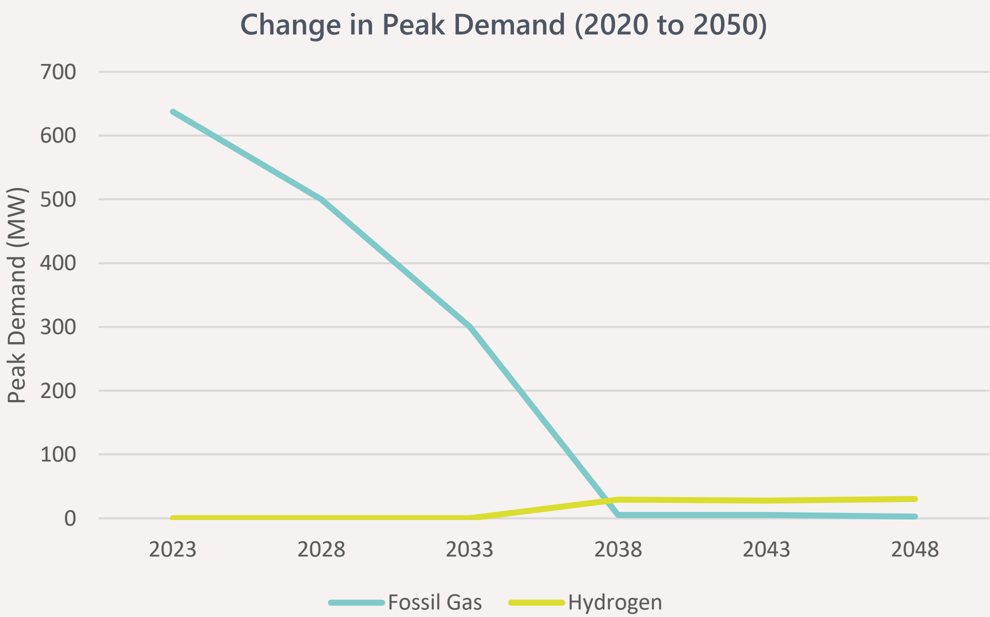
* https://www.gov.uk/government/publications/green-heat-network-fund-ghnf
** http://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSHydroMap&_ga=2.227016797.1726030392.1645026282-782257203.1645026282
Figures shown are based on the medium ambition scenario. Total peak demands are lower than the sum of domestic and non-domestic peaks, as they will not fully coincide in time

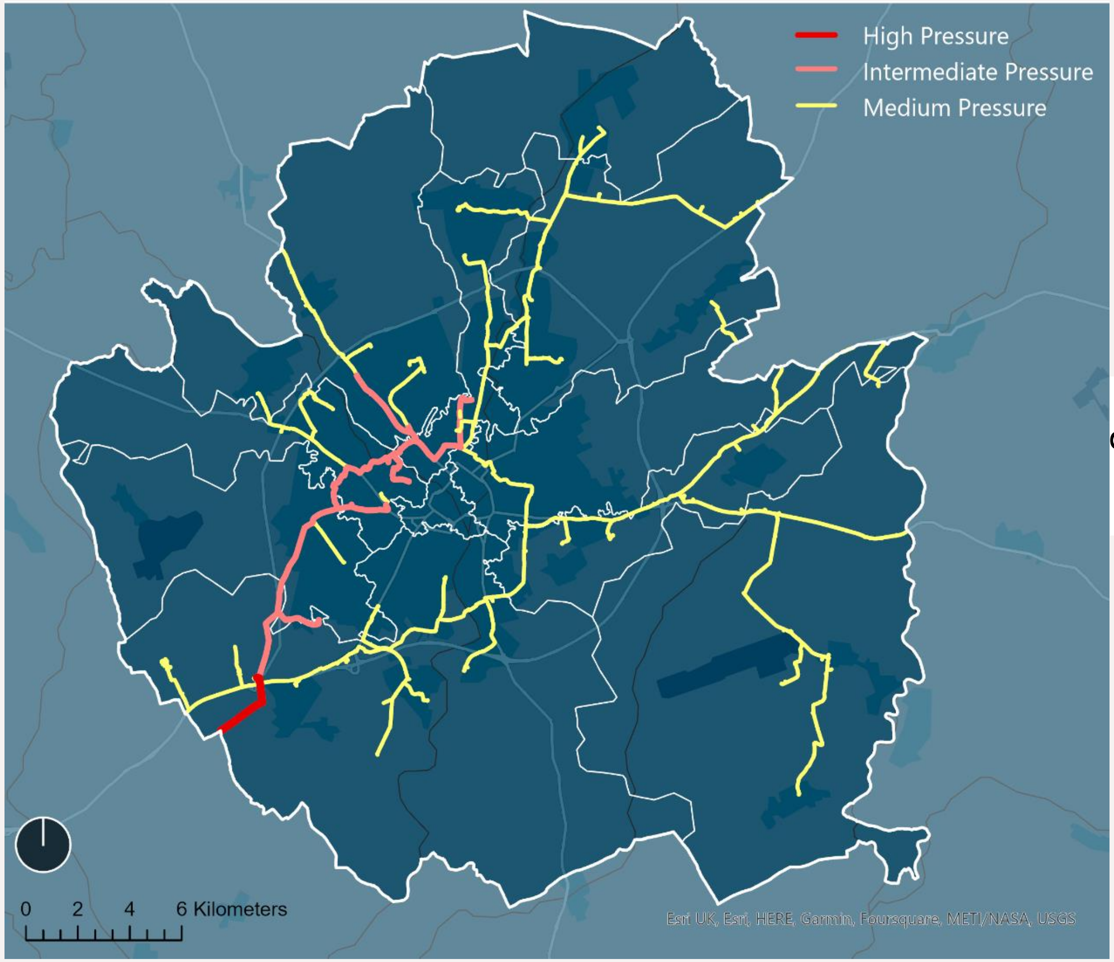
Gas Network

The gas network in York is operated under license by Northern Gas Networks and currently supplies fossil gas to the majority of dwellings (extents of the high-pressure network shown in the map). It is used predominantly for domestic heating, hot water and cooking, but also supports a range of non-domestic and industrial local energy demands.

The current total fossil gas consumption across York is around 1,625 GWh per year. Meeting the net zero goal would mean a steep decline in fossil gas consumed across York, illustrated in the graph below (based on following the 2040 net zero pathway).

Meanwhile, parts of the gas network could be repurposed to supply hydrogen around industrial areas – this is detailed on the following page.





Map of the existing gas network in York

Hydrogen

It is assumed that hydrogen will become available from a converted gas network in the mid-2030s under the H21 scheme*, and therefore cannot contribute to a 2030 net zero target. Even by 2040, the use of hydrogen for home heating is likely to be minimal, as the cost and carbon intensity of hydrogen** are less favourable than for electrification of heat.

There are, however, uses of fossil gas in industry for high temperature processes that would be difficult to electrify, and this is where hydrogen could be usefully deployed. Once these industrial clusters are supplied by hydrogen, it could make sense for nearby buildings, including any homes in the area, to also be heated by hydrogen, avoiding the disruption, upfront cost and space requirements of heat pump installation. This could be valuable in dwellings where space for heat pump equipment is constrained, such as the terraces around the train station and Hazel Court recycling centre.

Use of hydrogen for high-temperature industrial processes.

An example area around the Hazel Court recycling centre where industrial hydrogen use could benefit nearby hard-to-electrify homes

- https://h21.green/about/

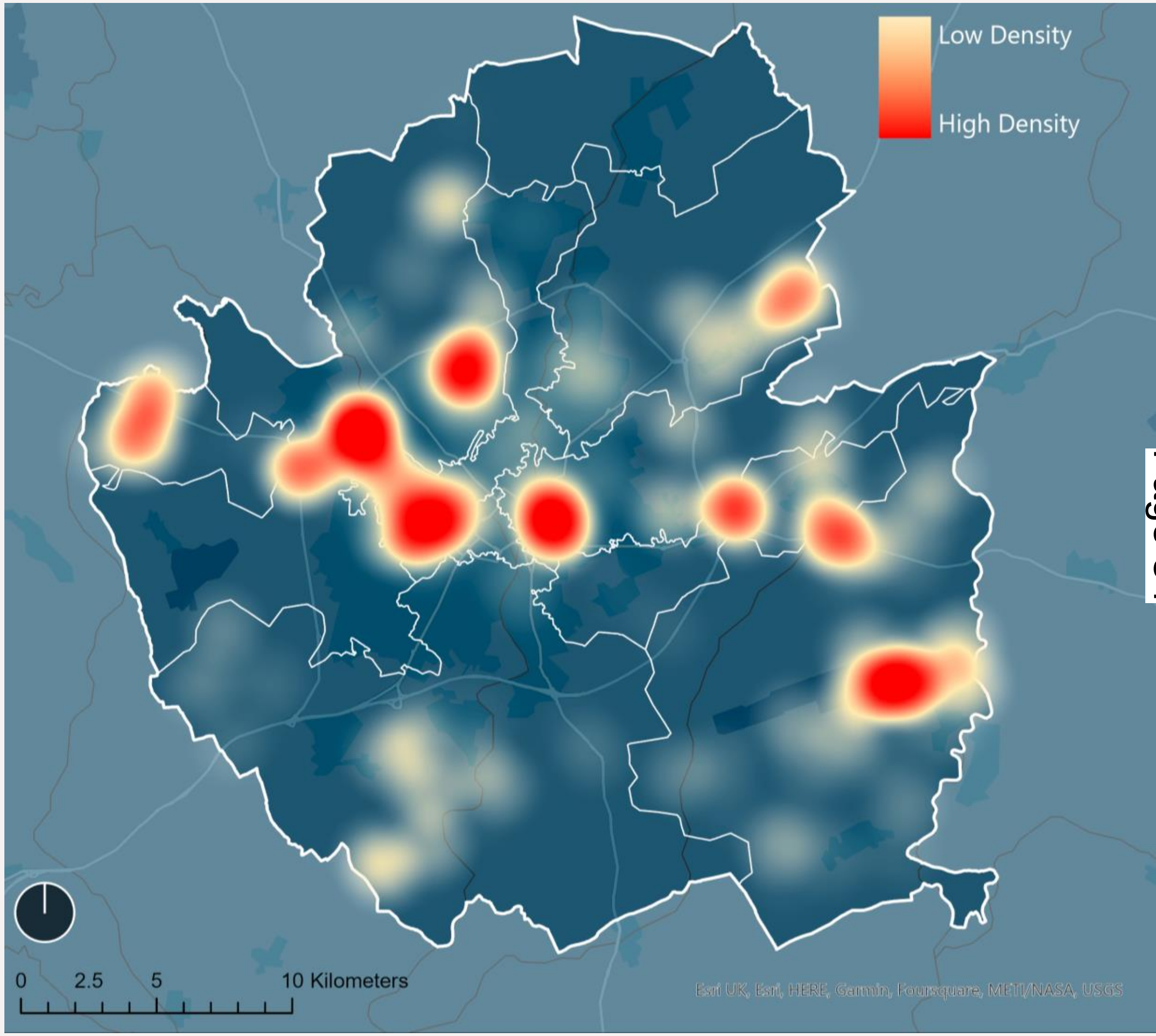
** Hydrogen production cost based on BEIS figures https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011506/Hydrogen_Production_Costs_2021.pdf

Carbon intensity based on the East Coast Hydrogen Feasibility Report https://www.nationalgrid.com/gas-transmission/document/138181/download

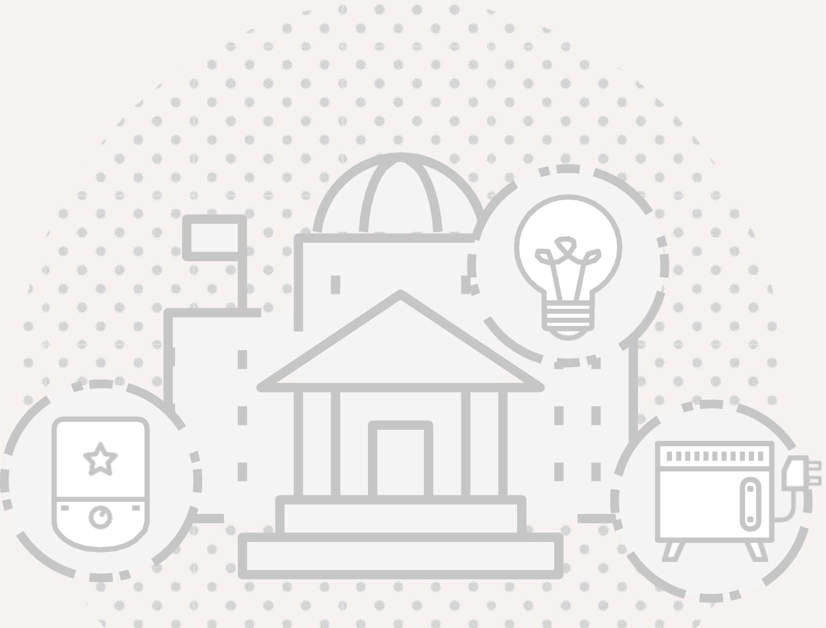
Hydrogen

Areas with high-temperature industrial processes which are unlikely to be reached by a hydrogen network could investigate the use of electrolysers to produce hydrogen on-site. Such electrolysers could form central supplies for a small cluster of nearby users of hydrogen, as shown in the map.

Recognising that there is uncertainty associated with the cost and carbon projections used for hydrogen, near-term focus should be centred on the identified heat pump and district heat network focus zones, keeping options open for areas outside the focus zones. The UK government is expected to clarify its strategy on the use of hydrogen for heating buildings in 2026, which will give a steer on the decisions for these areas.

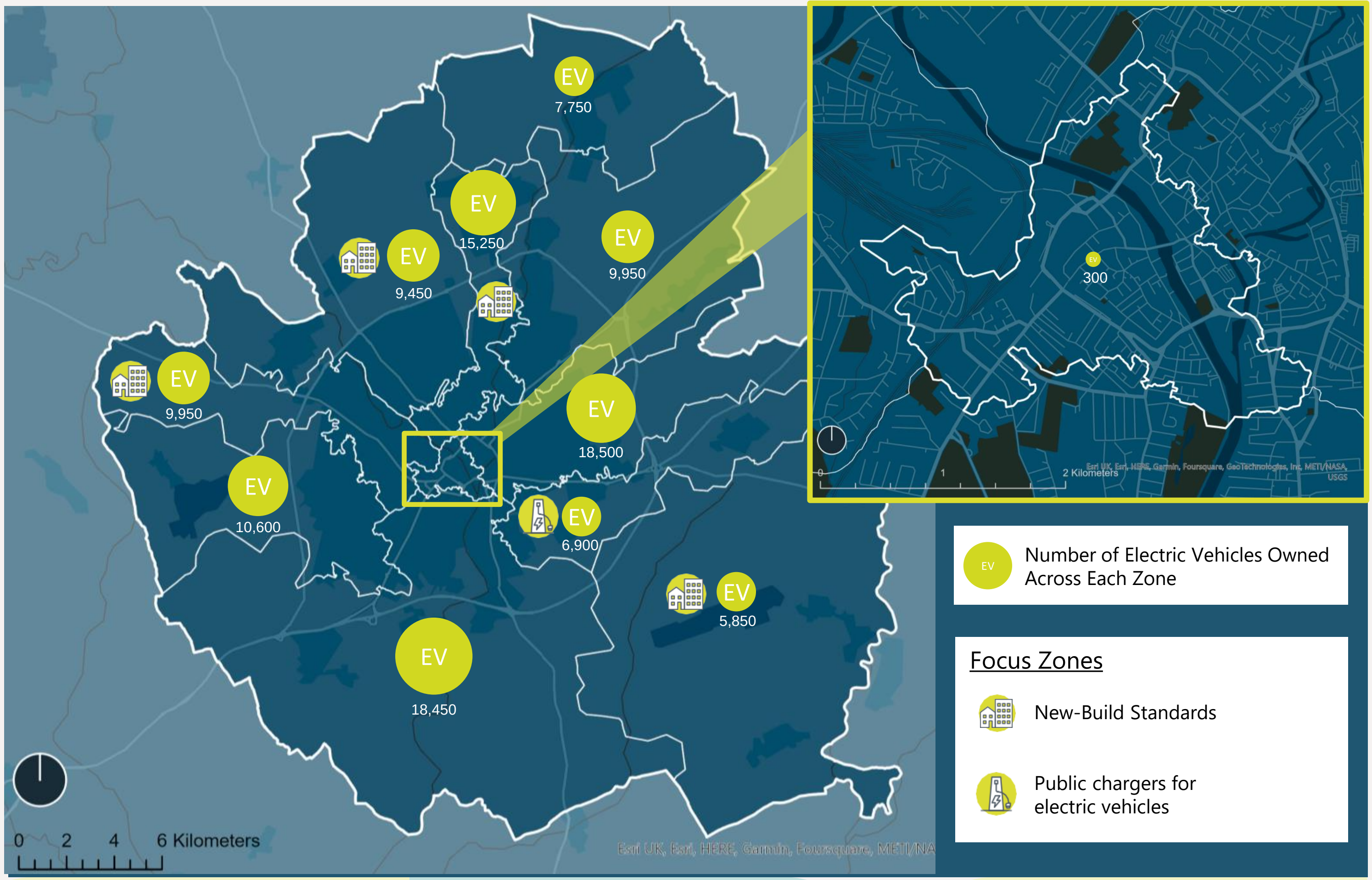


Use of hydrogen for high-temperature industrial processes



Transport

EV Overview



113,000
Electric cars and vans by 2040

168 GWh/year
Energy consumption for charging when 100% of cars and vans are electric

48%
Households have off-street parking, suitable for home charging

Electric vehicles (EVs) are expected to grow significantly in number as a proportion of total vehicle fleet, as purchase costs match or fall below those of petrol and diesel vehicles, local clean air zones favour clean vehicles, and national policy phases out petrol and diesel vehicle sales by 2030 and hybrids by 2035. Reaching net zero ahead of the national target would require strong incentives for residents to shift to electric vehicle purchases earlier, which could lead to the scrappage of working vehicles.

Projections of an increasing proportion of private electric vehicles were used to anticipate the electricity demand across York for charging these vehicles, and the associated infrastructure upgrades that would be required. EV uptake is higher in the more suburban and rural areas of York, with city dwellers being less likely to own cars.

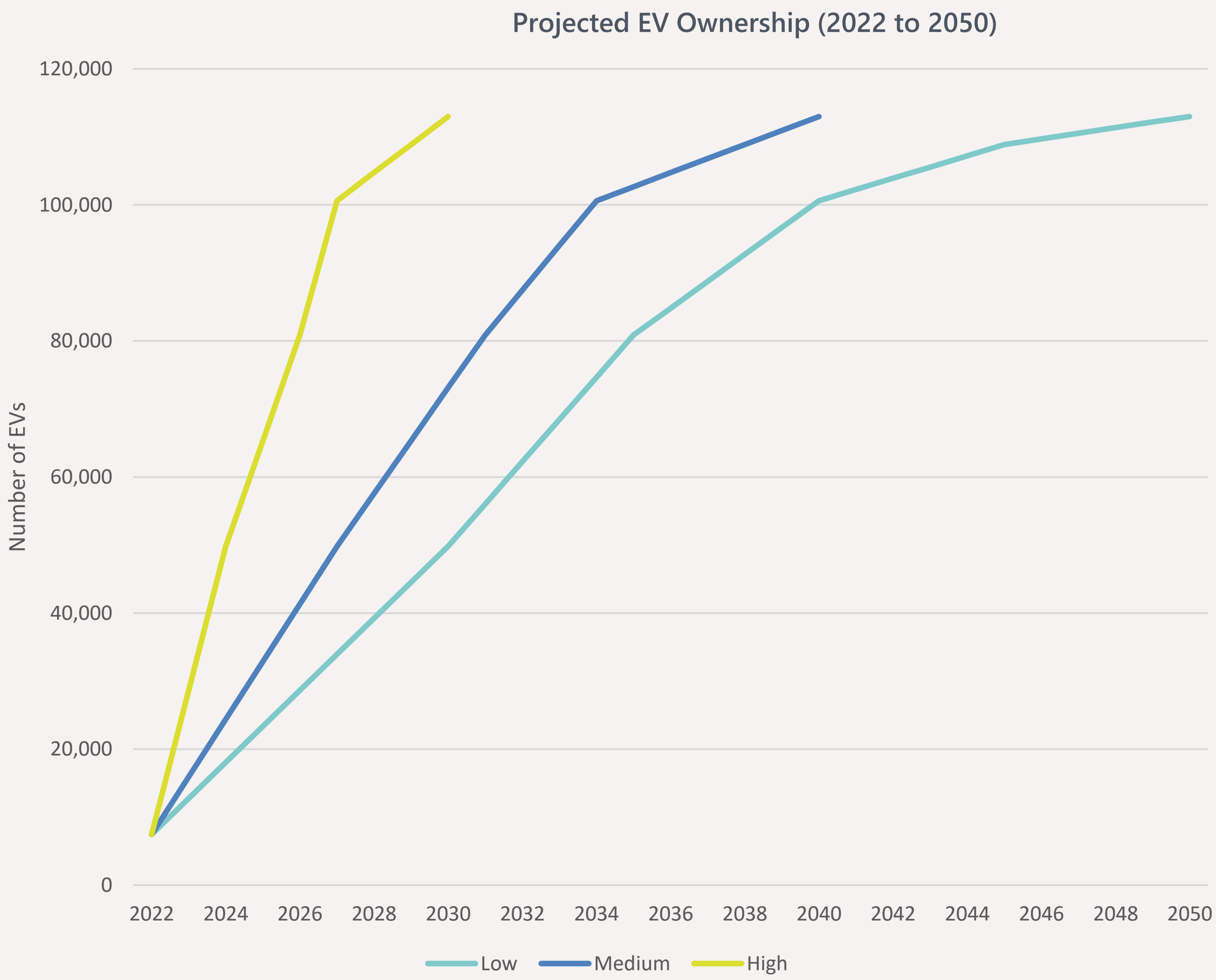
Areas with large numbers of new builds expected can ensure homes are built with EV chargers in place, avoiding the need for costlier retrofit at a later date.

EV Projections

Based on projections by Transport for the North, plug-in cars and vans are expected to grow from their current level of around 9,150 in the year 2022 to 49,800 vehicles (~50% of the total fleet) by 2030 and over 113,000 (100%) by 2050. To reach net zero before the national target, this transition would need to happen even faster, with the sale of new petrol and diesel vehicles having to end by 2025 if premature replacement of vehicles is to be minimised (assuming a 15 year vehicle lifespan).

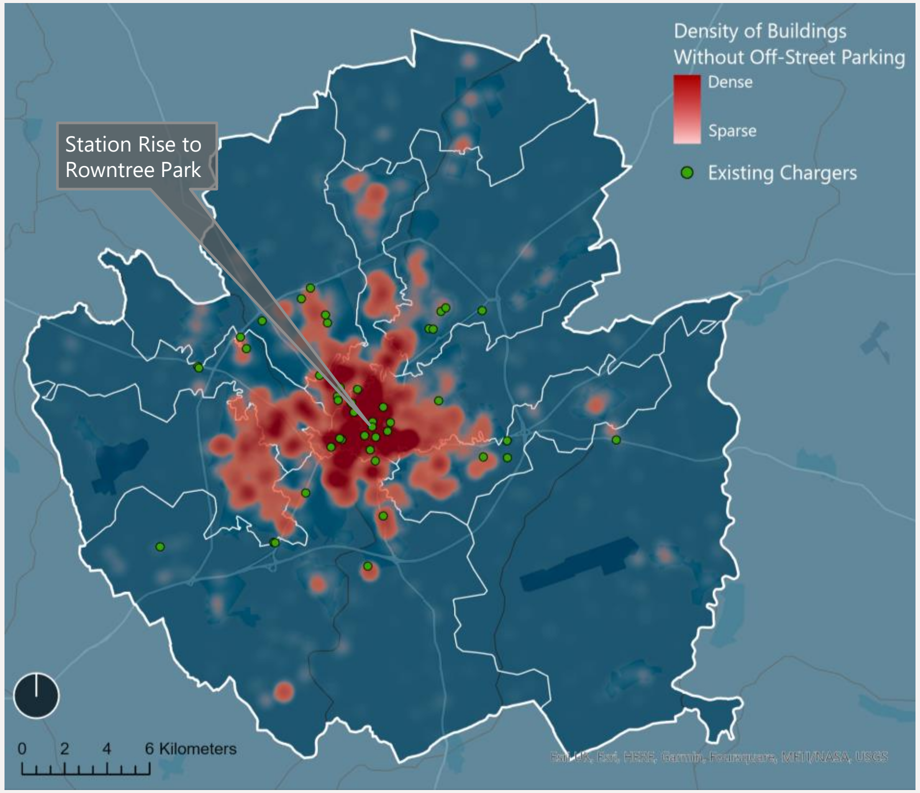
Currently there are few options available to local authorities that give this level of control, however the introduction of low emission zones which charge non-EV owners for entering certain areas can help to drive behaviour. Access to abundant and reliable charging infrastructure will also be important to encourage the transition and keep up with demand. This provides confidence to residents that they can be part of the transition and reduces the 'range anxiety' often cited as a block to EV uptake.

For more information about the Transport for the North data which fed into this plan please visit: https://evcivisualiser.z33.web.core.windows.net/

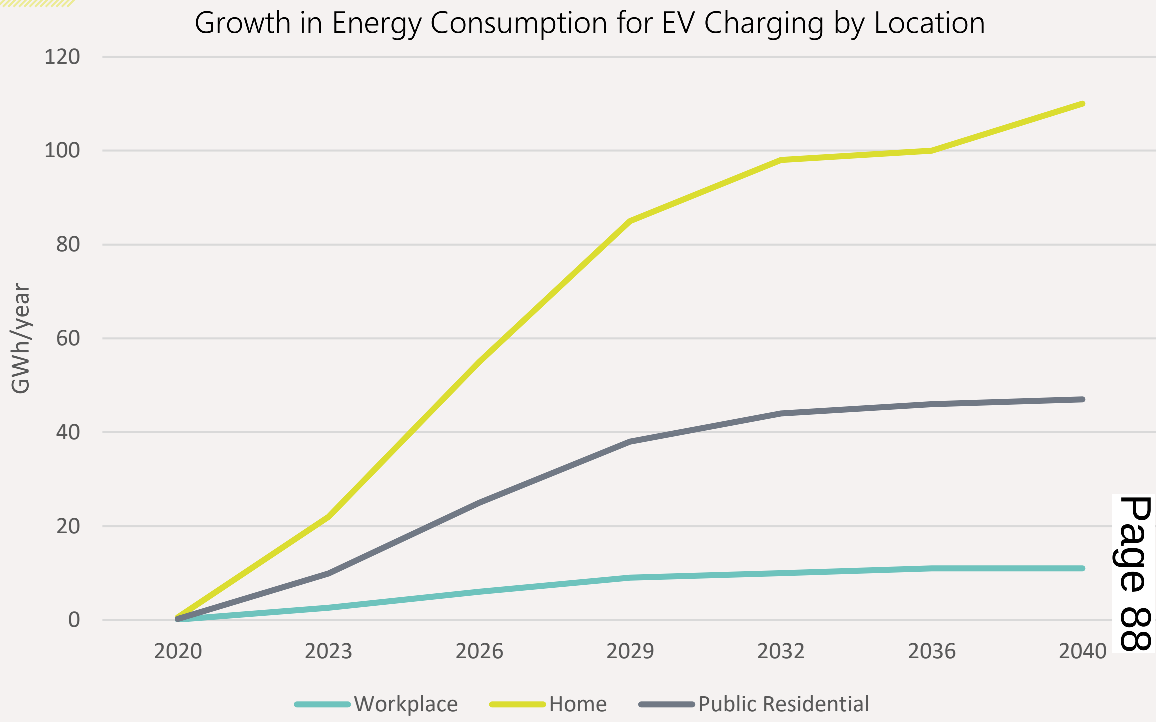


EV Charging Infrastructure

Density of housing without off-street parking & existing charge points



Areas of high-density housing without off-street parking are largely concentrated around York city centre, as seen on the map above. Only 17% residents in the Station Rise to Rowntree Park zone have off-street parking, where prioritisation of public charging infrastructure would be crucial to ensure an equitable transition to low carbon transport.



Those residents without off-street parking will require ready access to charging hubs, kerb-side charging, destination charging, workplace charging, etc. Given that only 48% of the residents of York have access to off-street parking, significant investment needs to be directed towards public EV infrastructure. Funds such as ORCS (On-street residential charge point scheme) and Local EV Infrastructure Fund can be utilised to support the development of this infrastructure. The City of York Council's EV Charging Strategy* sets out plans to further develop York's already extensive public charging network (with around 130 charge points currently available), building HyperHubs to deliver ultra-rapid charging at strategic locations.

The electricity requirement to charge electric vehicles in various locations is expected to grow as shown in the graph above. Home charging is likely to remain the most cost-effective and convenient way of charging an electric vehicle, therefore those who have access to off-street parking are assumed to choose this option whenever possible.

* https://www.york.gov.uk/downloads/file/6264/city-of-york-public-ev-charging-strategy

EV Focus Zones

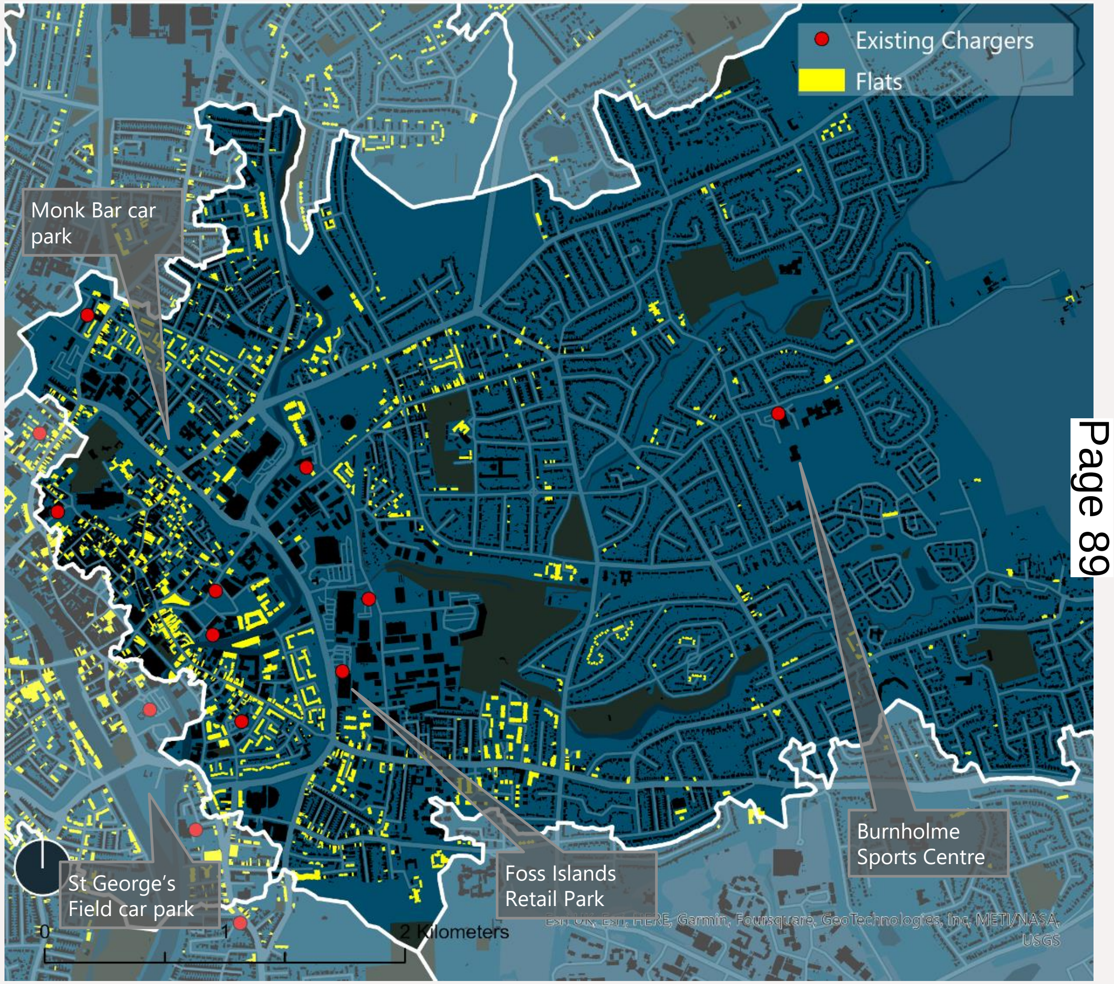
The Bishopthorpe to Copmanthorpe zone and the York Centre to Holtby zone have the largest expected uptake of EVs due to high private vehicle ownership, with around 18,500 expected in each zone by 2040 for the medium ambition pathway. Given there is significant spare capacity on the electrical network in the York Centre to Holtby zone, this has been identified as a focus zone for installation of public charging infrastructure.

Currently, there are around 135 public charge points around the city, but further expansion would be needed to keep up with demand in the near future. Given that there are a large number of flats in the York Centre to Holtby zone and little off-street parking (as shown in the map), it is likely that most charging will need to be provided by public charging infrastructure. This would include a mixture of kerb-side and destination/site charging.

The Foss Islands retail park, with a number of large supermarkets and major outlets, is a clear opportunity for the expansion of public charging provision, where residents and visitors will routinely spend prolonged periods parked. Beyond this, other public facilities such as the Burnholme Sports Centre could host EV chargers.

The Grimston Bar park & ride (off map) will host parked cars for prolonged periods – another opportunity to expand public charging (in addition to the chargers already present). There are a number of car parks in and around the city centre such as St George's Field which could have charging infrastructure installed, in addition to those such as Monk Bar which already have planned roll-out.

In the Wheldrake to Kexby zone, the Holgate to Hessay zone and the Clifton to Corban Lane zone, where substantial numbers of new homes are anticipated, EV charging can be fitted during construction, incentivising EV ownership and avoiding the need for costlier retrofit. Strategic transport planning in these areas to provide access to quality public transport and active travel routes could encourage behaviour changes that reduce car dependency, while promoting health.

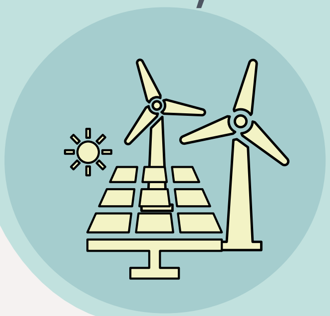


Map showing flats and existing EV chargers in the York Centre to Holtby zone

In areas where demand is likely to be high, City of York Council should work with private providers to increase provision of charge points whilst targeting public sector funding towards providing charging infrastructure in areas where the private sector could struggle to build a business case. This could be due to lower charge point utilisation or where problems with network constraints or high connection costs could be additional barriers.

Local Generation

Overview

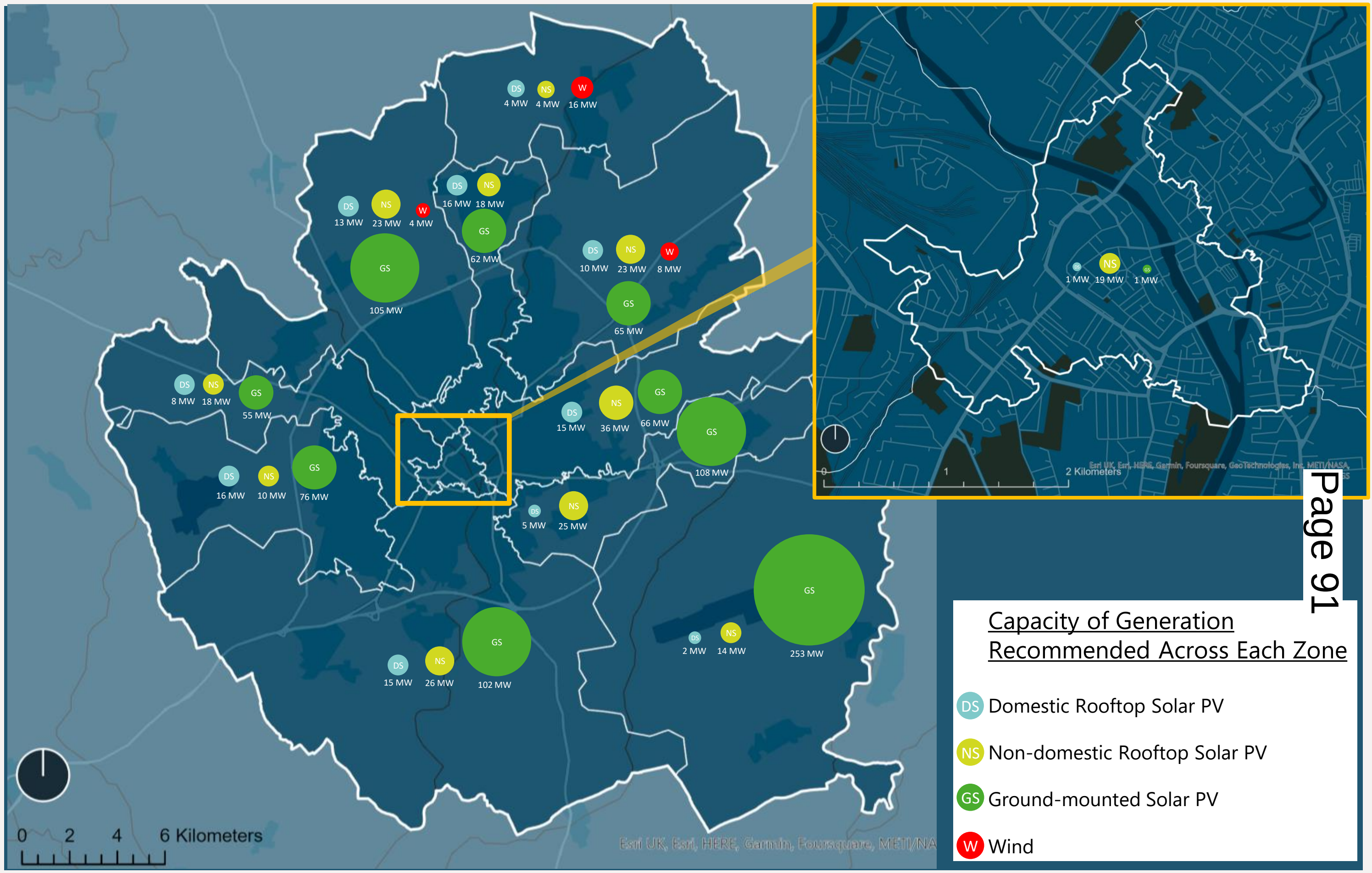


1,240MW

of wind and solar generation capacity could be developed

£840m

Investment in local renewable generation



Electrification of heat and transport is essential for decarbonisation, since oil and gas supplies are unlikely to decarbonise, or face major uncertainties doing so. This electrification will increase York's annual demand for electricity from 773 GWh to 1,273 GWh between 2020 and 2040. York can participate in producing that electricity from low carbon sources by deploying rooftop and ground-mounted solar as well as onshore wind, which will reduce the area's emissions faster than relying on grid decarbonisation.

Local generation of electricity is less essential for reaching net zero than eliminating local fossil fuel use in buildings and vehicles. This is because the electricity network is on a credible path to full decarbonisation, with an intention to reach net zero by 2035. Renewable generation built in York can contribute to national progress as well as accelerating local emissions reductions. The area, which is suitable for large scale renewable projects, could produce more energy than is used locally, even allowing York to become a net exporter if fully developed.

To further reduce the spend on imported electricity from the grid, York may wish to explore the use of power purchase agreements (PPAs)* and novel approaches such as local market places and peer-to-peer (P2P) networks. These all aim to maximise the consumption of local production within the area.

* For an example of a virtual PPA with large solar developments, see https://www.novartis.com/news/media-releases/novartis-set-achieve-100-renewable-electricity-its-european-operations

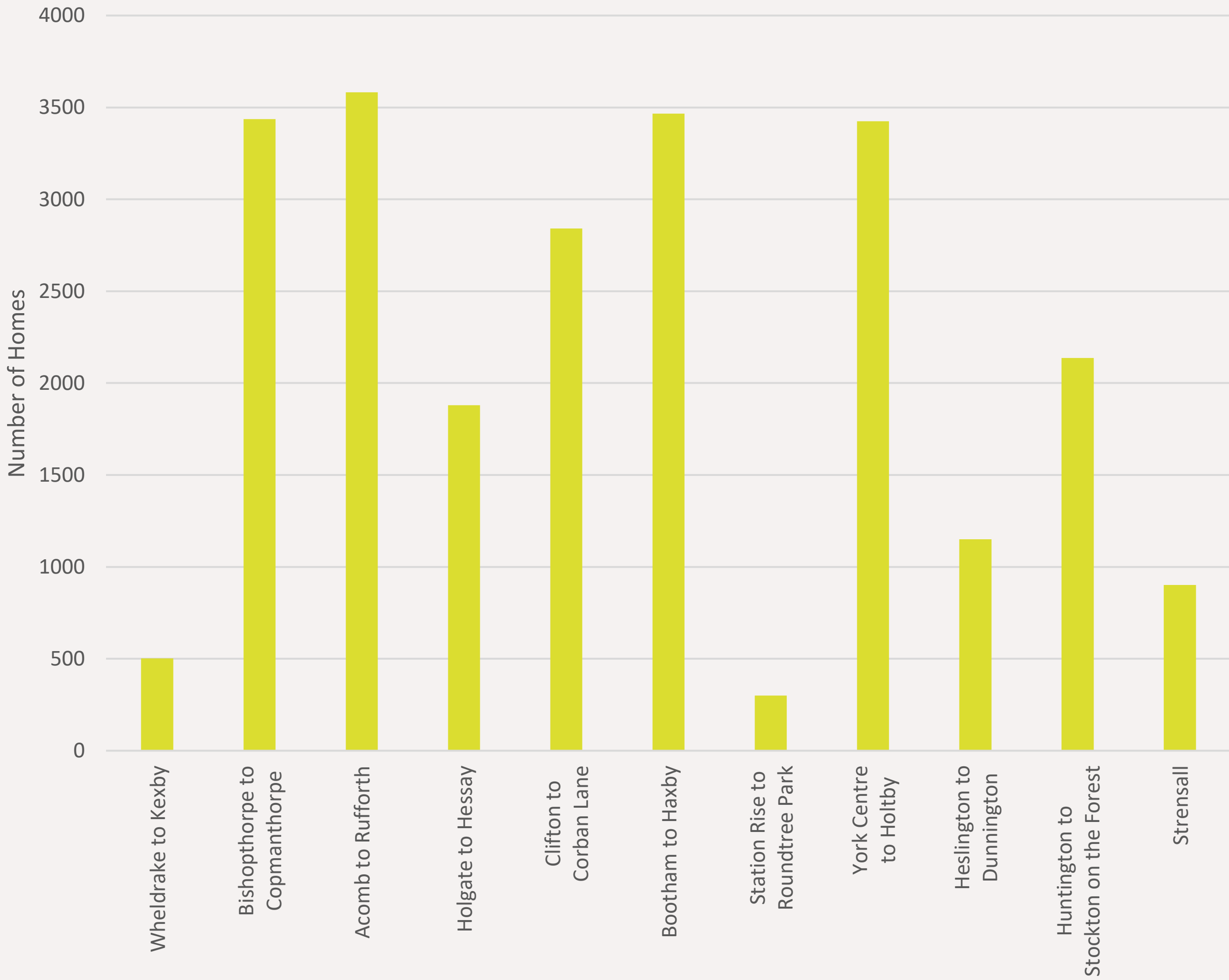
Domestic Solar PV

Although more expensive per unit of energy generated than ground mounted solar and wind, domestic PV makes use of roof space that would otherwise be unused and can provide direct financial benefits to householders. The recent energy crisis has resulted in rising costs of wholesale energy, which further improves the investment case for rooftop solar while energy prices remain high. A large rollout of domestic PV is of value regardless of the net zero target date chosen and therefore is deemed to be low regret.

Based on roof orientation and pitch, homes are identified for solar PV suitability. If fully developed, a capacity of 105 MW could be installed for a total investment of £137 million. This would contribute 91 GWh per year to York's 1,235 GWh electricity demand in 2040 (with electrified heating and transport).

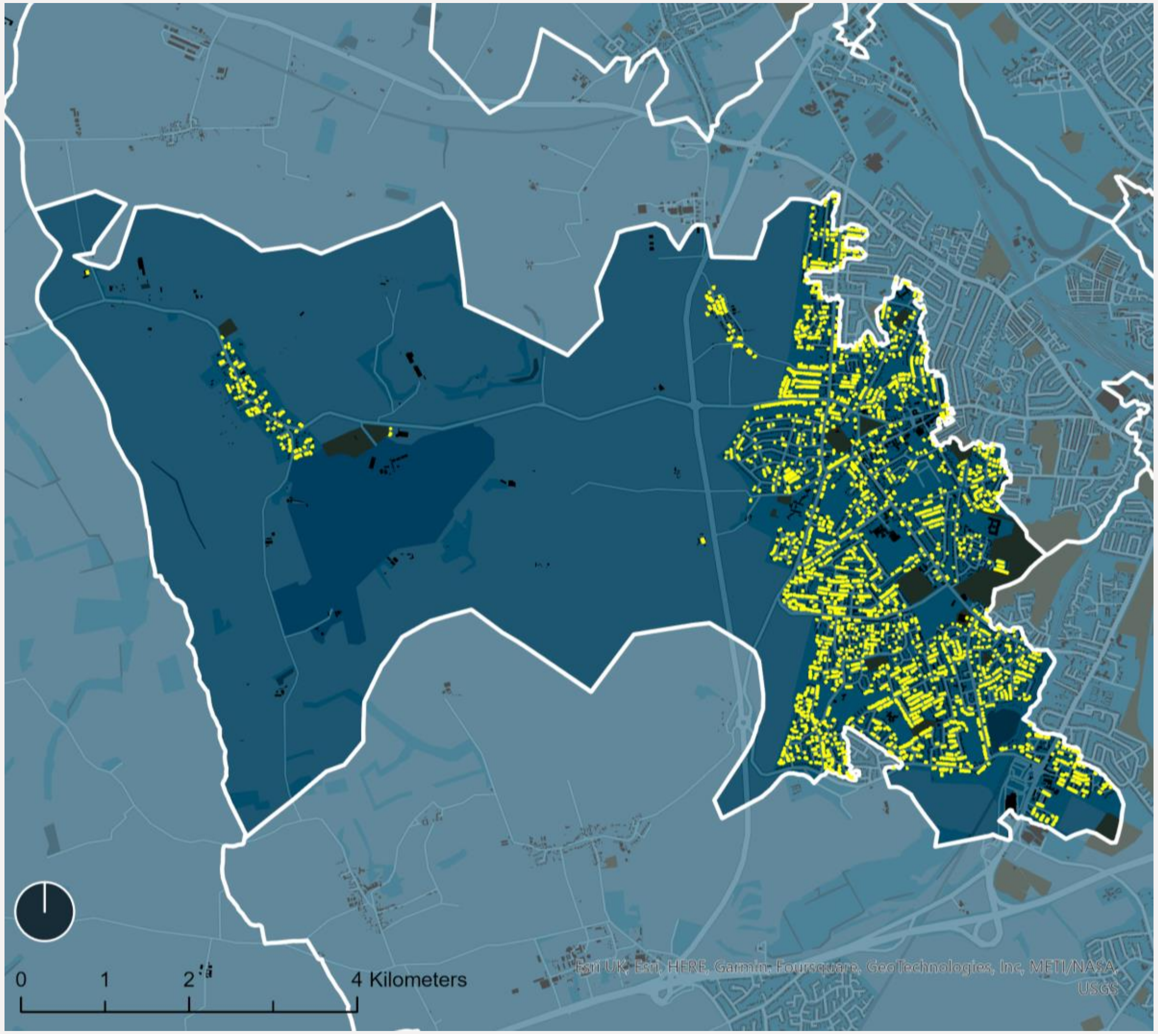
Local authority owned housing and social housing could be prioritized for roll-out of domestic PV in York. This approach could stimulate supply chain and skills in the area, preparing them for a larger roll out in private rental and owner-occupied residences. To assist owner-occupiers to invest in solar installations, programmes such as group buying schemes, which can be initiated by the LA, can be utilised to develop economies of scale and reduce costs to residents.

Number of homes potentially suitable for domestic rooftop solar deployment in each zone



Domestic Solar Focus Zone

The Acomb to Rufforth zone has the greatest capacity for new generation in the local network, suggesting a large number of homes can install rooftop solar PV before network constraints are encountered. This also coincides with the greatest number of homes likely to be suitable for solar PV (over 3,500), making the Acomb to Rufforth zone ideal for an early focus of effort. Whole neighbourhood approaches could be taken to raise the profile of domestic solar to householders and drive down costs with scale and efficiency of installation.



Homes with potential for rooftop solar PV in the Acomb to Rufforth zone

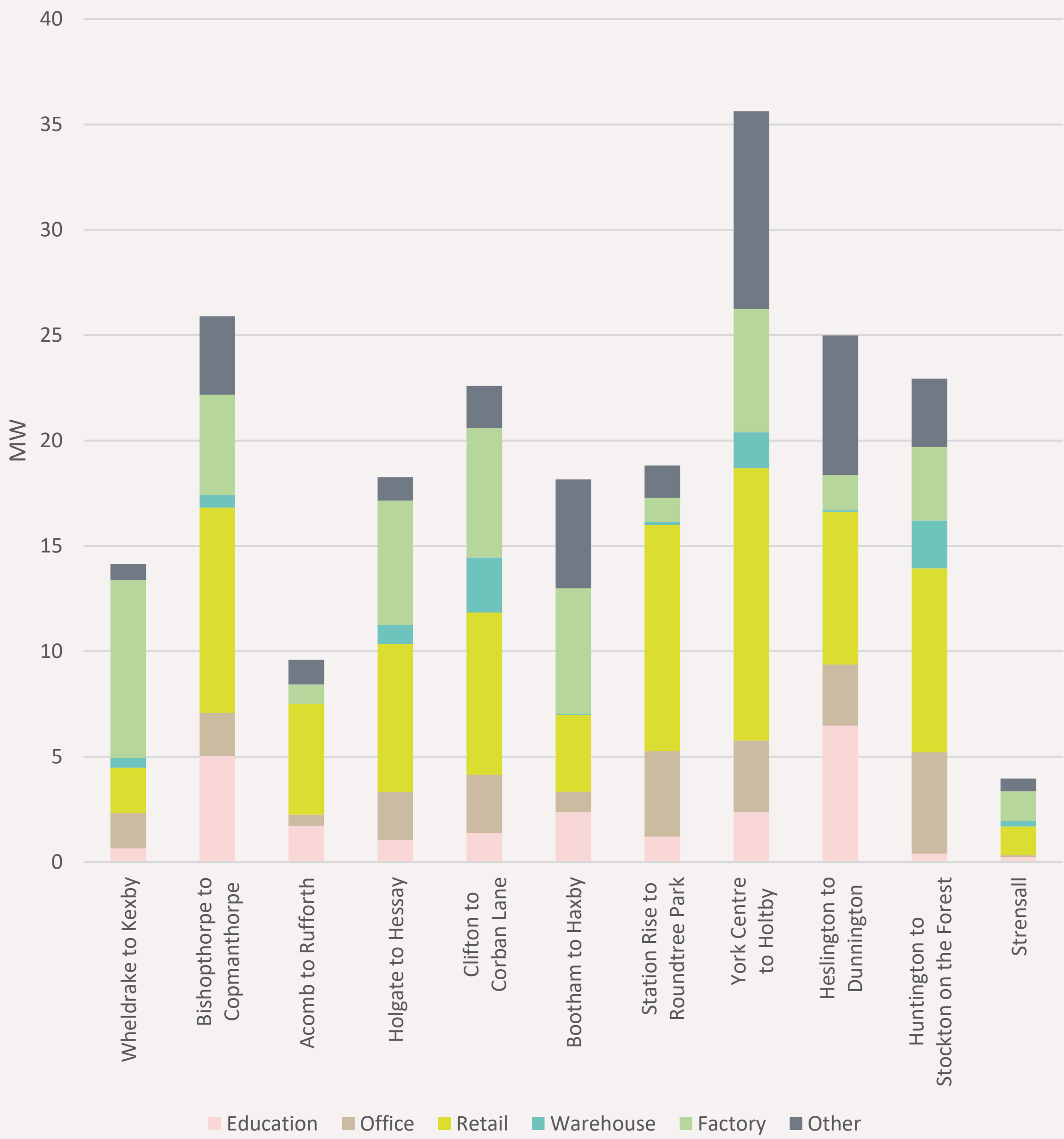
Non-Domestic Solar

Non-domestic solar installations also contribute to cost effective decarbonisation plans for York, regardless of the level of ambition. They have the potential to be more cost effective than domestic solar, but there are some challenges that arise when the building owner is not the bill payer. These projects would be low regret and should give confidence that they are an appropriate investment. The chart shows the potential capacity for non-domestic solar deployment, based on available roof space and assumptions about the extent to which it could be developed.

Non-domestic building construction is more variable than domestic, and it is not possible to say if a building is suitable for PV without a site survey of the roof construction, load bearing capacity and the extent to which other building services such as cooling vents are present.

With almost 10MW of rooftop solar already deployed on non-domestic sites, available roof space could host up to 215 MW of PV capacity if fully developed. This would contribute 207 GWh/year of electricity, for an investment of £195m.

Rooftop Solar PV Potential on Non-Domestic Buildings in Each Zone



Large-Scale Renewables

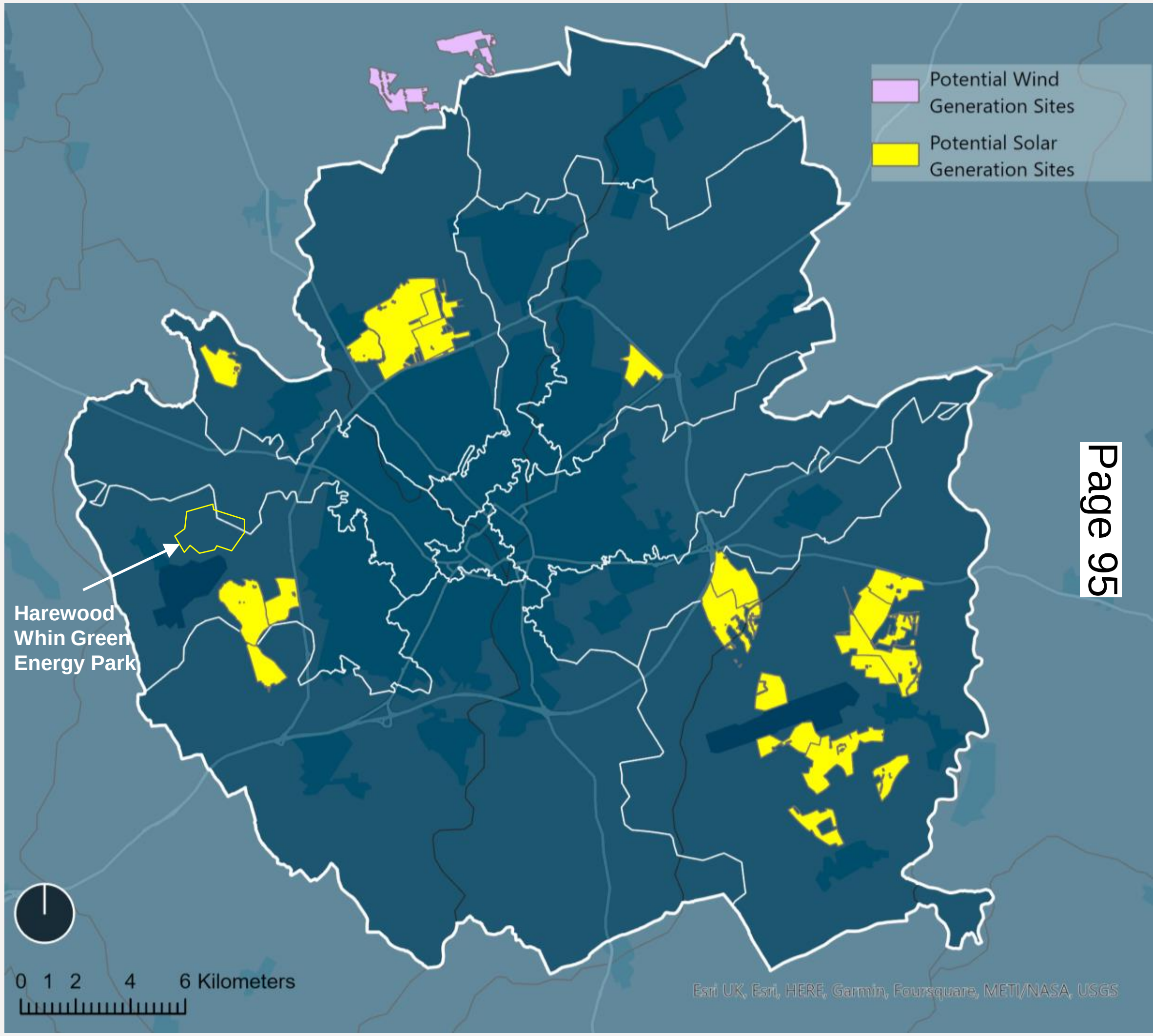
Large-scale renewable generation, particularly ground-mounted solar PV and onshore wind are the most cost-effective way to produce low-carbon electricity, due to economies of scale. Arrangements such as power purchase agreements (PPAs) and community ownership co-ops can capture this value locally. Many examples of community ownership models can be found in the UK, with local residents enjoying income or bill savings from the schemes.

The requirements for land purchase, planning permission, public acceptance and connection to the grid can put limits on their scale and deployment. While obstacles to development could delay the journey to net zero, they will not necessarily make it impossible to reach, since grid electricity is also expected to reach net zero by 2035.

To give an impression of scale, land in York has been assessed for its suitability for ground-mounted solar and onshore wind. Around 3,900 hectares is suitable to build ground-mounted solar, which is enough space to host 950 MW of solar capacity. This is greater than what was found by the 2014 Renewable Energy Study by AMEC however there were differences in methodology whereby only the top thirteen sites were selected out of a shortlist of fifty-six.

A further 800 hectares of suitable land was found for wind turbines in areas of Hambleton and Ryedale immediately adjoining the York area boundary, sufficient to build 28 MW of capacity for an investment of £33m. No land within York was deemed suitable for onshore wind development using the criteria established. This contradicts the 2014 Renewable Energy Study undertaken by AMEC which found parcels of land with a potential installed capacity of 24 MW. Yorwaste are seeking to install up to 28 MW of solar PV and 2 MW of wind generation at their Harewood Whin Green Energy Park.

The remaining annual energy demand after developing rooftop solar and wind to their full potential could be met by developing 94% (893 MW) of the ground mounted solar potential. This would contribute 858 GWh per year of electricity for an investment of £475m.



Land suitability for large scale renewable developments

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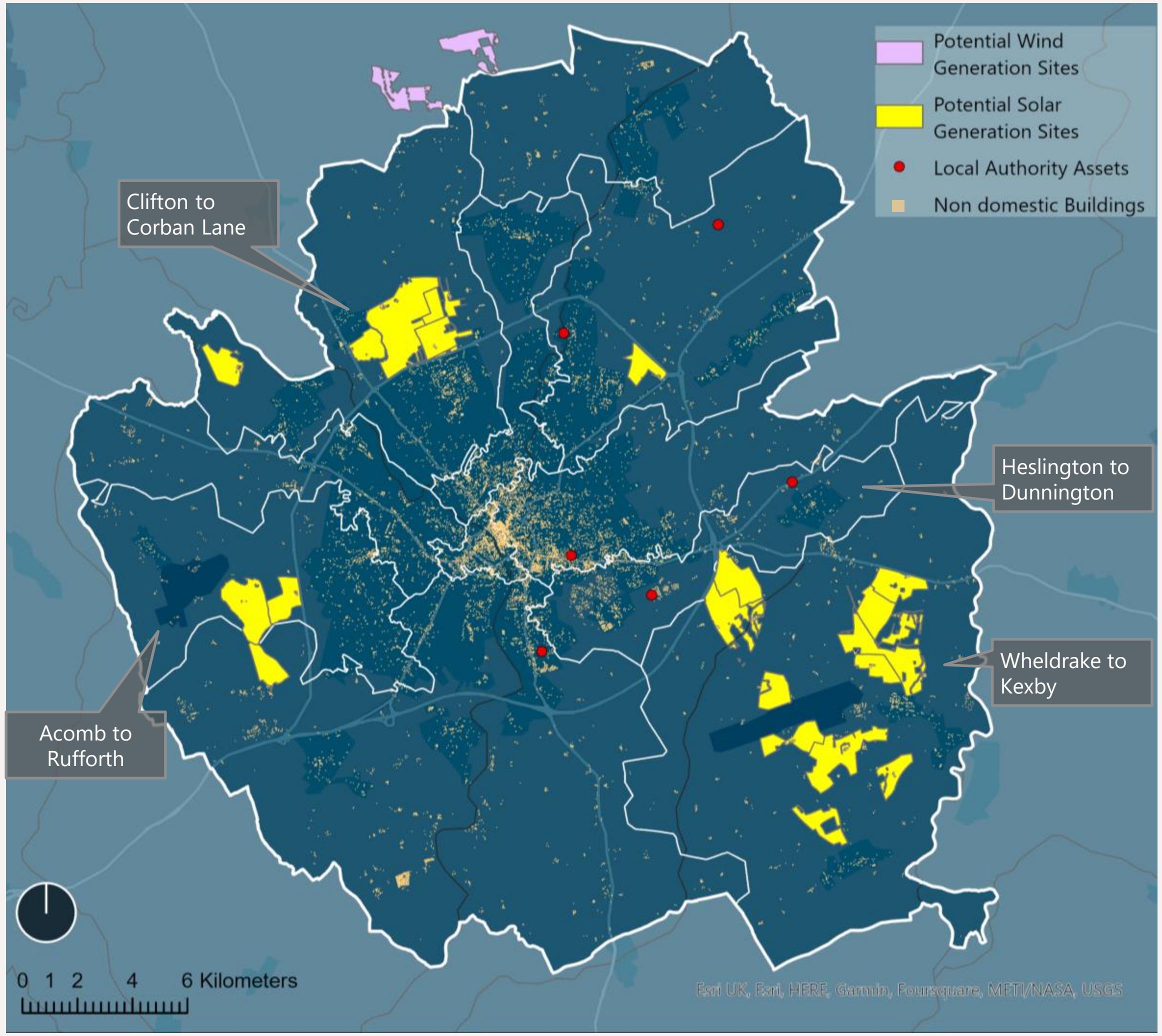
* Costs based on BEIS figures, including pre-construction cost and infrastructure cost scaled to capacity
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/911818/GC20_Key_Data_and_Assumptions.xlsx

Large-Scale Renewables

It is not expected that ground-mounted solar would be built upon a single piece of land, but over a large number of distributed plots across York. These could become part of a local energy marketplace if permitted by regulation, where generation assets could be matched with off-takers requiring electricity, allowing local businesses to directly benefit from the production of locally generated low carbon electricity. Sites are selected according to criteria including vicinity of roads, quality of agricultural land, areas of outstanding beauty and other factors. Sites which would accommodate less than 10 MW or more than 50MW of solar capacity are excluded. For wind, less than 2MW and more than 10MW is excluded, to identify projects of suitable scale for investment and deployment.

The map highlights where non-domestic buildings and council-owned assets are located alongside land which has been deemed suitable for ground-mounted solar and wind.

As an additional benefit, well designed and located ground mounted solar and wind farms can support York's commitment to biodiversity and protecting local wildlife. Many site specific measures can be taken to improve biodiversity, e.g. restoring peatlands on on-shore wind sites.



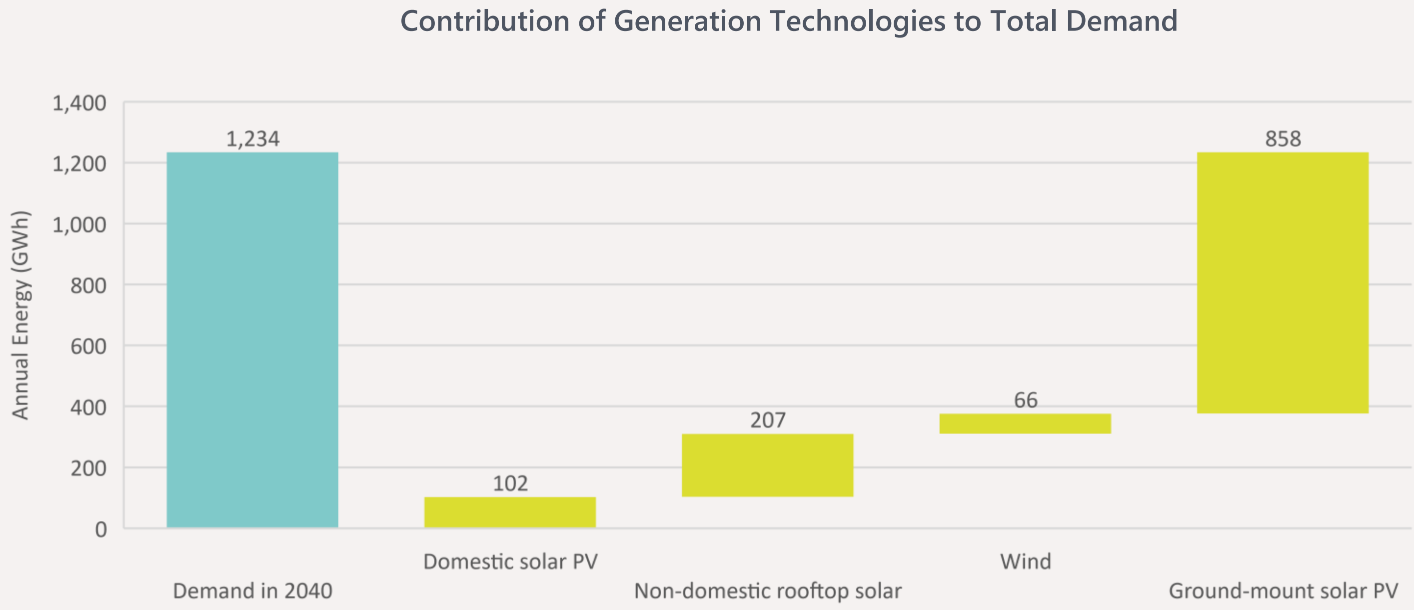
Land suitability for large scale renewable developments overlayed with potential purchases of energy

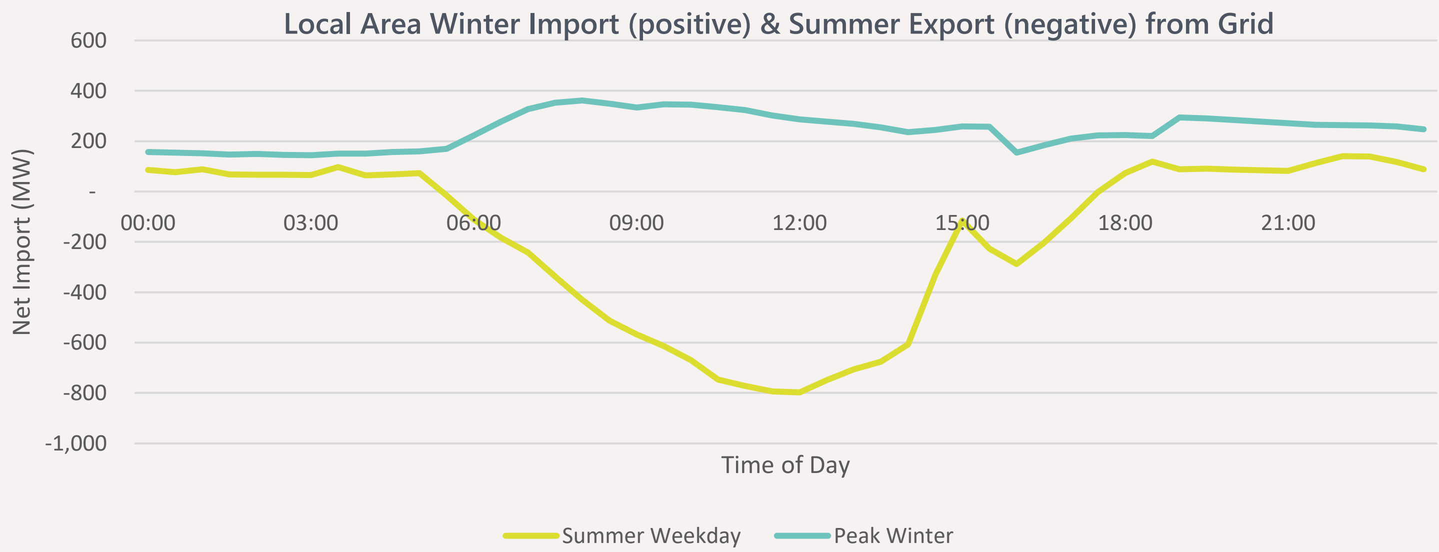
The Wheldrake to Kexby zone, the Acomb to Rufforth zone and the Clifton to Corban Lane zone contain large amounts of solar potential, however, LA assets as well as non-domestic sites are scattered and not always close to generating sites, thus making it difficult to benefit from proximity to generation.

The Heslington to Dunnington zone, with its potential for solar in close proximity to a number of LA assets, could be a potential for private wire and PPA contracts, as well as P2P markets.

Batteries and other types of energy storage could be co-located with ground mounted solar and wind. Co-located battery storage can help to smooth generation and enable participation in grid balancing services, increasing revenue streams available.

Large-Scale Renewables





Priority has been given to fully developing domestic and non-domestic rooftop solar, as no land is needed, and residents and owners can make direct use of the generation. Wind has also been prioritised for maximum development given that its generation profile matches winter heating demand, and the land around wind turbines remains useable for other purposes. The development of ground mounted solar is then scaled to cover the remaining local requirement for energy, on a net annual basis. The contribution of each type of generation is visualised against the total local demand in the top graph.

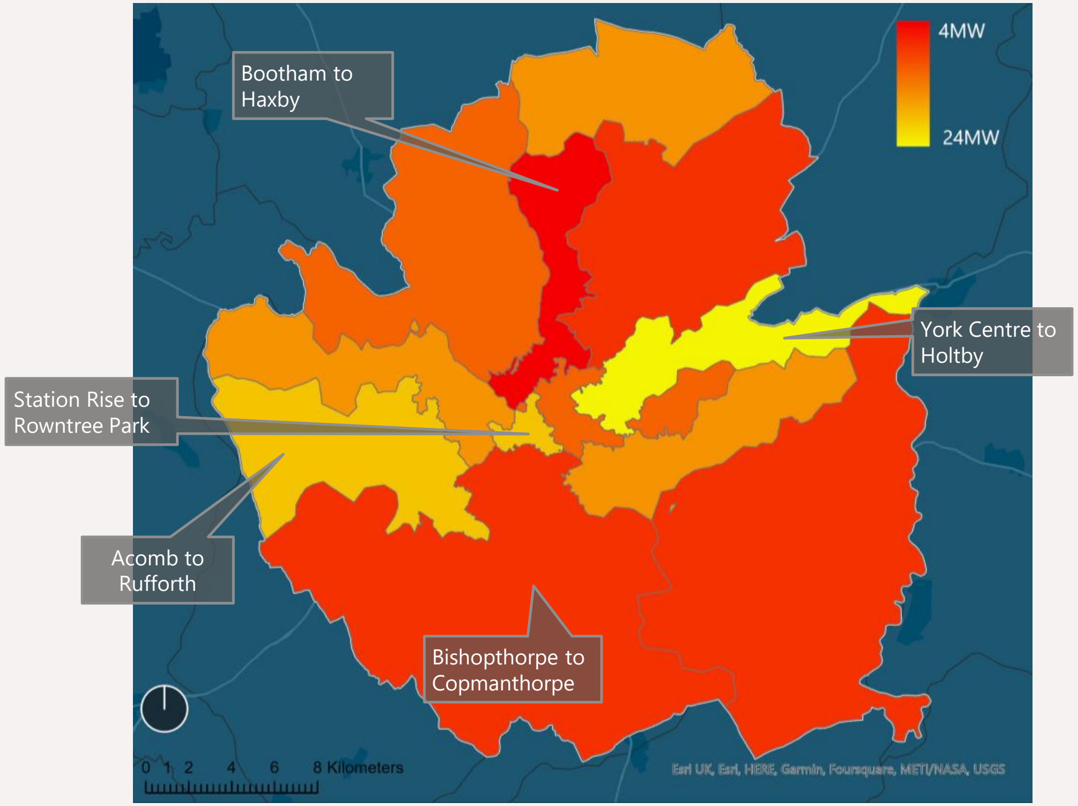
Since renewable generation will vary with weather, time of day and season, York would still need to import from the electricity grid when supply from local generation does not meet demand. Wind and solar are somewhat complementary, with wind increasing in winter months and occurring through the night, while still days are often very bright. Battery storage would enable more of the generated electricity to be utilised locally at times of demand, but would not be suitable to store the energy inter-seasonally to use the summer surplus in winter. Local hydrogen production may offer a viable option for seasonal storage.

Without seasonal storage, the large quantity of solar generation would result in a large summer export to grid from the area (shown in lower graph). There is limited local capacity for increased generation in the area (see https://www.northernpowergrid.com/generation-availability-map). Greater grid capacity would be required to absorb this surplus than the capacity needed to supply the area in winter. Any large scale deployments of solar generation will need to be coordinated with Northern Powergrid to ensure that network capacity is available.

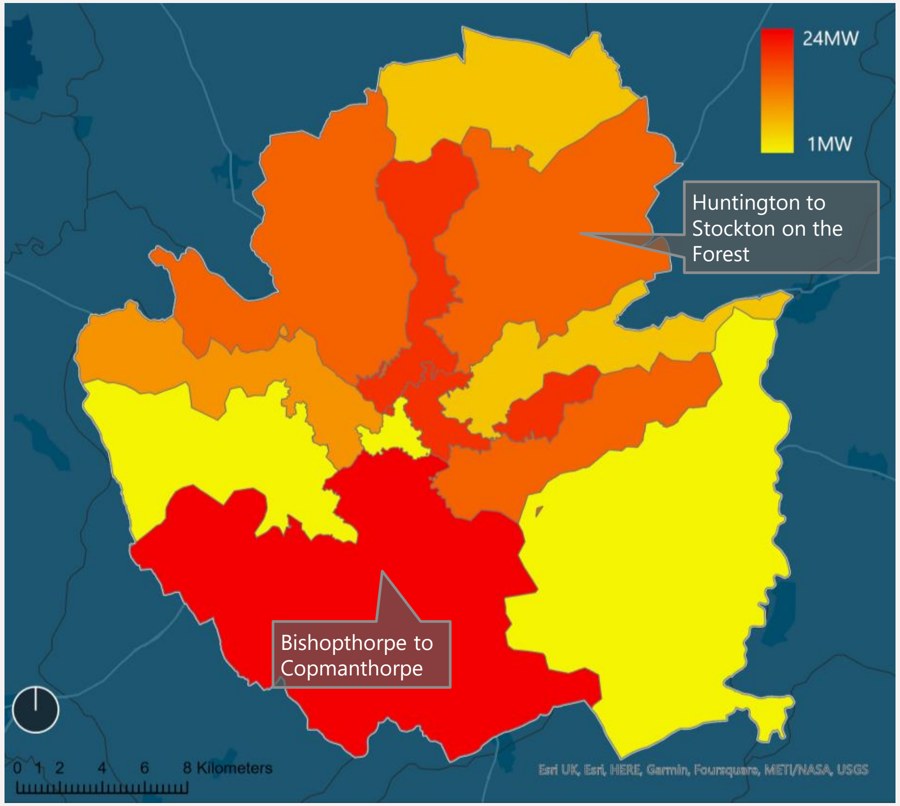
National Grid's Future Energy Scenarios envisage around 20 gigawatts (GW) of solar in the North of England by 2050. If distributed evenly by household, this would be about 315MW for York. This implies that generating all of York's annual demand locally could require more local renewable capacity than the grid is likely to be able to accept.

Networks, Storage & Flexibility

Upgrading the High Voltage Network



Current headroom on the high-voltage network



Increase in peak demand on the high-voltage network to 2040

A total gross investment of £20m in capacity upgrades is estimated across the high and low voltage networks by 2040 to accommodate the changes in this pathway. Ofgem's Open Letter on the Green Recovery Scheme "is aimed at accelerating low regrets, shovel ready network investment under the remainder of the RIIO-ED1 period [ends 31 March 2023] to stimulate economic recovery and support faster delivery of decarbonisation benefits for customers, while supporting Government's climate change ambitions."

The high voltage network consists of substations on land owned by the distribution network operator, supplying feeders which run to secondary substations, which in turn serve multiple streets. The maps above show the areas of York served by each HV substation.

The amount of headroom currently available on the high-voltage network varies significantly across the area, as shown in the left map. Several zones such as Bishopthorpe to Copmanthorpe and Bootham to Haxby have little headroom available, York Centre to Holtby has a lot more, along with Acomb to Rufforth and Station Rise to Rowntree Park to a lesser degree. Large scale electrification is very likely to trigger the need for capacity upgrades, but several areas have sufficient capacity to get started on small near-term projects. As shown in the map on the right, several areas are likely to require capacity upgrade to accommodate the full extent of electrification needed to reach net zero, such as Bishopthorpe to Copmanthorpe, Bootham to Haxby and Huntington to Stockton on the Forest.

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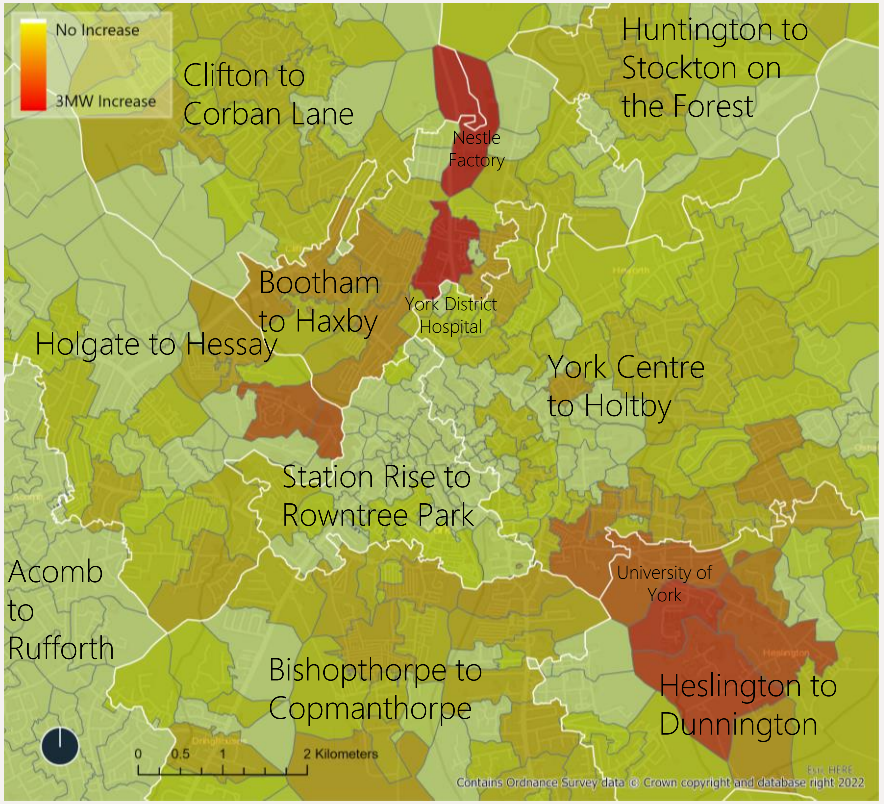
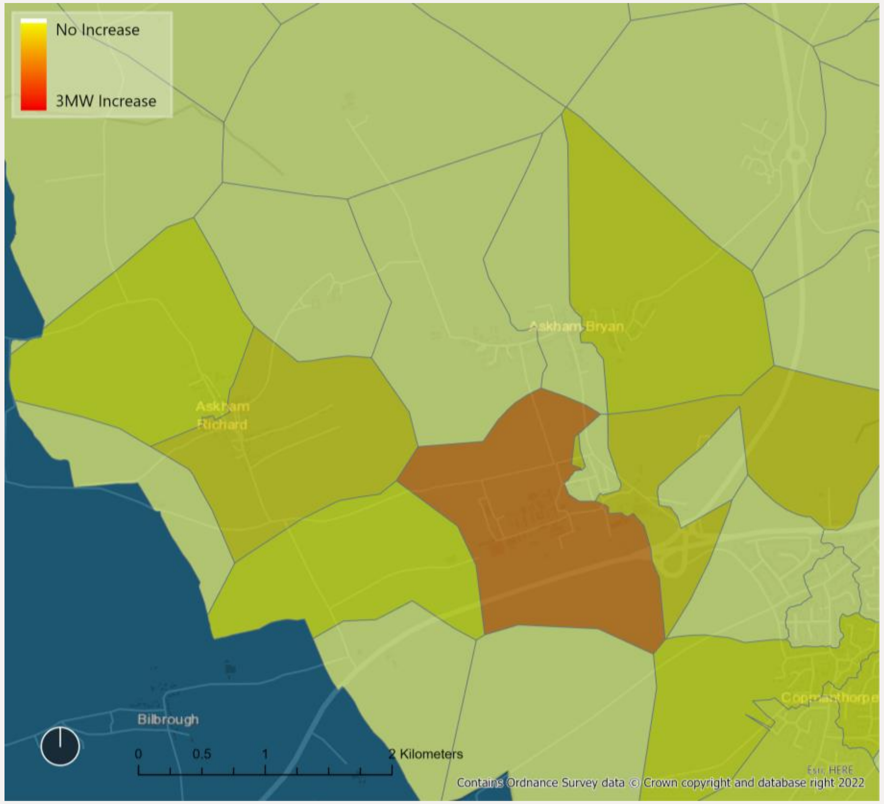
Upgrading the Low Voltage Network



Demand change on the low voltage network around Central York



Increases in peak demand in 2040 in Askham Bryan

The low voltage network consists of smaller neighbourhood substations, supplying feeders which run under pavements or roads to each building or on overhead wires in rural areas. The maps above show for some example areas that parts of the LV network are likely to see significantly more peak demand increase than others, for instance around the York District Hospital and the university campus.

Innovations in flexibility have the potential to delay and reduce the scale of electricity network reinforcement by shifting peak demands to periods of lower demand. DNOs would need to tender for local flexibility services, which could be provided by, for example, smart EV charging.

In some areas flexibility will not be sufficient to manage increased demands without network reinforcement. Discussing plans well in advance with the DNO will ensure that both provision of flexibility and network reinforcement can be planned so that projects are not delayed longer than absolutely necessary through lack of network capacity.

Outline Priority Projects

Overview

In creating the LAEP, near-term projects have been identified that the City of York Council and York & North Yorkshire LEP could start the process of implementation. These near-term projects are either:

- Low regrets –common under various scenarios but may require further enabling action before they can be progressed.
- Quick wins – which can be carried out in the near-term without major blockers.
- Focus zones - specific areas within the LAEP boundary that have a cluster of near- term components.

The purpose of identifying specific outline priority projects is to provide stakeholders with projects that can immediately be implemented to make progress towards net zero. The following section specifies details of these near-term projects, including details such as locations and financial information. Energy Systems catapult "Net Zero Go" platform* provides resources to help local authorities design and develop energy projects.

Further details, information and advice for implementing the Outline Priority Projects can be found towards the end of this document.

* https://www.netzerogo.org.uk/s/

Buildings Efficiency Upgrades

Almost 1,000 terrace homes built between 1945 and 1979 are likely to be suitable for basic efficiency upgrades across the Acomb to Rufforth zone. As this is an area of high fuel poverty, efficiency upgrades would be especially impactful in their social benefits.

Identification of social housing in this area is likely to be a good starting point. It may then be possible to design a scheme that targets retrofit of all social housing, but with an offer to owner-occupied households and private landlords to join the scheme while contractors are in the area. This has the potential to reduce costs for all home owners, at the same time as increasing the number of retrofits carried out.

Zone	Acomb to Rufforth
Building Type	Terrace 1945-1979
Number of homes	1,000
Insulation Type	Basic
Cost	c. £1.1m

Homes suitable for efficiency upgrades in sample area of Acomb to Rufforth zone (does not show all dwellings identified for project)

Heating Demonstrators & Enablers

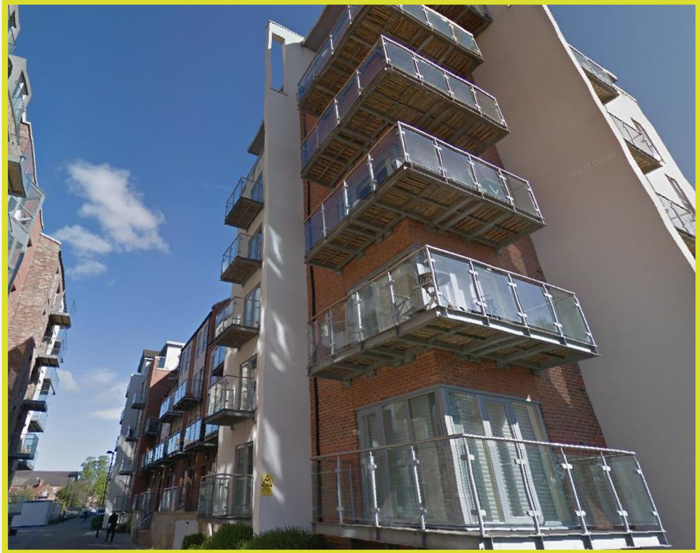
Heat Pump Demonstrators

The Bishopthorpe to Copmanthorpe zone has a significant number of terrace dwellings (just over 4,050) which could be suitable for air source heat pumps making this a good area for early demonstration neighbourhoods. Demonstration neighbourhoods could be valuable for developing the approach for particular housing types, identifying common barriers and finding solutions, such as recommending changes to planning rules.

Terrace dwellings in the Bishopthorpe to Copmanthorpe zone

The York Centre to Holtby zone has many flats (1,650) which could have air source heat pumps installed. Indoor space in both terraces and flats is at a premium and therefore locating the internal equipment could be difficult and is a challenge that will need to be overcome for the decarbonisation of this part of the housing stock. Innovations such as more compact heat storage/batteries* may be part of the future solution. Whole-building solutions which include a central heating supply and a shared distribution could also be investigated.

Zone	Bishopthorpe to Copmanthorpe	York Centre to Holtby
Number of Homes	4,050	1,650
Building Type	Terrace	Flats
Heating System	ASHP	ASHP
Total Cost	c. £28m	c. £11m



Flats in the York Centre to Holtby zone

District Heat Network Demonstrators

In addition to the air source heat pumps, the York Centre to Holtby zone also has the greatest number of flats which could connect to a district heat network (2,650). In the Acomb to Rufforth zone, 1,400 terrace homes could also connect. Both areas could host demonstrators of heat network connection for these types of homes. Early steps could include surveying residents to gauge their appetite and knowledge of heat networks, spreading awareness of the technology, and identifying nearby anchor loads which can vastly improve the efficiency and cost-effectiveness of a heat network scheme.

* https://es.catapult.org.uk/case-study/electrification-of-heat-2000s-flat-heat-pump-installation/

Heat Network Starting Point

The heat network proposed for the York Central Energy Masterplan redevelopment (area A) could form a starting point for further expansion into the city. The area either side of the river near Clifford's Tower has a particularly high density of buildings and heat demand (area B). Although many of these buildings are private businesses, which could be more difficult to get on board, large anchor loads such as the York Castle and Yorkshire museums, student accommodation and the hotels in the area could help secure the viability of a heat network. Heat networks could allow historic buildings such as Fairfax House or York Mansion House to decarbonise with minimal disruption. The heat demands in area B are estimated in the table below.

It may be feasible to extract heat from the river using a water-to-water heat pump, as explored in the York Central Energy Masterplan, which can lead to higher efficiency and lower running costs. York also sits on an aquifer which has potential to provide large quantities of heat.

The mixture of domestic and non-domestic buildings allows for more of a balanced load across the network at any given time. Nevertheless, anchor loads (such as large schools, hospitals, leisure centres) with a steady and constant heat requirement should be sought if possible.

The table shows the split of domestic and non-domestic properties and the peak demands within the starting area marked on the map. (Note: peaks are not additive as domestic and non-domestic peaks will not occur at the same time.)

1. Yorkshire Museum
2. Theatre Royale
3. York Mansion House
4. Travelodge
5. Student Accommodation
6. Hilton Hotel
7. Hampton Hotel
8. Clifford's Tower
9. York Castle Museum
10. York Barbican
11. Novotel

Zone	Number of Domestic Dwellings	Number of Non-Domestic Properties	Domestic Peak Demand	Non-Domestic Peak Demand	Combined Network	
					Total Peak Demand	Cost
Station Rise to Rowntree Park	1,456	1,233	3.17 MW	26.19 MW	44 MW	c. £90m
York Centre to Holtby	927	981	2.44 MW	13.91 MW		

Onshore Wind

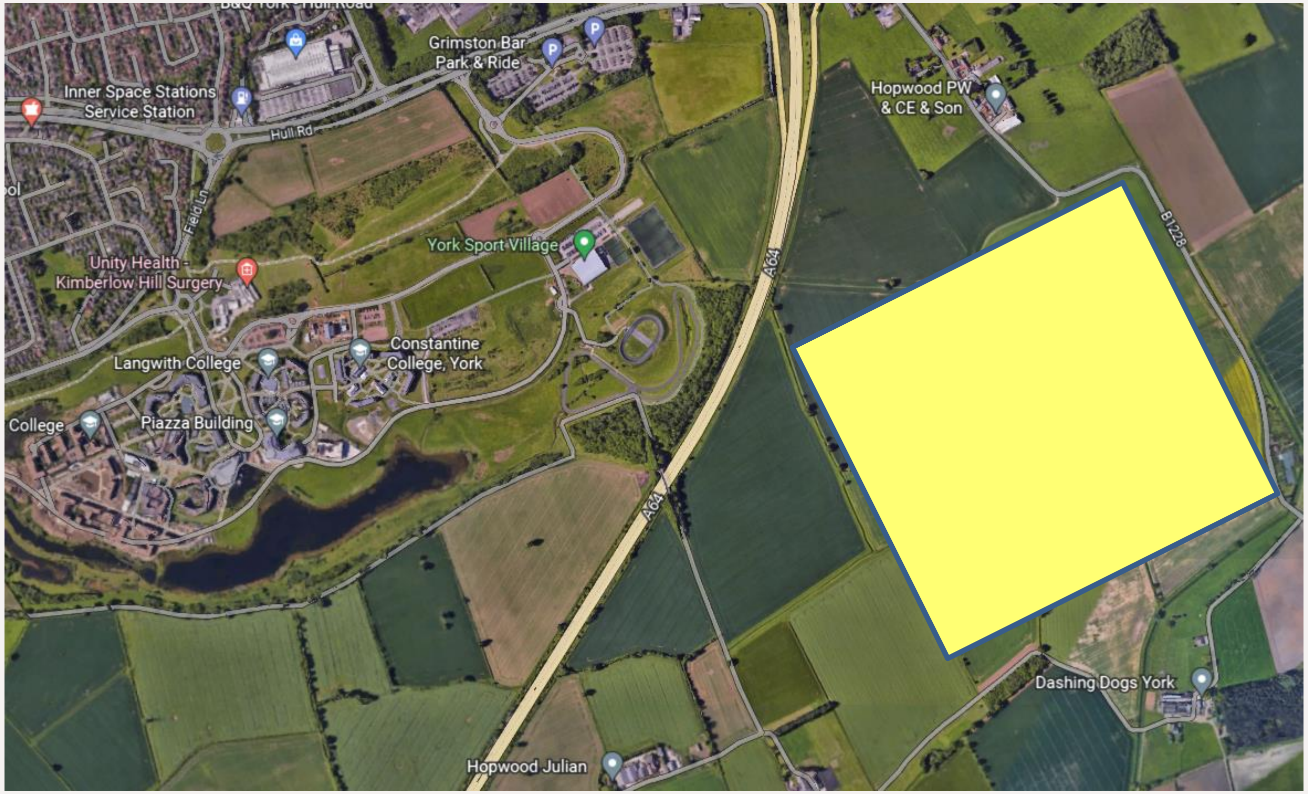
The potential locations for wind turbines north of Wigginton, in the Hambleton area, would be more distant from major consumers, so more likely to feed into the grid. However, a wastewater treatment plant to the north-east of Strensall, Robert Wilkinson Primary Academy to the north and Queen Elizabeth Barracks to the south could be candidates for power purchase agreements.

Zone	North of Wigginton
Size	2 MW
Total Cost	c. £2.4m
IRR	4.5% - 7%
Payback period	15-20 years

Potential Business Models

Ownership	Local authority owns the land and builds a project on it.
	Local authority partners with an organisation and jointly invests.
	Local authority leases the land it owns for others to develop ground mounted PV.
Energy Trading	Via power-purchase-agreements, the LA can secure low-cost electricity with low associated emissions counting towards their footprint.
	Via a power purchase agreement (PPA), a utilities company can be an off taker of all or some of the generation.

Grimston Bar Park-and-Ride Solar Charging Hub



A major area of land suitable for ground solar deployment in the Wheldrake to Kexby zone is near to the Grimston Bar park and ride facility, as well as the east campus of the University of York and the sport village. A 30 MW array (shown as yellow area) would generate power sufficient to supply large numbers of EV chargers and university buildings in favourable conditions. At peak output for example, 30 MW would be sufficient to supply 600 rapid 50 kilowatt (kW) EV chargers or almost 4,300 fast 7 kW chargers.

Zone	Wheldrake to Kexby
Size	30 MW
Total Cost	c. £16m
IRR	7% - 9%
Payback period	15-20 years

Domestic Solar PV

The area around Hull Road Park in the York Centre to Holtby zone has high levels of fuel poverty, coinciding with large numbers of homes likely to be suitable for rooftop solar PV. Approximately 500 homes in this neighbourhood could be prioritised ahead of the rest of the zone for PV deployment.

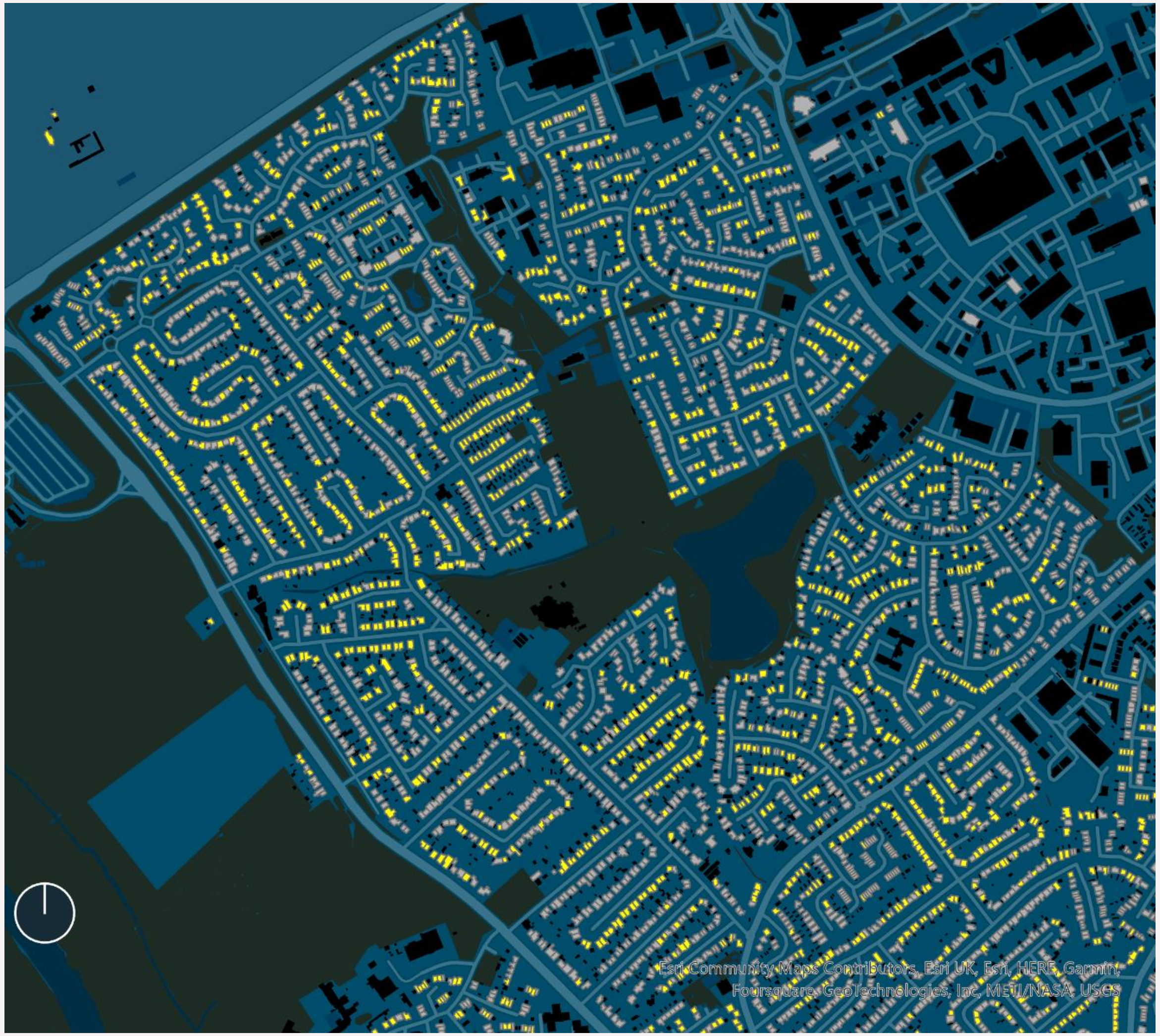
Generating electricity on-site can reduce the requirement to purchase electricity from suppliers which can reduce costs to the household (depending on how the PV installation is paid for). The roll-out of a scheme like this could start with social housing by working with key stakeholders. As with fabric retrofit, it may be possible to offer lower cost installations to private owners by widening such a scheme. Feasibility studies would be required.

Zone	York Centre to Holtby
Number of Dwellings	c. 500
Total Cost	c. £3.2m

Homes with potential suitability for rooftop solar PV around Hull Road Park highlighted in yellow

Fuel Poverty	Prioritising fuel poor areas to reduce bills and give residents more autonomy.
Social Housing	Supporting roll-out, particularly, in local authority owned assets to rapidly increase the amount of low carbon electricity generation .
Solar Together	Supporting community buying programmes to reduce capital cost.

Domestic Solar PV



Dwellings suitable for rooftop solar PV in Rawcliffe

Zone	Clifton to Corban Lane
Number of Dwellings	c. 1,000
Total Cost	c. £6.4m

The able-to-pay market is the largest market in any area. With the increase in cost of energy, rooftop solar can provide a mechanism to reduce costs of energy for households. The more affluent area of Rawcliffe has around 1,000 homes likely to be suitable for rooftop solar PV.

Private homeowners can purchase rooftop solar panels through a variety of mechanisms, directly paying for them or through innovative business models which include no CAPEX options.

Non-Domestic Solar PV

Large public buildings are well suited for quick win rooftop solar PV projects. Large roof space makes a more cost-effective installation possible. Occupation of the building through the daytime means that a high proportion of the electricity generated can be used on-site, maximising bill savings. Institutions which own their buildings will be best-placed for rapid deployment of projects.

The National Railway Museum's south-facing roof could host 640 kW of solar capacity if completely covered, generating around 617 MWh of energy per year for an investment of around £575k.

The York Leisure Centre has space on its roof for approximately 370 kW of solar PV capacity. For an investment of around £334k, this could generate 292 MWh of electricity per year. More ambitiously, the neighbouring stadium has a roof big enough to accommodate 640 kW on the largest roof, though this would be subject to the structural capabilities of the roof.

The Royal Mail Birch Park depot might be able to host 80 kW of solar panels on its roof, producing 77 MWh of energy per year for an investment of around £72k.

Large roof space of the Monks Cross shopping park

Commercial buildings have some of the largest roof areas, though since many commercial buildings are leased, with bills paid by tenants, installation of solar can be less straightforward. The Monks Cross shopping park hosts multiple businesses under one roof. If most of the south- and south-east-facing roof was used to site solar panels, as much as 1.5 MW capacity could be hosted for an investment of £1.35m.

Annexe C – 2030 York

Catapult Energy Systems

City of York Council

Local Area Energy Plan

Context & Historical Emissions

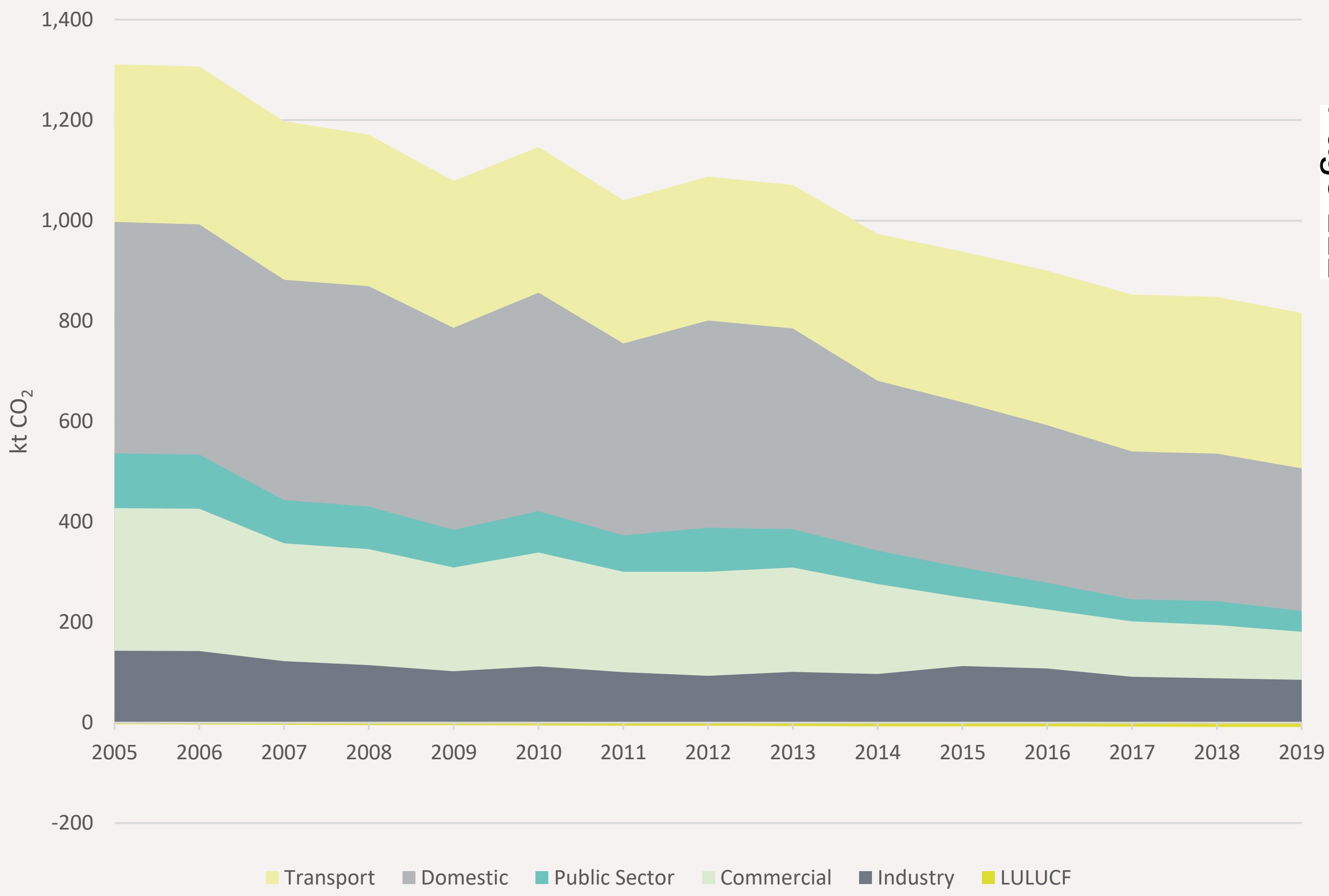
This Annexe is complementary to the local area energy plan (LAEP) that has been developed by Energy Systems Catapult on behalf of City of York Council. The main LAEP document has been aligned to the York & North Yorkshire LEP target of reaching net zero by 2034 and becoming England's first net negative region by 2040. To meet these targets, the energy system would need to become net zero before 2040 with all emissions between 2034 and 2040 being offset by negative emissions elsewhere. However, City of York have committed to meeting a net zero target of 2030 and therefore some acceleration of the LAEP plan will be required in order to meet that target.

In addition to the net zero tathet, the Council committed to:

- create partnerships among businesses, the public sector, civic organisations and [York's] institutions in higher and further education
- build inclusive, healthy and sustainable communities by promoting the positive social and economic benefits of climate action and by supporting individuals who need it the most.
- create new employment and investment opportunities, strengthening the economy through [the council's] work with local suppliers to build local "green" skills in sectors such as retrofitting and the bio-economy.
- supporting growth in the supply chain, training and upskilling the workforce and positioning York as a place to pioneer and pilot new projects
- attracting national and international investment and accessing new sources of finance to deliver the scale of change required across the city

Whilst the graph below shows that significant progress has been made in decarbonising the York economy over the last 15 years, a lot of this progress is due to the decarbonisation of the electrical network. The electrical network still has a way to go to become zero carbon by 2035, but this alone won't decarbonise the region at the rate that has been committed to.

CO_2 Emissions by Sector in York



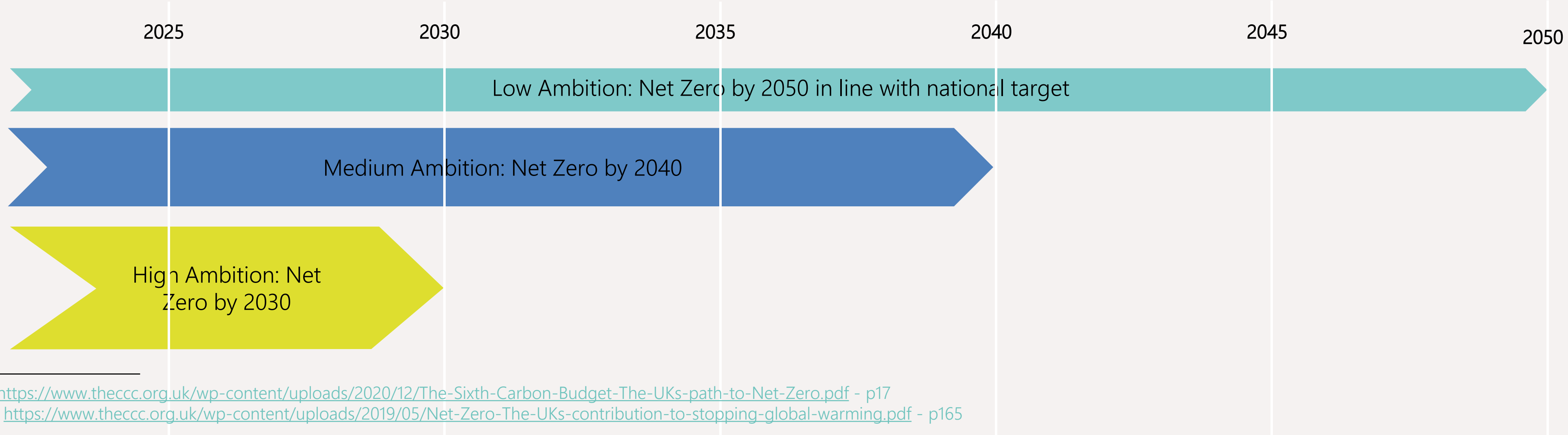
Note: this graph is based on data from BEIS which uses a different accounting method from the data used to estimate emissions in scope in the introduction. This results in lower LULUCF emissions shown in this graph.

Pathways

The LAEP for the City of York centres on a 2040 net zero target, as a compromise between the national target of 2050 and an admirably ambitious local target of 2030, with the aim of allowing time to build the necessary skills and supply chain capacity, public support, funding mechanisms, delivery approaches, novel technologies and supporting infrastructure required to deliver the changes recommended in the plan.

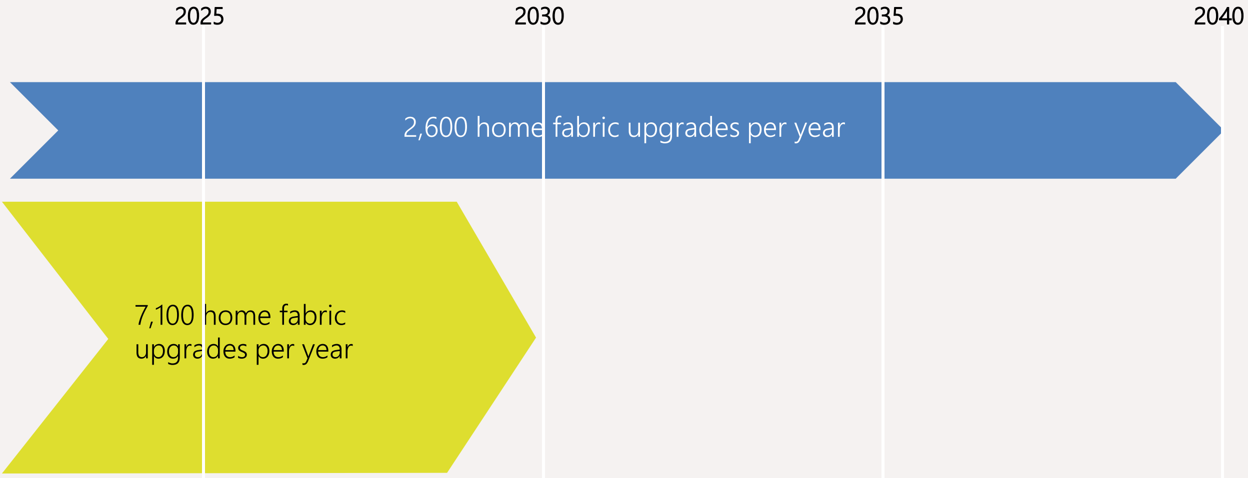
For national context, the Climate Change Committee's "Balanced Pathway" to net zero by 2050 is reflective of what they consider to be "the UK's highest possible ambition", compatible with the 1.5°C Paris climate target*. This pathway recommends that the UK reduce emissions by 78% by 2035 against a 1990 baseline. They also note that "Our assessment is that achieving net-zero GHG emissions domestically prior to 2050 is not credible for the UK as a whole." **

This document draws out some key differences between the pathways to net zero by 2040 and 2030 for the City of York, to support decision making around this ambition level. The differences are primarily expressed in terms of the delivery rates of various technologies and interventions, as average annual figures over the pathways to the net zero target dates. The diagram below shows the format used to visualise these delivery rates, with the delivery rate compressed for earlier target dates.



* https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf - p17
** https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf - p165

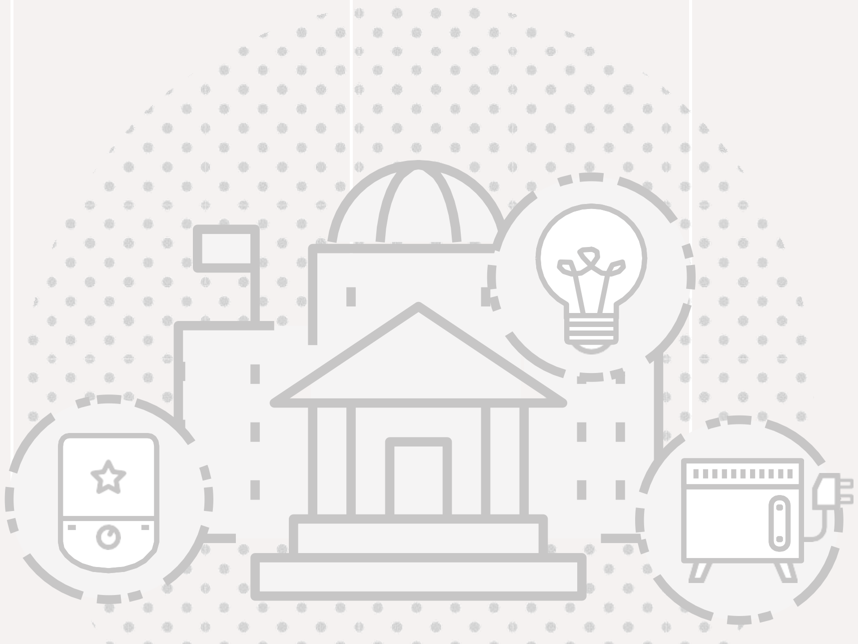
Building Fabric Upgrades



Increasing the ambition to target net zero by 2030 does not significantly change the overall approach to building fabric upgrades recommended, but it dramatically compresses the rate at which the work would have to be carried out. In modelled pathways, 5,300 additional homes are recommended for fabric upgrades for the 2030 target compared to the 2040 target, an increase of 12%.

Upgrading 49,500 homes by 2030 amounts to 7,070 homes each year on average, starting in 2023, compared to the 2,600 per year recommended for the 2040 target.

In 2020, 50,000 wall insulation upgrades were carried out across the UK*. Scaled to York's share of the UK's households, this equates to 156 homes receiving wall insulation per year across York. While not all of the insulation upgrades recommended in the pathways are for wall insulation, this demonstrates at least an order of magnitude increase in delivery rates from today's level is likely to be required.



* https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf - p111

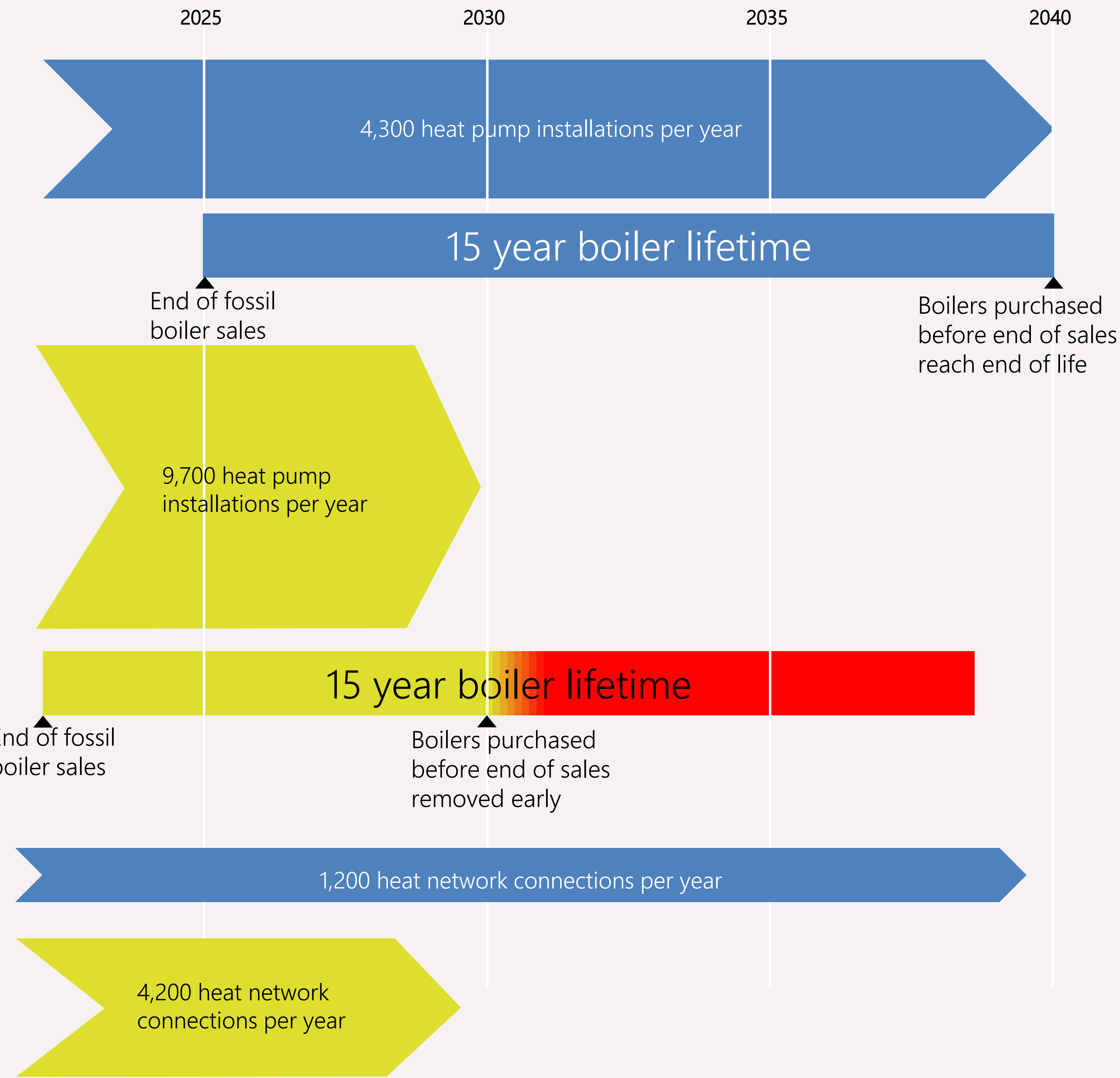
Heating System Replacements

Modelled pathways recommend building a larger heat network, connecting an additional 8,700 homes for the 2030 target. This means that for the 2030 target, the overall scale of heat network development is increased as well as compressed in timescale.

The total number of heat pump installations recommended for the 2030 target is not dramatically different from in the 2040 target, though is reduced slightly by a larger heat network. However, the rate of installation would need to be more than double to meet the compressed delivery timescale.

In 2021, just under 43,000 heat pumps were installed in the UK*. Scaled to York's share of households in the country, this is equivalent to 133 heat pumps per year across York. For the 2030 target, the City of York would need to utilise 23% of the current national installer capacity.

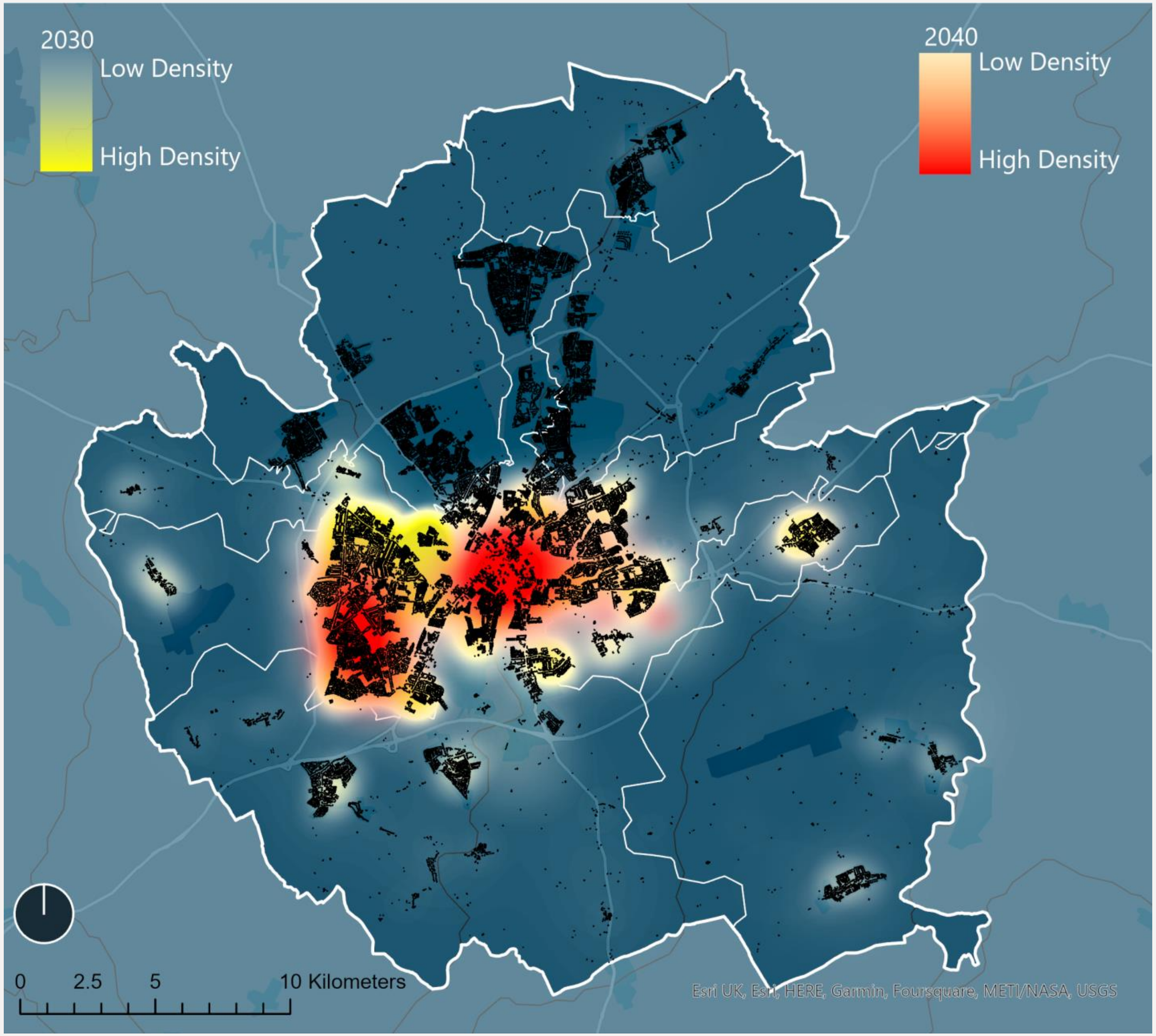
Ideally, the sale of new fossil fuel boilers can be ended in advance of the net zero target date, to minimise the need to remove working boilers before their end of life. Assuming an average boiler lifetime of 15 years, the sale of new fossil fuel boilers would need to end as soon as 2025 to minimise early removal for the 2040 target. For the 2030 target it would not be possible to avoid early removal of boilers which have already been installed, even if a ban on new sales was brought into force immediately.



* www.energylivenews.com/2022/07/14/will-the-uk-need-600-years-to-hit-its-2050-heat-pump-target

District Heat Networks

The map shows the slightly greater coverage of heat networks in the 2030 net zero target pathway. The density of buildings recommended for connection to district heat networks for the 2040 pathway is shown in shades of red, while the density of additional buildings recommended for connection for the 2030 pathway is shown in shades of yellow.



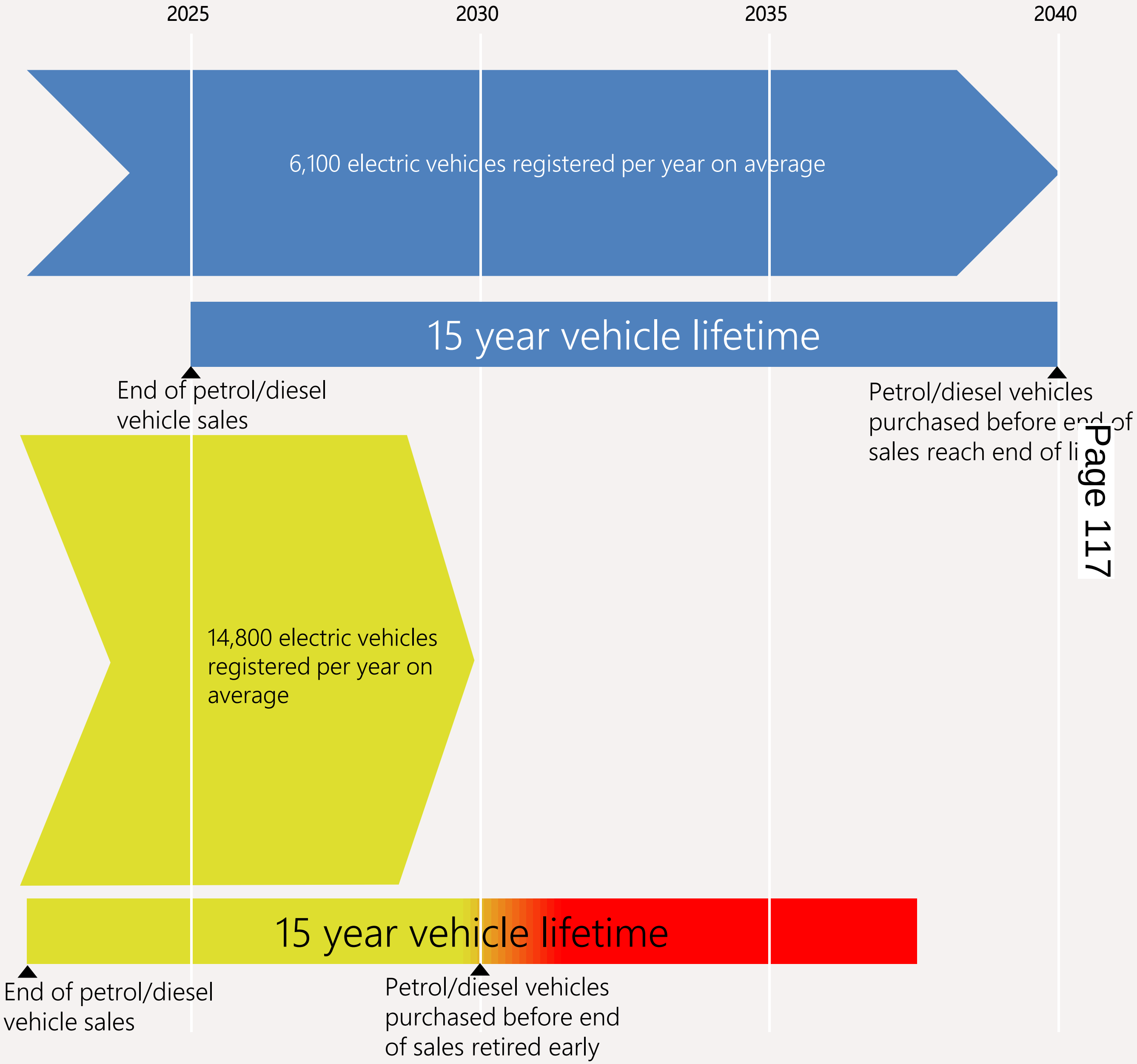
Cars and Vans

In order to reach zero emissions from road vehicles, all petrol and diesel vehicles would have to be retired from use within York – or offset – by the net zero target date, with remaining vehicles being battery electric or other zero emissions technologies.

The rates of electric vehicle purchase to replace all petrol and diesel cars and vans by the respective net zero target dates are shown in the diagram.

In the UK in 2021*, 327,000 plug-in vehicles were registered. Scaled to York's share of the UK's cars and vans, this equates to around 825 new plug-in vehicles across York. For the 2030 target, York would need to purchase electric vehicles at almost 18 times the national rate, with the corresponding installation of charging infrastructure to support these vehicles. It's worth noting that plug-in hybrids would not be compatible with a zero emissions target unless they were used in pure electric mode within the boundaries of the City of York or their emissions offset. Some vehicles are beginning to use GPS geofencing to detect low emissions zones, and switch to pure electric mode while inside the zone**.

The national phase out of sales of new petrol and diesel cars aims to minimise the need to retire vehicles before their end of life, based on an average vehicle lifetime of 15 years. To adopt the same strategy for York, the sale of new petrol and diesel cars and vans would need to end in 2025 to minimise early retirement of vehicles for the 2040 target. For the 2030 target it would not be possible to avoid early retirement of petrol and diesel vehicles which have already been purchased, even if a ban on new sales was brought into force immediately.



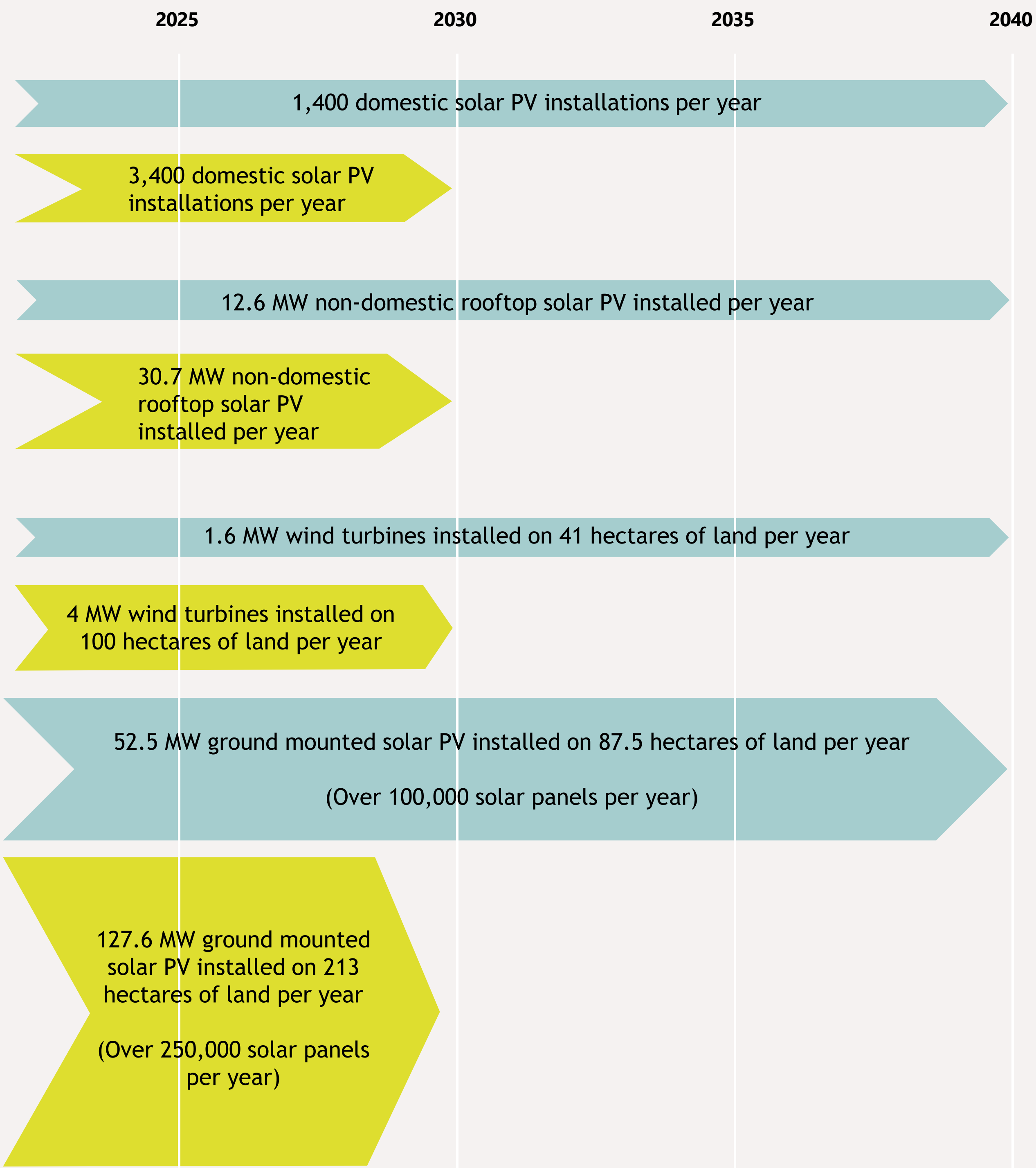
* https://www.gov.uk/government/news/quick-off-the-spark-electric-vehicle-sales-continue-to-soar-in-green-revolution
** https://www.thisismoney.co.uk/money/cars/article-8600251/Hybrid-BMWs-automatically-switch-electric-mode-low-emission-zones.html

Local Generation

With aspirations to decarbonise the national electricity supply by 2035*, there is not a strict requirement to generate all of York's electricity using local renewables for the 2040 target, as the use of grid electricity will no longer contribute to carbon emissions. However, aiming to fully decarbonise earlier than the National Grid would imply a need to source 100% of electricity consumed from renewable generation.

In York's LAEP, the amount of renewable generation required to produce 100% of the electricity consumed in the city on an annual basis is presented to give a sense of scale for a maximum level of ambition. To reach the earlier target, the same capacity of generation would need to be installed in a compressed timeframe, illustrated in the diagram.

It is worth noting, that the high-level assessment in the main report showed no land was suitable for onshore wind development within the City of York local authority area. Therefore, harnessing this resource would require engagement with neighbouring local authorities with the generated electricity then being used by dwellings and businesses within York's boundary.



* https://www.gov.uk/government/news/plans-unveiled-to-decarbonise-uk-power-system-by-2035

Networks

A recurrent theme in stakeholder discussions of the LAEPs for York and North Yorkshire has been the risk that the electricity networks may not have the ability to build capacity rapidly enough to support the steep increase in local electricity demand from heating and transport, and generation from renewables. Stakeholder feedback has made mention of Northern Powergrid reinforcement plans across the region which will only come into effect in the early 2030s and anecdotal evidence of connections of low carbon generation to the network being delayed to 2032 at the earliest. Efforts to bring forward and accelerate network capacity upgrades will be needed to reach all net zero targets. An example of this would be a more permissive regulatory environment reducing the barriers to investment. However, it's clear that the risks and challenges posed by network capacity constraints will be exacerbated with a 2030 target.

While the availability of hydrogen through a converted gas network from the mid-2030s is uncertain, it is especially unlikely that it will be available in time to support a 2030 net zero target. This means that industries which depend on low carbon gas for hard-to-electrify uses will have to use alternative means of decarbonising, such as producing hydrogen on-site using electrolysers.

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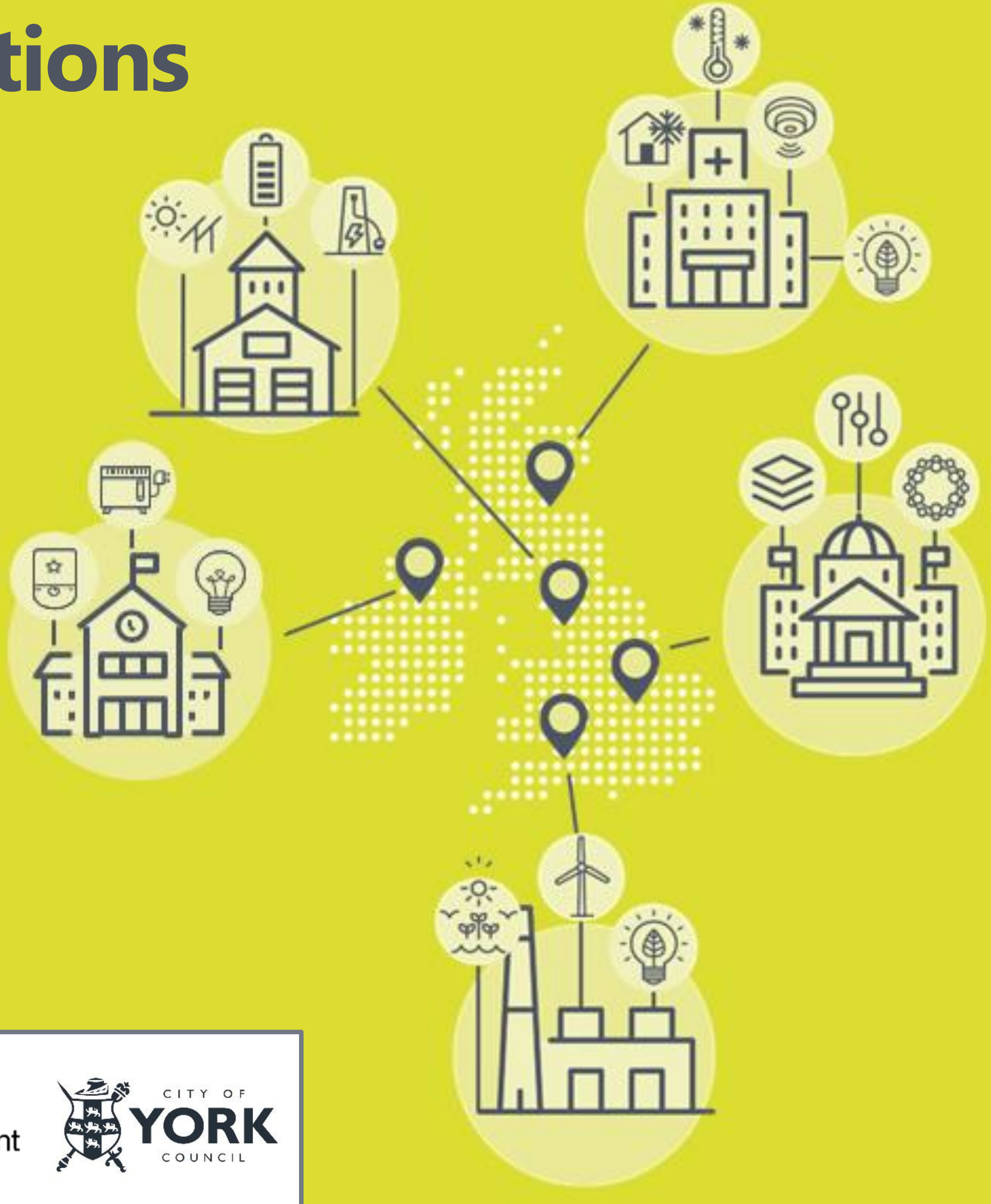
Annex D

Annexe B – Method, Data & Assumptions

CATAPULT Energy Systems



York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP

HM Government

CITY OF YORK COUNCIL

LOCAL AREA ENERGY PLAN

Modelling Approach

We have used the ESC-developed EnergyPath Networks™ tool to produce a series of future local energy scenarios for York & North Yorkshire. This tool seeks to develop a full range of decarbonisation options for the local area and then use an optimisation approach to identify the combination that best meets the carbon ambitions in a cost-effective way across the whole system.

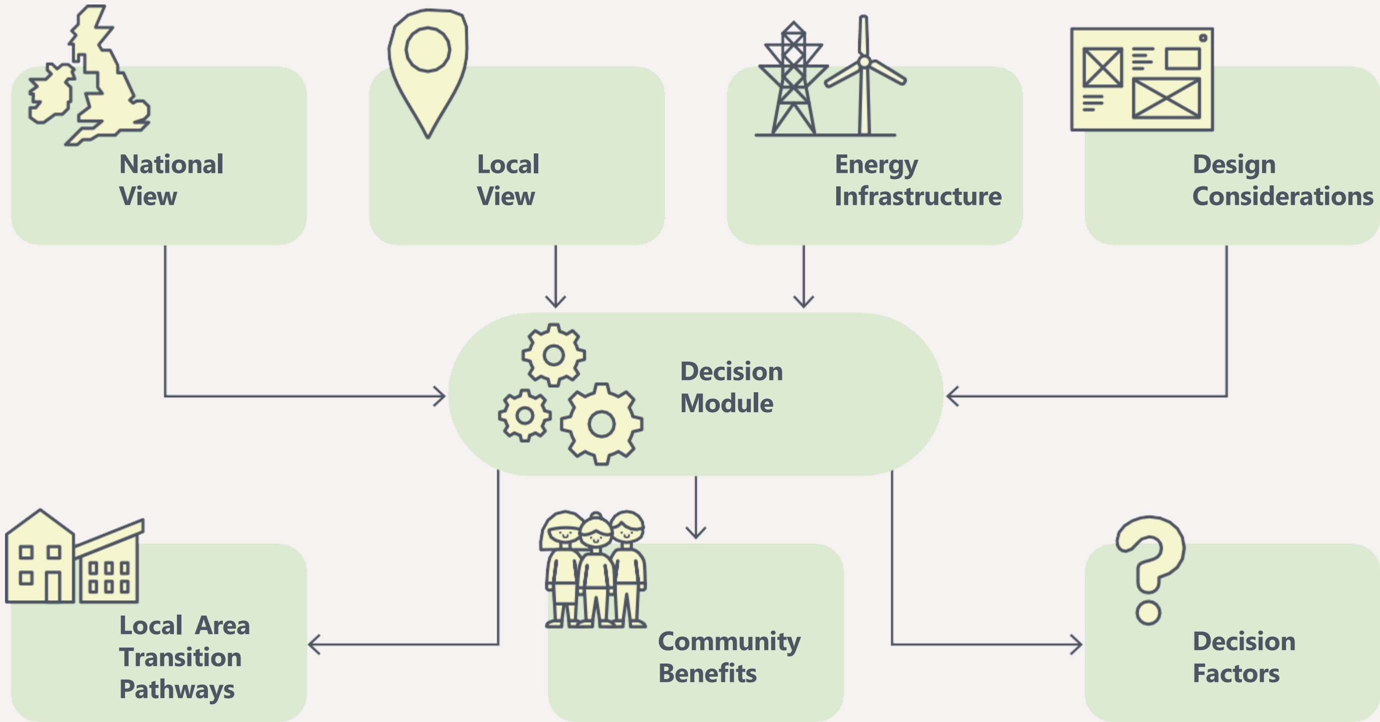
EnergyPath Networks (EPN) is a whole system optimisation analysis framework that aims to find cost effective future pathways for local energy systems to reach a carbon target whilst meeting other local constraints. EPN is spatially detailed, covers the whole energy system and all energy vectors, and projects change over periods of time. The focus is decarbonisation of energy used at a local level.

An overview of EPN is shown in the diagram to the right.

At the core of EPN, a Decision Module compares decarbonisation pathways and selects the combination that meets the CO_2 emissions target set for the local area at the lowest possible total cost to society .

A variety of local energy system pathways are possible to meet emissions targets. Running multiple EnergyPath Networks scenarios and doing detailed sensitivity analyses reveals decarbonisation themes that are prevalent across all scenarios.

EPN uses optimisation techniques in the Decision Module to compare many combinations of options (tens of thousands) rather than relying on comparisons between a limited set of user-defined scenarios (although scenarios of different inputs are still typically used and the Decision Module then runs within each of these scenarios).



Modelling Approach

EnergyPath Networks is unique in combining several aspects of energy system planning in a single tool:

- Integration and trade-off between different methods of meeting heat demand – e.g. gas, solid/liquid fuels, electric power, hydrogen, district heating schemes, etc.
- Integration through the energy supply chain from installing, upgrading or decommissioning assets (production, conversion, distribution and storage) to upgrading building fabric and converting building heating systems.
- Inclusion of existing and new build domestic and commercial buildings.
- The spatial relationships between buildings and the networks that serve them, so that costs and benefits are correctly represented for the area being analysed.
- Spatial granularity down to building level when the input data is of appropriate quality.
- A modelled time frame of 2020 to 2050.

Taken together, the analyses enable informed, evidence-based decision-making and can be used to ensure long-term resilience in near-term decisions, mitigating the risks of stranded assets.

The approach to modelling these aspects of the energy system is described in detail over the following pages.

Modelling Approach

Domestic Buildings

The thermal efficiency of domestic buildings is related to the construction methods used, the level of any additional insulation that has been fitted and any modifications that have been undertaken since construction. The oldest buildings in the UK generally have poor thermal performance compared with modern buildings. In addition to building age, the type and size of a building also have a direct influence on thermal performance. For example large, detached buildings have a higher heat loss rate than purpose-built flats, due to their larger external surface area per m^2 of floorspace.

Buildings are categorised into five age bands in EnergyPath Networks, from pre-1914 to the present, shown in the table on the top right. These are broadly consistent with changes in building construction methods (as defined in building regulations) and so represent different levels of 'as built' thermal efficiency. The thermal efficiency of future new homes represents the minimum efficiency level required by current building regulations. There are ten modelled domestic building types, shown in the table on the bottom right. This allows approximately 60 different age and building type combinations which are used to define the thermal characteristics of existing and planned domestic buildings.

Once the current characteristics of a building have been defined, based on its age and type, the basic construction method can then be categorised. For example, the oldest buildings in the region can be expected to be constructed with solid walls. Buildings constructed between 1914 and 1979 are more likely to have been built with unfilled cavity walls. Buildings constructed from 1980 onwards are likely to have filled cavity walls. Where data (for example, Energy Performance Certificates) shows that they are likely to be present, thermal efficiency improvements that have been carried out since construction (such as filling cavity walls) are also included.

Where available, address level data is utilised in the EnergyPath Networks modelling to provide accurate building attributes. Missing building attributes, for example types of wall or windows are filled using rules based on English Housing Survey data.

Property Age Band
Pre-1914
1914 – 1944
1945 – 1964
1965 – 1979
1980 – Present
New Build

Property Type
Converted Flat: - Mid Floor / End Terrace
Converted flat: - Mid Floor / Mid Terrace
Converted Flat: - Top Floor / End Terrace
Converted Flat: - Top Floor / Mid Terrace
Detached
End Terrace
Mid Terrace
Purpose-Built Flat: - Mid Floor
Purpose-Built Flat: - Top Floor
Semi-detached

Modelling Approach

Domestic Heating Systems

The definition of current (primary) heating systems is handled in a similar way to the definition of the building fabric. Information is used to identify the heating system as follows:

1. Xoserve data is first used to identify which buildings in the local area are not connected to the gas grid.
2. Direct user input is used where the actual heating system in individual buildings is known (e.g. from Energy Performance Certificates).
3. Defining logic rules based on the most likely heating system combinations within each archetype group.

Once the current thermal efficiency of a building has been defined, Ordnance Survey MasterMap and LIDAR data is used to establish its floor area and height. With this knowledge of a building's characteristics there is sufficient information to perform a Standard Assessment Procedure (SAP) calculation. SAP calculations are used to calculate the overall heat loss rate and thermal mass of domestic buildings in the study area.

EnergyPath Networks utilises these SAP results, as well as detailed retrofit and heating system cost data, to group buildings into similar archetypes. EnergyPlus is used to calculate dynamic energy profiles for heat and power demand for each group, for the current and all potential future pathways. These pathways include potential to install varying levels of fabric retrofit and different future heating systems in multiple combinations. Restrictions are applied so that inappropriate combinations are not considered, so for example loft insulation cannot be fitted to a mid-floor flat. EnergyPath Networks also filters out heating systems and storage combinations that cannot be sized to a large enough power within a home to meet a predefined target comfort temperature and hot water requirements based on the EnergyPlus analysis.

Three primary elements are defined in each heating system combination:

1. The main heating system.
2. A secondary heating system which can provide additional heat or hot water.
3. Thermal storage – either not present or a hot water tank.

For each domestic building, the modelling assumes that a high carbon heating system could be replaced at any time. It is assumed low carbon heating systems cannot be replaced until the end of their life (generally around 15-20 years). At each opportunity to change to an alternative heating system there is also the opportunity to perform some level of building fabric retrofit.

Different heating systems reach end of life at different times, but there would need to be some coordination of the change if transitioning to a district heat or community system. Three different levels of retrofit (thermal performance enhancement) are considered, ranging from do-nothing to a full retrofit. In addition, each heating system option can be combined with advanced heating controls and each level of retrofit. Options will be excluded if a new heating system technology is unable to provide sufficient power to meet heat demand in a building with a given level of retrofit. These combinations mean that for each building there can be hundreds of different future pathways which must be considered.

Modelling Approach

Non-Domestic Buildings

Non-domestic (commercial and industrial) building stock is more diverse than domestic stock. There are a wide variety of construction methods and few robust data sets are available defining the design of any particular building, its heating system or thermal performance. Due to these limitations, an energy benchmarking approach is used to establish the energy demand of the non-domestic stock.

Different building types are given an appropriate energy use profile per unit of floor area. The building type represents how the building is used (e.g. industry, retail, offices, school) and is sourced from a variety of datasets including OS Address Base and Energy Performance Certificates.

Benchmarks are defined for electricity (direct electric, ground source heat pump and air source heat pump), gas, hydrogen, oil and heat demand in 30-minute time periods for different characteristic heat days. The characteristic heat days for which energy demand profiles are defined are shown in the table to the right. Benchmarks are defined for current and future use to represent changing energy use over time.

The footprint floor area and height for each building is derived from the OS MasterMap and LIDAR data. The building height is then used to establish the number of storeys, from which the total building floor area is estimated. Using an energy benchmark (derived from CIBSE and CARB2 data) appropriate to the particular use class, the half hour building energy demand for gas, electricity and heat is calculated for each of the characteristic days.

For both domestic and non-domestic pathway options, EnergyPath Networks includes costs of replacing all technologies at their end of life. At these points technologies can be replaced with a lower carbon system or like-for-like. For example, even in a scenario without a local carbon target, costs will be incurred when boilers and windows are replaced with analogous technologies.

Characteristic Heat Day
Autumn Weekday
Autumn Weekend
Peak Winter
Spring Weekday
Spring Weekend
Summer Weekday
Summer Weekend
Winter Weekday
Winter Weekend

Modelling Approach

Electricity Network Infrastructure

In order to assess potential options for future changes to energy systems, knowledge of current electricity, gas and heat network routes and capacities is required. From this the costs of increasing network capacities in different parts of the local area, as well as extending existing networks to serve new areas, can be calculated. The road network is used in EnergyPath Networks as a proxy to calculate energy network lengths. Substation capacities are established using DNO data and steady-state load flow modelling of networks. For example, EnergyPath Networks will find the load at which a Low Voltage (LV) feeder will require reinforcement and the costs associated with doing so. The cost of operating and maintaining the networks varies with network capacity and is modelled using a cost-per-unit length, broken down by network asset and capacity.

The EnergyPath Networks method does not replicate the detailed network planning and analyses performed by network operators. Rather, the energy networks are simplified to a level of complexity sufficient for numerical optimisation and decision-making. The method is used to model the impact of proposed changes to building heat and energy demand on the energy networks that serve them, for example increased or reduced capacity. The costs of these impacts can then be estimated and the effects of different options on different networks can be compared. Only network reinforcements required inside the study area are explicitly considered as options in EPN.

Northern Powergrid (NPG) and Energy North West (ENW) provided the following data for the current electricity network as both DNOs supply York & North Yorkshire:

1. Locations and nameplate capacities of the HV (33kV to 11kV) and LV (11kV to 400V) substations.
2. HV to LV substation connections.

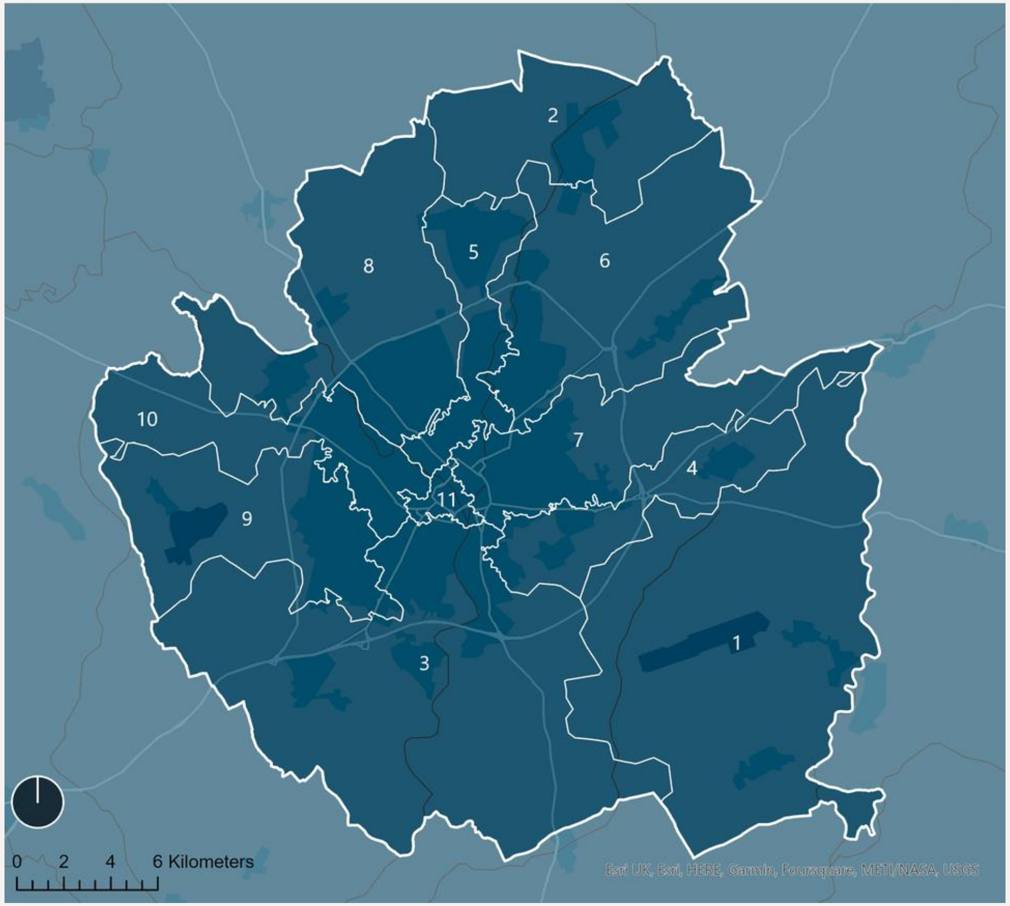
EnergyPath Networks synthesises the routes of the HV to LV substation connections assuming that feeders follow the shortest route allowed by the road network. Customer connections are then derived based on nearest substation and peak load constraints for each feeder. Non-domestic buildings with high demands are assumed to connect directly to the HV network . Network feeder capacities are then calculated based on the current load on each feeder and a headroom allowance. Voltage drop and thermal limits are considered when establishing asset capacity requirements.

EnergyPath Networks performs steady state load flow modelling for electricity and heat networks using the Siemens tool PSS® SINCAL.

Once all the building data has been analysed and the buildings located, it is possible to identify their nearest roads, which shows where the buildings are most likely to be connected to energy networks. In this way the total load and the load profile for each energy network can be calculated at different scales from individual building level, through local networks up to aggregate values for the whole study area. This allows an understanding of different energy load scenarios in different parts of the local area and the energy flows between those locations. In addition, an understanding of network lengths and required capacities can be established.

Modelling Approach

Analysis Areas



Due to the complexity of the number of different options available in EnergyPath Networks (for buildings, networks and generation technologies) the total problem cannot be solved at individual building or network asset level. Each of the four Local Energy Area Plan areas across York & North Yorkshire is further sub-divided into a number of spatial analysis areas. Decisions are made at this level based on aggregating similar buildings and network assets within each area.

The analysis areas are necessary within the EnergyPath Networks model but do not correspond directly to local districts, wards or neighbourhoods.

Within each analysis area, different components of the system are aggregated. Aggregation of buildings is performed based on energy demand and cost of retrofitting insulation and new heating systems. This way, similar buildings within an individual analysis area will all follow the same pathway. Similarly, decisions on network build and reinforcement are made at an aggregated level. If the electricity loads in one analysis area increase, such that the aggregated capacity of the low voltage feeders is exceeded, then reinforcement of all low voltage feeders within that area will be assumed to be required. The same applies for all other aspects of the energy networks such as low voltage substations, high voltage feeders and substations and heat network capacity.

Since the network options are aggregated, it is important that the boundaries between analysis areas do not cut across the electricity network. It would not be realistic to reinforce the 'downstream' end of an electricity feeder without considering the impact of the loads on those components further upstream in that network.

To ensure consistency in the analysis of electricity network options, the study area was divided by considering each high voltage substation within the local area and all of the electricity network downstream of each substation to give the analysis areas discussed above. Some simplifications to create continuous areas were applied.

Once the analysis areas had been defined, energy network links between them were defined. This allows transmission of heat, gas and electricity across the analysis area boundaries.

Modelling Approach

Local Energy System Design Considerations

Options which are not considered technically feasible are excluded from EnergyPath Networks – for example, fitting loft insulation into a mid-floor flat or cavity wall insulation to a building which has solid walls.

There are other options which, whilst they may be possible, are not practical in a real-world environment. For example, the use of ground source heat pumps in areas of dense terraced housing: a lack of space means that cheaper ground loop systems cannot be fitted, whilst there is insufficient access for the equipment required to create vertical boreholes. In addition, the heat demand for a row of terraced houses may cause excessive ground cooling in winter leading to inefficient heat pump operation and a need for additional top-up heat from an alternative source.

Consumer preferences also influence suitability of certain options. The installation of domestic hot water tanks for heat storage is a good example. Many low-carbon heat technologies, such as air source heat pumps, work at a lower output power than conventional gas boilers, and this can require the use of heat storage in order to be able to meet peak demand for heat on cold days. However, many households have removed old hot water tanks and fitted combi-boilers to provide hot water on demand.

This allowed the space previously occupied by the hot water tank to be repurposed for other uses, which householders find valuable, such as additional household storage.

For example, the English Housing Survey shows that 54% of homes had a combi-boiler in 2016 with this figure rising by around 2% a year since 2001. These consumers often place a high value on the space that has been made available by doing this and are unlikely to embrace heat solutions that require large amounts of domestic space to be sacrificed. A proxy for the value that consumers place on space in their homes is property market values normalised by floor area. With median house price costs in England and Wales in 2021 varying from £125,000 (within County Durham) to £1,250,000 (within Kensington and Chelsea)1 it is clear that the options for using space for domestic heat storage are likely to be heavily dependent on local factors.

Assumptions and Inputs

Any technical modelling exercise requires decisions to be made as to the level of complexity and detail that is appropriate. There are several areas where limitations have been applied to limit the complexity of the EnergyPath Networks analysis to keep the scale of the analysis practical, such as grouping buildings into archetypes.

Fixed Input Parameters

Some parameters are considered as fixed inputs within EnergyPath Networks. That is, they are derived externally and presented as inputs to the tool. Any options to vary these parameters are excluded from the decision module. The following energy demands are modelled as inputs:

- Domestic lighting and appliance demands are based on data from DECC's (Department of Energy and Climate Change) household electricity survey which gives these demands for different house types.
- Electric vehicle numbers and charging profiles are based upon assumed take-up rates for electric vehicles from the TfN EV Charging Infrastructure Framework.
- The EV charging profiles reflect a vehicle charging immediately after it returns home and so represent a worst case scenario for peak network loads.
- Non-domestic building demands for current systems and future transition options are calculated based on building use and a set of energy benchmarks.

Building Modelling

Within the domestic building simulation, a standard target temperature profile is taken from SAP and used for all domestic buildings. This is intended to reflect typical building use patterns. It is recognised that real-world building use will deviate from this profile, as shown by the Energy Follow-Up Survey (EFUS). To reflect this, diversity factors are applied within EnergyPath Networks when individual building energy demands are aggregated to calculate total network demands. These diversity factors modify both the magnitudes of the demands and the times at which they occur.

Construction standards are assumed for buildings of different ages. For example, all pre-1914 buildings are assumed to have solid walls. Similarly, for some building ages the thermal conductivity of the walls is assumed to be the same for each level of insulation. For example, all walls in buildings constructed between 1945 and 1964 which now have filled cavities are assumed to have the same thermal performance. Note that these performance assumptions are based on 'traditional' brick construction and assume that insulation is correctly installed and performs to its technical potential. Buildings constructed in other ways may not be correctly represented in terms of their thermal performance.

Assumptions and Inputs

Network Modelling

The network modelling approach assumes that development of future energy systems should be driven by consumer needs. On this basis, the EnergyPath Networks modelling framework works on a traditional network reinforcement model. If load on a network is calculated to exceed capacity, then the network will be reinforced to meet that load.

There is limited capability within the model to consider 'Smart' network control or all aspects of Demand Side Response. For example, if a particular feeder in a street was overloaded, a demand side response could be to raise the price of electricity at peak times to decrease consumer demand on the network. EnergyPath Networks will deploy technologies that minimise electricity use at times of peak costs if it is cost effective to do so, but it is not designed to model the behaviours of the DNO or the consumer in this scenario.

The load-flow modelling is not intended to replace full dynamic network modelling conducted by network operators. EPN uses a steady-state approach which is appropriate for establishing peak loads and the capacity required to meet them, to understand the influence of different options on network costs. It considers both voltage and temperature constraints.

Technology Cost and Performance

EnergyPath Networks models the future energy system which is considered to have the lowest cost to society whilst meeting defined carbon targets. The selected options are influenced by the costs associated with different technologies. The modelled technology cost should represent the cost in a fully competitive UK market, with significant volumes of the technology being sold. This is currently the case for markets for some technologies such as a gas boiler, but not for others such as heat pumps.

Where the market is not fully developed it is not appropriate to use the current price charged to consumers. Instead, an estimate of the current costs of buying and installing is made using a variety of data sources to ensure that estimated costs are within reasonable bounds.

Optimisation Variables

A variety of technology options have been considered within the EnergyPath Networks analysis. These are described over the following pages.

Primary Heating Systems

Different current and future heating system combinations have been considered within the analysis. The heating systems assessed are as follows:

- **Gas boilers** are the main source of heat for domestic premises in the UK at present.
- **Oil / LPG boilers** are a popular heat source for those buildings which are not connected to the gas network.
- **Biomass boilers** can provide a low-carbon heat source by burning fuel derived from sustainably sourced wood products.
- **Hydrogen boilers** could provide a low-carbon heat source once hydrogen becomes available.
- **Heat pumps** use electrical energy to transfer heat energy from one source to another. They are similar to a domestic refrigerator which transfers heat from a cold space to the surrounding room. This is reversed in a heat pump system so that the internal space is warmed by transferring heat from outside. Heat pumps have an advantage compared to other electrically powered heat sources as they produce more heat energy than the electrical energy required to power them.

Different types of heat pump are considered:

- o **Low Temperature Air Source Heat Pumps (ASHPs)** use the outside air as the source of heat and provide hot water to the heating system at temperatures around 45ºC. This temperature is lower than that normally used for domestic heating with a gas boiler and so may require changes to heating distribution systems, such as the provision of larger radiators to allow the building to be heated effectively. These changes are accounted for in the costs of the technology used in the model.
- o **Low Temperature Air Source Heat Pump – Gas Boiler Hybrids** use a combination of a low temperature ASHP to provide a large proportion of the heat demand but can top up this heat using a conventional gas boiler at times when it is not efficient to operate the heat pumps, or the heat pump cannot meet the required demand.
- o **Low Temperature Air Source Heat Pumps** can also have supplementary heat provided by direct electric heating when required.
- o **High Temperature Air Source Heat Pumps** are similar to a low temperature Air Source Heat Pump but provide hot water at a higher temperature (typically 55ºC) which may remove the need for other modifications to the heating system. They generally operate at a lower efficiency than low temperature air source heat pumps.
- o **Ground Source Heat Pumps** use heat energy stored in the ground to provide hot water to the heating system. Since ground temperatures are higher than air temperatures in winter they can operate more efficiently and provide higher water temperatures than air source heat pumps. Space is required, however, to install pipework to extract heat from the ground and this adds considerably to the cost of installing these systems.

- **Electric Resistive storage heating** is the most commonly used system for buildings which have electric heating. Room heaters are typically charged overnight (where there can be an option to charge the system at a lower, night rate electricity tariff) and then release this heat over the course of the following day.
- **Electric Resistive heating without storage** provides instant heat through panel, fan or bar heaters.
- **District heating** provides heat to buildings through pipes that carry the heat from a central heat source. In current systems, this is typically a large gas boiler or gas fired Combined Heat and Power (CHP) plant which provides heat to the network and generates electricity which is either consumed locally or exported to the electricity network. Once installed these systems can be converted from using gas to lower carbon alternatives such as a large-scale Ground Source Heat Pump or a biomass boiler. Equally, if there is no gas supply in the first place, then systems can be designed from the outset with such alternatives.

Optimisation Variables

Building Retrofit Options

Domestic buildings in the UK have been constructed to a wide variety of building regulations depending on their age. Many older buildings have low levels of insulation and require much more energy to keep them warm in winter than those built to more recent regulations.

There are many options available to reduce heat loss from older buildings some of which could also be applied to more modern buildings. Loft insulation, wall insulation (cavity or solid depending on existing building fabric) and triple glazing retrofit options are modelled within the EnergyPath Networks model.

In addition, some minor improvements are considered as secondary measures. That is, "quick wins", such as draught proofing, that could be installed at the same time as more substantial building fabric upgrades.

Solar

EnergyPath Networks considers the deployment of solar panels within a local area to generate electricity and hot water. Both systems can produce significant amounts of energy in summer months but may produce close to zero energy on winter days when the sun is low in the sky and days are much shorter. This may coincide with times of greatest heat demand, so alternative energy supply options need to be available at these times.

In the case of electricity generation (solar photovoltaics) the power might be used by the home owner or might be exported to the electricity network if the amount being generated exceeds the demand of the generating building.

Solar hot water systems typically heat water in a hot water tank by circulating a fluid between a heating coil within the tank and the roof mounted panel heated by the sun.

Heat Storage

Heat storage can be considered at two scales:

- Individual domestic storage in hot water tanks.
- Large-scale storage in association with heat networks.

In both cases, it is assumed that more heat could be produced at certain times than is required to meet demand. This provides an option to store that heat and then release it back into the heating system at times when the peak demand is high. It can sometimes be a cost-effective solution as it allows a less powerful heat source to be installed that can be topped up using stored heat at times of peak demand.

Depending on the location in the UK, the value of the floor space lost could outweigh the capital savings associated with installing a heating system with a hot water tank over a more powerful heating system without a hot water tank.

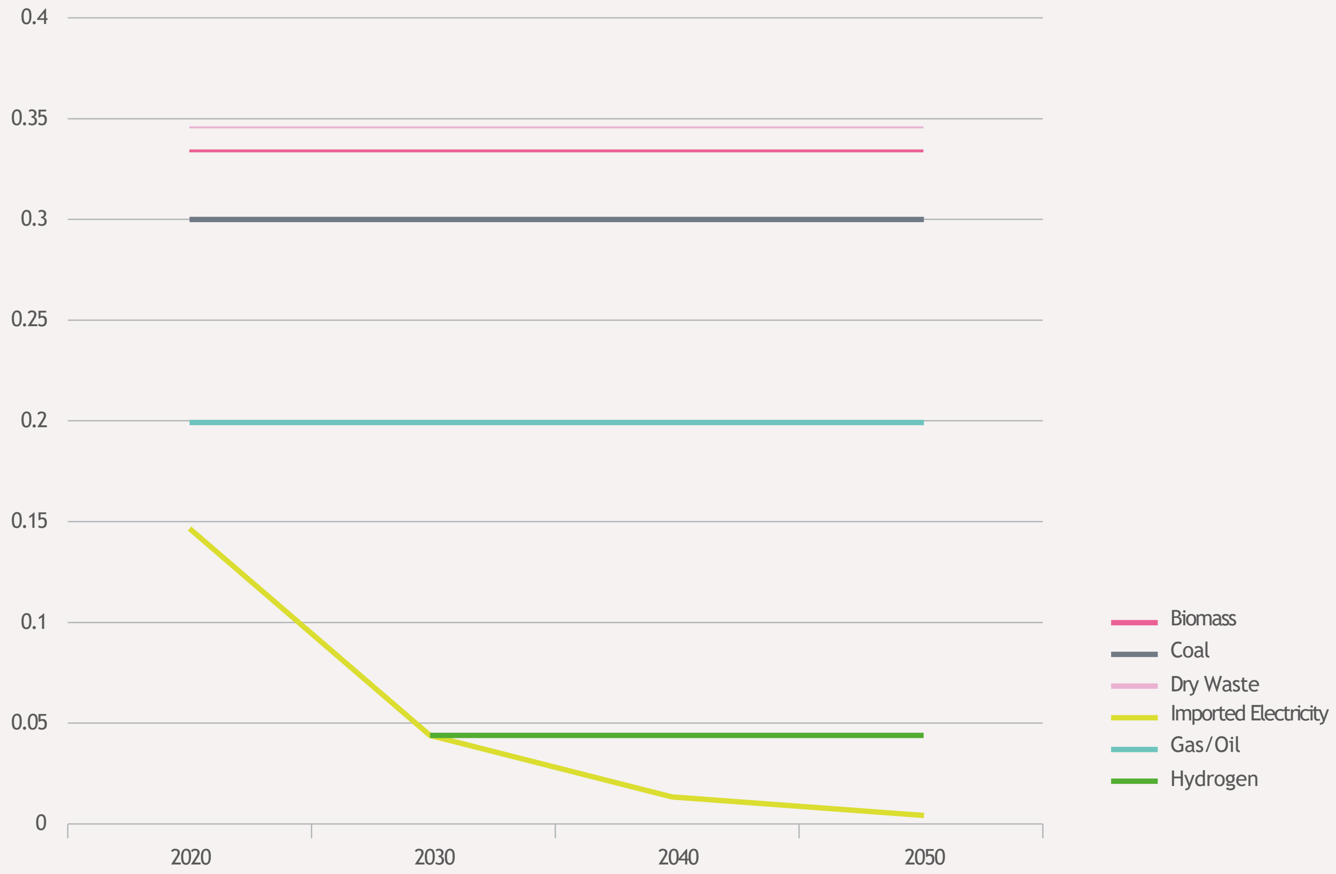
Emission Calculations

EPN optimises to calculate the lowest cost route to meeting a defined carbon target. Domestic, industrial and commercial emissions (i.e. those related to buildings) are in scope for the model. Transport emissions (beyond personal vehicles) and those resulting from land use change are excluded from the analysis.

Some types of non-domestic buildings are projected to have reductions in demand and so emissions over the time period to 2050, even if their heat demand continues to be met using gas or electricity. Emission reductions from these buildings can occur due to:

- Conversion of the national grid to low-carbon electricity which decarbonises the emissions associated with local electricity consumption as shown in graph to the right.
- Reduced gas use in buildings where there is historical evidence to support this trajectory – mainly associated with professionally managed buildings whose managers have a commercial incentive to improve energy efficiency.

CO_2 Emissions Inputs to EnergyPath Networks



Note that it is assumed Hydrogen does not become available until the mid-2030s and therefore there are no emissions for Hydrogen prior to 2030.

Cost Optimisation Approach

EnergyPath Networks has been used to provide evidence to support local area energy planning and the development of local energy system designs able to meet local carbon reduction targets. The importance of other factors such as fuel poverty and health benefits should be recognised in the planning of the future energy system but they are not core parameters in EnergyPath Networks.

Once a set of potential options for the buildings and energy networks in the local area have been identified, the Decision Module compares all valid option combinations and selects the set that meets the local CO_2 emissions target at minimum cost.

The costs considered are the total cost to society for the whole energy system including capital costs, fuel costs and operation and maintenance costs to 2050.

The future costs are discounted. Discounting is a financial process which aims to determine the "present value of future cash flows", or in other words: calculating what monies spent or earned in the future would be worth today. Discounting reflects the "time value of money" – one pound is worth more today than a pound in, say, one year's time as money is subject to inflation and has the ability to earn interest. A discount rate of 3.5% is used, as suggested in the UK Treasury's "Green Book" (used in the financial evaluation of UK Government projects).

Taxes and subsidies are excluded as these are transfer payments with zero net cost to society. Their inclusion in the analysis might result in the selection of sub-optimal solutions. The intention is that, once evidence has been used to define a local area energy strategy and possible future local energy system designs then appropriate delivery methods and associated policies can be developed to enable delivery.

Summary of Data Sources

Buildings and Roads

Category	Data Source	Usage	Owner	Reference and Copyright (if applicable)
Domestic, Non-Domestic and Roads	Ordnance Survey AddressBase Premium, MasterMap Topography, Highways, Building Heights, Sites, VectorMap District, Open Roads, Terrain 50	• Shows location, footprint and classification of buildings, plus road layout for network modelling. • Provides status and classification of non-domestic building (e.g. office, retail). • Informs building size and height. • Informs land classification for renewable generation suitability studies. • Latest data obtained September 2021 for buildings and roads.	Ordnance Survey	© Crown copyright and database rights 2021 OS 100057254
Domestic and Non-Domestic	Lidar Data	• Used to obtain building heights	Department for Environment, Food & Rural Affairs	Lidar data © Crown 2021 copyright Defra licenced under the Open Government Licence (OGL). https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Domestic and Non-Domestic	Energy Performance Certificates (EPC)s	• ESC-built address matching algorithm to match housing attributes from EPCs • Informs building-level attributes – e.g. current heating system, levels of insulation. • Non-domestic Energy Performance Certificates (EPC) and Display Energy Certificates (DEC) to provide further building attributes and demands.	Ministry of Housing, Communities & Local Government	Energy Performance Certificates obtained from https://epc.opendatacommunities.org/ under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Domestic	English Housing Survey	• Informs building-level attributes – e.g. current heating system, levels of insulation.	Ministry of Housing, Communities & Local Government	© Crown copyright material is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland Ministry of Housing, Communities and Local Government. (2021). English Housing Survey, 2017: Housing Stock Data: Special Licence Access. [19 March 2019]. 2nd Edition. UK Data Service. SN: 8546, http://doi.org/10.5255/UKDA-SN-8546-2
Domestic	Off Gas Postcodes from Xoserve	• Used to determine off-gas buildings	Xoserve	Off Gas Postcodes © Copyright Xoserve Limited 2020
Domestic	Heritage Data: Listed Buildings	• Potential constraint on retrofit for listed buildings	Historic England	© Historic England 2021. Contains Ordnance Survey data © Crown copyright and database right 2021. The Historic England GIS Data contained in this material was obtained on 22/09/2021. The most publicly available up to date Historic England GIS Data can be obtained from http://www.HistoricEngland.org.uk
Domestic	DECC household electricity survey	• Domestic appliance use profiles	UK Government	© Crown copyright, 2013. Data obtained from https://www.gov.uk/government/publications/household-electricity-survey--2 under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Domestic	ETI's Optimising Thermal Efficiency of Existing Housing Project	• Retrofit Costs	ETI	https://www.eti.co.uk/library/optimising-thermal-efficiency-of-existing-housing
Non-Domestic	Land Registry	• Informs classification of non-domestic building.	UK Government	© Crown copyright, 2020. Data obtained from https://use-land-property-data.service.gov.uk/datasets/inspire/download under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Non-Domestic	Energy benchmarks (kWh/m²) developed in conjunction with Arup	• Non-Domestic building energy profiles	Energy Systems Catapult	
Future Building Stock	North Yorkshire Housing Allocation Information	• Identify location and number of buildings with planned construction dates	North Yorkshire County Council	

Summary of Data Sources

Networks, Generation, Emissions and Transport

Category	Data Source	Usage	Owner	Reference and Copyright (if applicable)
Networks	Northern Gas Networks (NGN)	• Mapping of pipes including material, size and pressure.	NGN	
Networks	Northern Powergrid (NPG)	• Substation locations, capacities and headroom (for 11kV-400V upwards)	NPG	
Networks	Electricity North West (ENW)	• Substation locations and capacities (for 11kV-400V upwards)	ENW	
Networks	ETI Infrastructure Calculator	• Electricity, Gas, Heat and Hydrogen Network Costs	ETI	https://www.eti.co.uk/programmes/energy-storage-distribution/infrastructure-cost-calculator
Networks	ETI Macro Distributed Energy project	• Energy Centre costs and technical parameters	ETI	http://www.eti.co.uk/library/macro-distributed-energy-project/
Networks and Generation	Heat Networks Planning Databases	• Used to identify planned heat networks	UK Government	© Crown copyright, 2022. Data obtained from https://www.data.gov.uk/dataset/8a5139b3-e49b-47bd-abba-d0199b624d8a/heat-networks-planning-database under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Networks and Generation	Heat Networks Pipeline	• Used to identify planned heat networks	UK Government	© Crown copyright, 2022. Data obtained from https://www.gov.uk/government/publications/heat-networks-pipelines under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Networks	East Coast Hydrogen Feasibility Report	• Relative proportions of Blue/Green Hydrogen for East Coast Hydrogen • 87 % 'blue', 11 % 'green', 0.044 tCO2e/MWh, £61.20/MWh between 2030-2040 and £54.10 for 2040-2050.	National Grid	https://www.nationalgrid.com/uk/gas-transmission/document/138181/download
Networks	BEIS Hydrogen Production Costs	• Hydrogen Cost and Emissions Calculations	UK Government	© Crown copyright, 2021. Data obtained from https://www.gov.uk/government/publications/hydrogen-production-costs-2021 under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Networks and Emissions	BEIS Green Book	• Electricity Grid Prices and Emissions		© Crown copyright, 2021. Data obtained from https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Generation	Renewable Energy Planning Database	• Current planned and operational renewable energy installations (above 150kW)	UK Government	© Crown copyright, 2020. Data obtained from https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Generation	MCS Installations Database	• Data on microgeneration technologies installed in residential and commercial buildings at postcode level.	MCS Data	Some or all of the contents of this document were produced using the information and data from MCS. Data provided through a data-sharing agreement between ESC and Micro Certification Scheme (MCS) in order to perform studies for local authorities (e.g. Local Area Energy Planning studies).
Networks	Northern Gas Networks (NGN)	• Mapping of pipes including material, size and pressure.	NGN	

Summary of Data Sources

Land Classification and Electric Vehicles

Category	Data Source	Usage	Owner	Reference and Copyright (if applicable)
Land	Flood Risk Maps	• Identification of areas unsuitable for ground mounted solar PV	UK Government	© Crown copyright, 2021. Data obtained from https://www.gov.uk/government/publications/flood-risk-maps-2019 under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Land	Natural England: Sites of Special Scientific Interest, Special Areas of Conservation, National Nature Reserves, Areas of Natural Beauty, Ramsar – Wetlands Sites	• Identification of areas unsuitable for ground mounted solar PV	Natural England	© Natural England copyright, 2021. © Crown copyright and database right. Data obtained from https://naturalengland-defra.opendata.arcgis.com/search?collection=Dataset under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Land	Heritage Data: National Parks and Woodland	• Identification of Land use	Historic England	© Historic England 2021. Contains Ordnance Survey data © Crown copyright and database right 2021. The Historic England GIS Data contained in this material was obtained on 22/09/2021. The most publicly available up to date Historic England GIS Data can be obtained from http://www.HistoricEngland.org.uk
Land	Agricultural Land Classification	• Identification of areas unsuitable for ground mounted solar PV	UK Government	© Crown copyright, 2021. Data obtained from https://data.gov.uk/dataset/952421ec-da63-4569-817d-4d6399df40a1/provisional-agricultural-land-classification-alc under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Land	CORINE	• Identification of areas unsuitable for ground mounted solar PV	Environmental Information Data Centre	Cole, B.; De la Barreda, B.; Hamer, A.; Codd, T.; Payne, M.; Chan, L.; Smith, G.; Balzter, H. (2021). Corine land cover 2018 for the UK, Isle of Man, Jersey and Guernsey. NERC EDS Environmental Information Data Centre. https://doi.org/10.5285/084e0bc6-e67f-4dad-9de6-0c698f60e34d Data obtained from https://catalogue.ceh.ac.uk/documents/084e0bc6-e67f-4dad-9de6-0c698f60e34d Under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Electric Vehicles	Zap-Map®	• Location and speed of public chargepoints. • National Chargepoint Registry (NCR) has not been used since its data is included within Zap-Map's national database.	Zap-Map®	https://www.zap-map.com/
Electric Vehicles	TfN EV Charging Infrastructure Framework	• Data for EV annual demand forecasts across North Yorkshire by MSOA	TfN	https://.transportforthenorth.com/major-roads-network/Electric-Vehicle-charging-infrastructure/ © TfN 2022. Data obtained from https://evcivisualiser.z33.web.core.windows.net/ under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
Electric Vehicles	National Travel Survey	• Input for EV charging profiles	UK Government	© Crown copyright, 2021. Data obtained from https://www.gov.uk/government/collections/national-travel-survey-statistics under the Open Government License v3.0 https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

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Standard Data Inputs and Assumptions for Local Area Energy Planning can be found at: https://es.catapult.org.uk/guide/guidance-on-creating-a-local-area-energy-plan/ (Annexe 2). The document provides links to a number of data sources that can be used when creating a LAEP or carrying out follow-on work, providing a detailed description of the characteristics of the data source, as well as identifying any assumptions that need to be made when using the data. It was not used, however, in the creation of this LAEP and the data sources within this Annexe should be used if considering the source of data and figures.

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If there are any questions about the method or outputs in this Annexe, then please feel free to contact the Energy Systems Catapult team on:

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13 December 2022

Climate Emergency Policy and Scrutiny Committee

Report of the Head of Carbon Reduction
Portfolio of the Executive Member for Environment and Climate Change

City of York Council: Annual Carbon Emissions Report 2021/22

Summary

1. City of York Council (CYC) has set a target to reduce carbon emissions from corporate activity to net zero by 2030. An Annual Carbon Emissions Report will be produced every year to monitor progress against this target and identify areas of improvement.

2. The data collected covers the council's scope 1 and 2 (direct) emissions for 2021/22. The council's corporate emissions account for roughly 4% of city-wide greenhouse gas emissions (based on SCATTER data from 2019).

3. This represents the second year of reporting carbon emissions from our own buildings and operations[1]. In some areas we have data going back to 2015/16 which has been used for historical comparison and identifying the impact of the Covid-19 pandemic which saw significant changes in the way we work.

4. Total emissions experienced a small decrease between 2020/21 (3,658tCO_2e) and 2021/22 (3.633tCO_2e). This is despite an increase in staff returning to the office and increased staff and business travel.

5. Emissions associated with the council's fleet continues to reduce as a result of our electrification programme.

[1] https://www.york.gov.uk/climate-change-governance/ClimateChangeGovernance/2

6. Based on the current available data, our fleet and gas consumption account for the majority (99%) of corporate emissions.

7. Since April 2020, we now purchase 100% renewable electricity, reducing our emissions by 4,652tCO_2e over the last 2 years. Electricity consumption still accounts for a significant cost, and opportunities to reduce demand should still be considered for financial benefits.

Recommendations

8. Scrutiny Committee is asked to:

   i. Review the content of this report and provide any recommendations to the Executive Member for Environment and Climate Change

Reason
To support the accelerated delivery of decarbonisation to achieve the council ambition for York to be net zero by 2030.

Annual Emissions 2021/2022

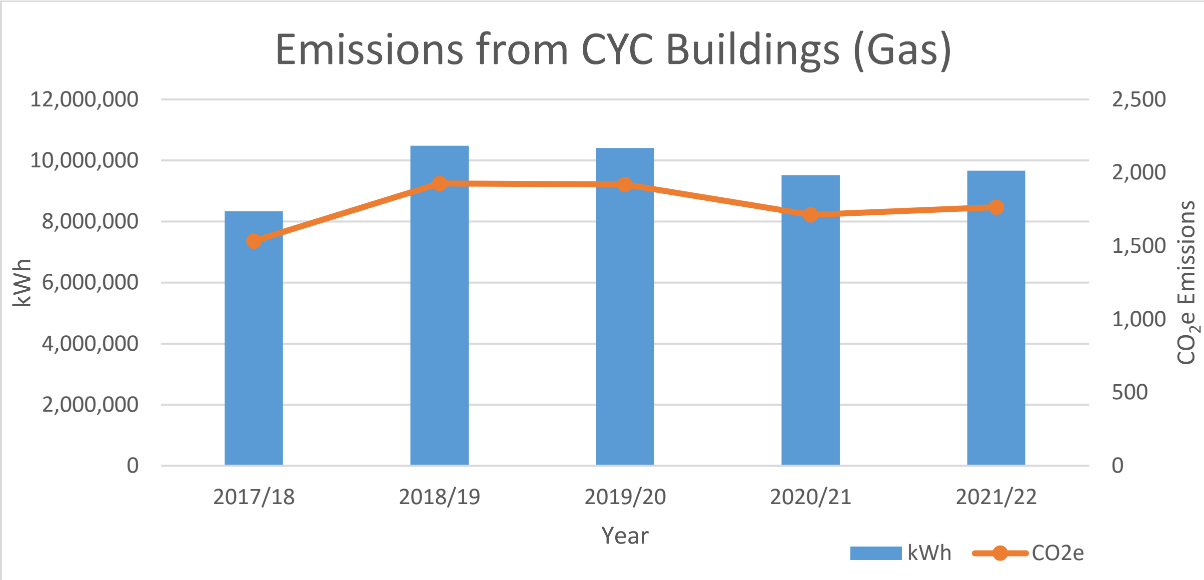
Source	Unit	Total	tCO_2e	Change
CYC buildings (Electricity)	kWh	5,962,141	-	0%
Street lighting (Electricity)	kWh	5,557,711	-	0%
CYC buildings (Gas)	kWh	9,665,792	1,764	3%
CYC buildings (Water)[2]	m^3	-	-	-
Corporate Waste Recycling	tonnes	343 63	5.9 1.4	55%
CYC Fleet Petrol Diesel	ltrs	 13,040 680,785	 30 1,797	4%
Business travel Flights Trains Hotels		 - NA NA	 - 6.7 1.5	204%
Car Club Diesel Unleaded Hybrid Electric	miles	 3,775 80,682 16,709 2,404	 1 22 3 0	170%
Land use	Trees	2,068		
Total			**3,633**	**0%**

[2] We were unable to access water consumption data and as a result are unable to calculate emissions for 2021/22.

Corporate Buildings

Gas

9. Gas use from corporate buildings is responsible for almost half (49%) of total CO_2e emissions.



10. West Offices was responsible for 22% of total gas usage in 2021/22; a doubling of usage on 2020/21. This reflects the higher building occupancy levels following the pandemic and is a return to pre-pandemic usage.

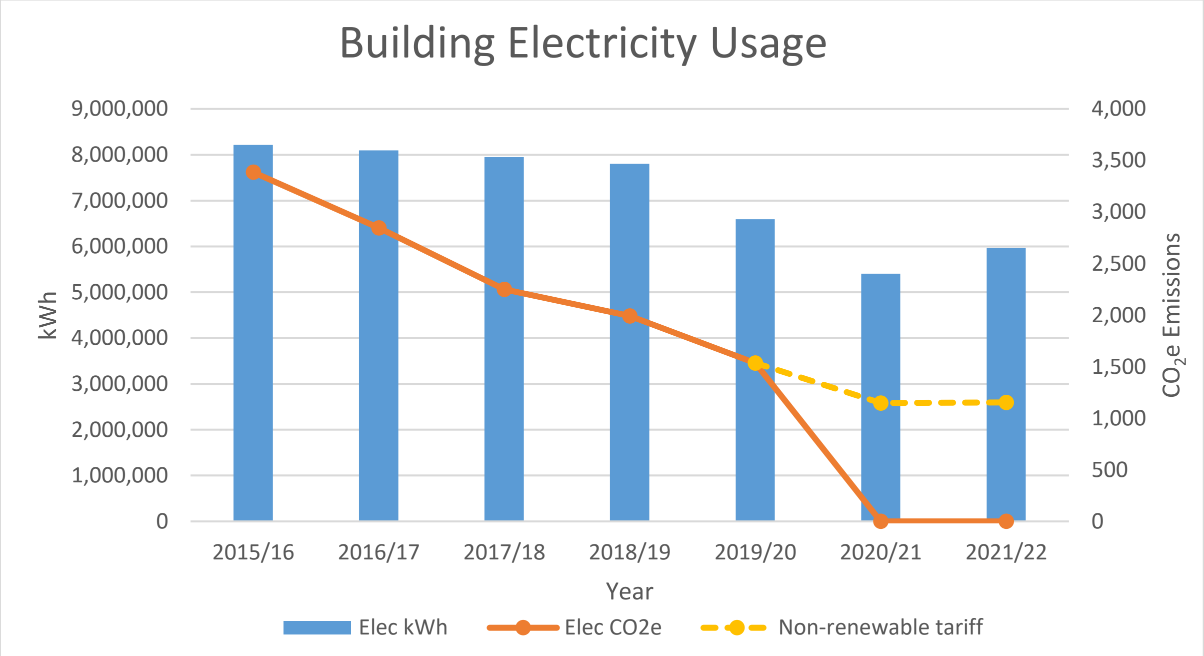
11. Gas usage and associated emissions and cost can be reduced through building efficiency improvements and transitioning to electrical heating. Decarbonisation plans for 7 of our highest consuming sites (accounting for 44% of gas usage) have been carried out to assess low carbon solutions and identify opportunities to reduce emissions.

12. Public funding has also been secured through the Low Carbon Skills Fund to develop decarbonisation plans for 21 schools and 5 leisure centres across York. These plans will be complete by March 2023.

Electricity

13. Since 2020, electricity purchased by City of York Council is from 100% renewable sources and therefore does not contribute to our

annual emissions. However, electricity usage in our buildings still contributes significant cost and opportunities to reduce consumption will have a financial benefit.



14. West Offices accounts for the highest share of our building electricity usage (26%). In 2021/22, electricity consumption at West Offices increased by 9% compared to the previous year, likely due to an increased number of staff in the building as a result of Covid-19 restrictions easing and more people working from the office. However, electricity consumption in 2021/22 is still lower than pre-pandemic levels. The overall decrease from 2015/16 is 27.5%.

15. West Offices occupancy pre-pandemic was between 950 and 1,210 people daily. For the period 2021/22, this was between 275 and 400 people.

16. Efficiency improvements to our buildings will not impact our CO_2e emissions for electricity; however, the potential for cost savings are significant. We will continue to investigate solutions such as LED lighting, voltage optimisation, renewable generation and efficient appliances in our largest consuming sites.

17. If we were not on a renewable energy tariff for electricity, CO_2e emissions for our buildings would have been 1,153 tCO_2e for 2021/22.

18. Building figures do not include schools or museums.

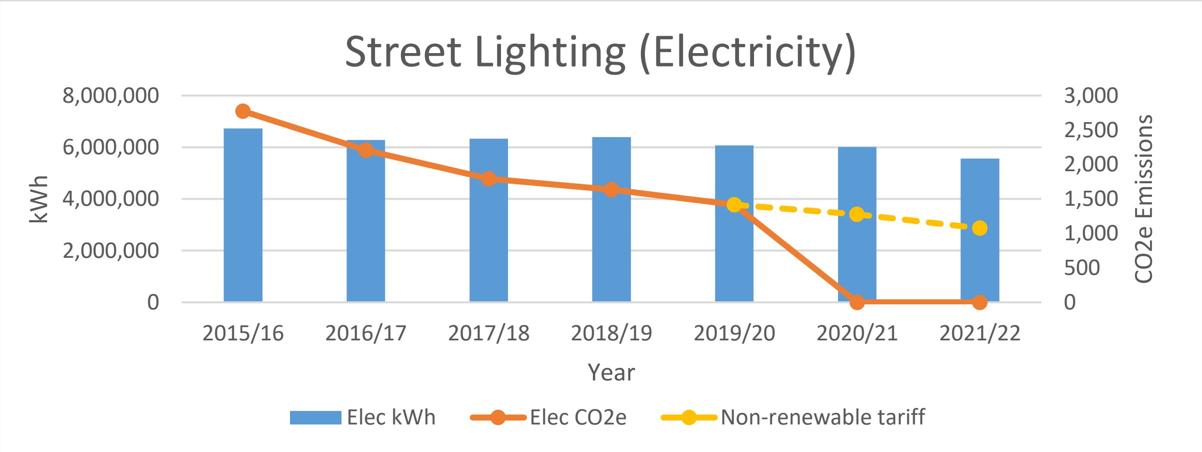
Street Lighting

19. Street lighting accounted for 48% of total electricity use in 2021/22. The nature of street lighting means this consumption is unmetered and is estimated by our supplier based on the total number of street-lamps in use.

20. Since 2015/16 estimated consumption has decreased by 17%.

21. Emissions associated with street lighting reduced to zero in 2020 when we switched our electricity supply to purchase 100% renewable. If we were still paying a non-renewable tariff street lighting would have accounted for 1,075 tCO_2e in 2021/22.

22. Over the last 8 years, CYC has been working on upgrading street lighting to more efficient LED lighting. 2020/21 to 2021/22 saw a 7% reduction in kWh used for street lighting.



Water

23. In 2020/21, emissions from water usage accounted for just 0.6% of our corporate emissions. We have been unable to confirm consumption levels in 2021/22.

Fleet

24. Emissions associated with our fleet reduced by 4% in 2021/22 and reflects the impact of the 4-year fleet replacement programme. As part of this plan, all combustion engine vehicles up to 3.5t will be replaced by electric vehicles. Currently 1.5% of the CYC fleet are electric vehicles. Once complete, emissions associated with our fleet are expected to reduce by around 800tCO_2e.

25. The corporate fleet accounted for half all emissions recorded in 2021/2022. This is a slight reduction from the previous year, in which it accounted for 52% of corporate emissions.

26. As part of the replacement programme, CYC recently obtained a new fleet for waste collection, which included 2 electric vehicles and 10 vehicles with Euro 6 standard engines. Fully electric vehicles cut emissions entirely while Euro 6 standard engines will lower emissions by around 16% a year.

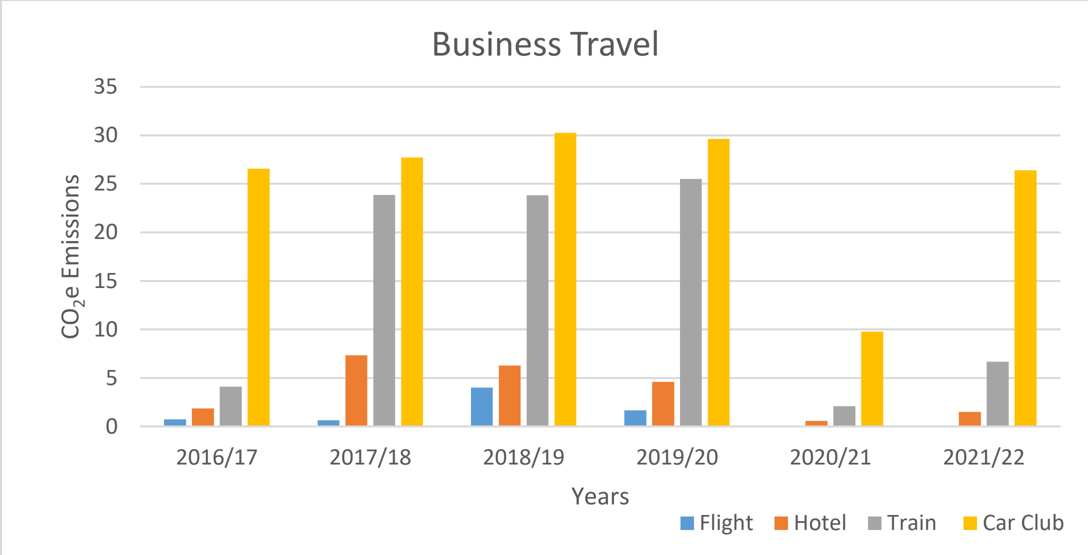
27. We are also reducing emissions and fuel costs by increasing vehicle efficiency through route planning and driver training.

Business Travel

28. Business travel data measures emissions linked to the council's use of hotels, flights, and trains. Emissions associated with business travel have experienced an increase on last year (8.2 tCO_2); however, 2020/21 was exceptional due to Covid restrictions.

29. The continuation of remote working and meeting attendance means that emissions from business travel in 2021/22 are 75% lower than pre-pandemic levels (32.6tCO_2/yr).

30. While flights were uncommon for business travel pre-pandemic, they significantly increase corporate emissions. During the Covid-19 pandemic there were no flights recorded for business travel purposes and this has continued into 2021/22.



Car Club

31. From 2017, the council began using Enterprise Car Club pool vehicles. The fleet consists of vehicles that run on unleaded petrol, diesel, hybrid electric and full electric. Currently over 50% of the vehicles run on unleaded petrol, around a quarter are hybrid electric and there are less than 10% each of diesel and full electric vehicles.

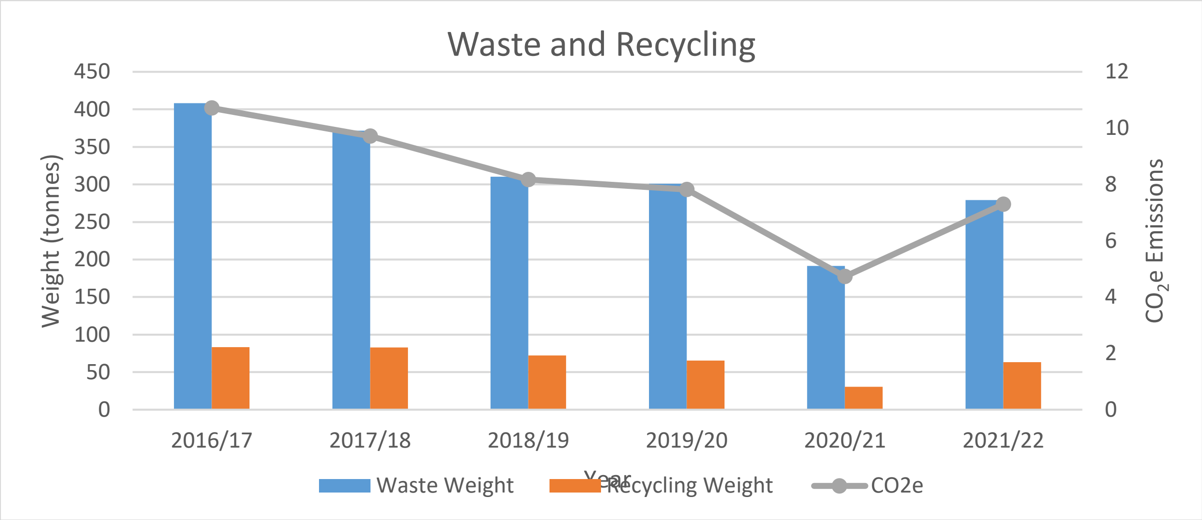
32. Short journeys that were 5 miles or less accounted for just over 2,000 miles. The council will continue to encourage shorter journeys that do not require a vehicle to be walked, cycled or commuted via public transport instead, if possible. The council's bike sharing will be promoted.

33. To reduce emissions from the Car Club, we are looking into the proportion of hybrid and electric vehicles and will encourage staff to use electric and hybrid vehicles rather than petrol or diesel. Enterprise use a preventative maintenance scheme which may help to keep vehicles running more efficiently.

Waste/Recycling

34. Waste from our corporate buildings accounted for 7.3tCO_2e in 2021/22. This is a 65% increase on 2020/21 due to more people

being in the office. However, levels of waste are still lower than pre-pandemic levels.



35. Pre-pandemic, recycling rates averaged 18%, reaching its lowest level of 14% in 2020/21. In 2021/22, the recycling rate has returned to pre-pandemic levels at 18.5%. The latest figures show waste and recycling weights continue to reduce.

36. Additional recyclable materials and food waste may be removed from the general waste during processing at Allerton Waste Recovery Park. Electricity is created from the general waste through burning it rather than being deposited in landfill.

37. In the short term, promoting recycling is important but auditing the type of waste that is produced over the long term can help the council reduce waste and emissions associated with waste.

Procurement

38. Emissions associated with procured goods and services are not included in this report. However, we are working with the York & North Yorkshire LEP to calculate our Scope 3 emissions.

39. As part of this work, a template sustainable procurement policy has been produced. This template will be considered in the next review of our procurement policy.

Actions

40. The City of York Council: Annual Carbon Emissions Report 2020/21 provided several actions for reducing our corporate emissions. Since then, we have worked to:
    - Produce decarbonisation plans for our largest emitting sites to identify improvements in heat generation, building fabric and energy efficiency and renewable generation – these are currently being finalised for 7 council buildings.
    - Adopt a policy to consider low carbon heating solutions for all system replacements – a Low Carbon Assessment Tool has been created.
    - Develop and promote a behaviour change campaign to reduce emissions associated with staff activity – A Carbon Literacy training module has been created for staff.
    - Promote remote event attendance where possible – IT allows this through the devices it provides to staff.

41. Other actions identified to reduce corporate emissions include:
    - Increase the proportion of hybrid and electric vehicles in the car club fleet and encourage staff to use electric and hybrid vehicles
    - Update the Business Travel Policy with more information about carbon reduction, including prioritising sustainable travel including trains over flights, wherever possible
    - Incorporate sustainable procurement and circular economy principles into our purchasing decisions
    - Work with YNY LEP to develop a methodology to calculate Scope 3 emissions associated with council activity
    - Review the corporate waste contract and undertake a waste audit

Council Plan

42. This report satisfies the commitment within The Council Plan to record data on CO_2 emissions from council buildings and operations as part of the “greener and cleaner city” priority outcome.

Implications

- **Financial** – The report identifies a number of actions that the carbon reduction team propose to undertake over the coming year. The majority require officer time and can be contained within agreed budgets. Projects that also provide revenue savings should be prioritised while there be occasions where costs become prohibitive. For example the cost of low carbon heating systems tend to be more expensive than traditional systems. It will be important to consider whole life costing to ensure that savings in running costs are included in the evaluation but it is likely that initial capital costs will be higher. This would need to be incorporated into capital budget setting.

- **Human Resources (HR) -** no HR implications have been identified

- **Equalities** – no equalities implications have been identified

- **Legal –** no Legal implications have been identified

- **Crime and Disorder** - no crime and disorder implications have been identified

- **Information Technology (IT)** - our server estate is subject the impacts of rationalisation where possible. Our move, like most, to use cloud based services where we can, will reduce our local rates of consumption

- **Property** - reduction of carbon emissions will have significant implications for the Council's property portfolio. Some of them are outlined in this report. Consideration of carbon emission data will be a significant factor when it comes to future rationalisation of property assets. Carbon reduction is already in the process of being considered where items of plant and machinery are coming up for replacement in our operational and commercial properties, particularly in respect of gas fired boilers, where consideration is being given to their replacement with, biomass, electric or heat source pumps where it is practical to do so.

Contact Details

Author:	**Chief Officer Responsible for the report:**
Shaun Gibbons Head of Carbon Reduction Tel No. 07923 222971	Claire Foale Assistant Director Policy & Strategy
	Report Approved ✓ **Date** 05/12/2022

Wards Affected: **All** ✓

For further information please contact the author of the report

Background papers

Corporate Emissions Report 2020/21
https://modgov.york.gov.uk/documents/s153499/EMDS_Corporate%20Emissions%20Report_2021.pdf

13 December 2022

Climate Emergency Policy and Scrutiny Committee

Report of the Head of Carbon Reduction

Portfolio of the Executive Member for Environment and Climate Change

York Emissions Inventory Report 2022

Summary

1. This report presents the Emissions Inventory for the city of York. The data will be used to monitor progress against the council ambition to achieve net zero carbon for the city by 2030.

2. The emissions inventory was compiled using SCATTER[1]; a tool designed for, and widely used by, local authorities to report emissions.

3. Emissions across the city for 2019 (the latest reporting year) were 912kilotonnes Carbon Dioxide equivalent ($ktCO_2e$). This covers Scope 1 and 2 (direct) emissions, representing a reduction of 2.6% from 2018.

4. The built environment and transport sector account for over 90% of our direct local emissions. The council is responsible for around 4% of city-wide emissions.

5. While the focus of our inventory reporting is Scope 1 and 2 emissions, as these fall directly under the control of actors within the city, we are exploring improved carbon accounting and management options to include scope 3 (indirect) emissions in the future.

Recommendations

6. Scrutiny Committee is asked to:

[1] https://scattercities.com/

i. Review the content of this report and provide any recommendations to the Executive Member for Environment and Climate Change

Reason
To support the accelerated delivery of decarbonisation to achieve the council ambition for York to be net zero by 2030.

Background

7. SCATTER (Setting City Area Targets and Trajectories for Emissions Reduction) is a local authority focussed emissions tool developed by Anthesis, Nottingham City Council and The Tyndall Centre for Climate Change Research using funding from The Department for Business, Energy and Industrial Strategy (BEIS).

8. SCATTER standardises greenhouse gas reporting and aligns to international frameworks, including the setting of targets in line with the Paris Climate Agreement. It is also compliant with the reporting standards of The Global Covenant of Mayors' Common Reporting Framework (CRF) and Carbon Disclosure Project (CDP).

9. The methodology[2] is based on the Accounting and Reporting Standard developed by the Greenhouse Gas Protocol, the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. Greenhouse Gas Protocol Guidance.

10. This report presents the latest York Emissions Report Inventory (2022) for the reporting year 2019. Previous reports are available from the council website[3].

York's City-Wide Emissions

11. Scope 1 and 2 emissions in York for 2019 were 912ktCO_2e.

[2] https://scatter-staging.anthesis.systems/pages/methodology/
[3] https://www.york.gov.uk/climate-change-governance/ClimateChangeGovernance/2

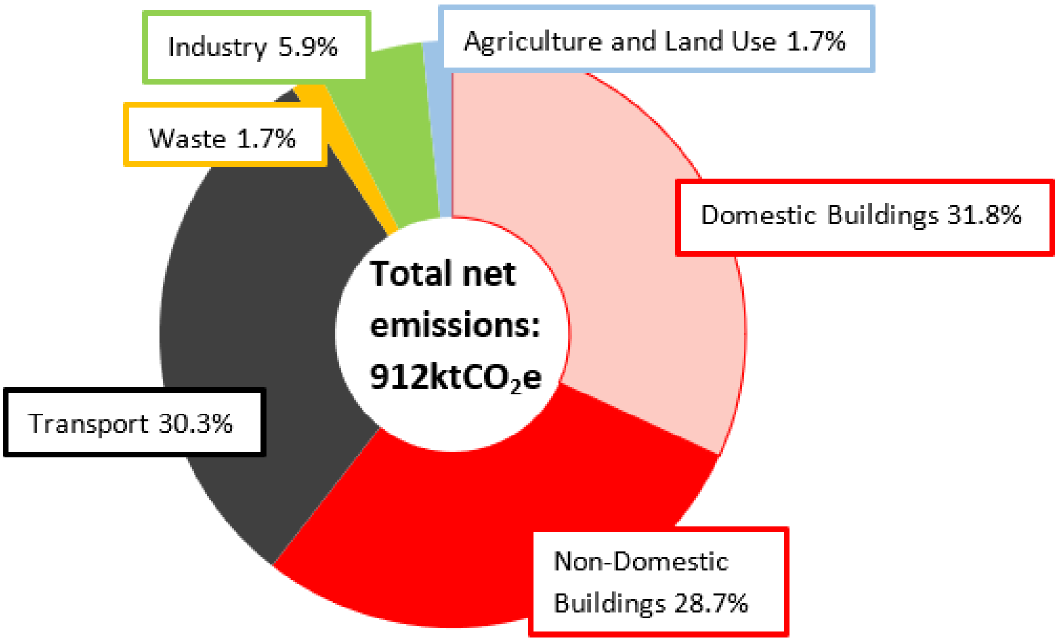


Fig 1: York's city-wide emissions profile in 2019 as modelled by SCATTER inventory tool.

12. The built environment accounts for just over 60% of emissions in York across both domestic and non-domestic. The proportion of emissions from homes has increased since 2018 to, while the share of emissions from other buildings has seen a slight reduction. Most emissions from buildings are associated with gas consumption used for space heating and hot water.

13. Emissions from transport is another significant contributor, with on-road transport responsible for most of these emissions. The percentage of emissions from transport has increased since 2018.

14. A more detailed breakdown of emissions by sub-sector is presented in the Inventory Summary Report (Annex A).

15. The York Emissions Inventory and SCATTER Pathway Tool is used to support the evidence base for the York Climate Change Strategy.

16. The council published an Action Update of measures to reduce city-wide carbon emissions in May 2022.[4]

[4]https://modgov.york.gov.uk/documents/s158862/EMDS_Climate%20Change%20Action%20Update_May%202022.pdf

Council Plan

17. The recommendation from this paper fulfils one of the commitments from the Council Plan: Providing data of carbon emissions across the city. This monitors progress against the Greener and Cleaner Council Plan priority.

Implications

- **Financial –** no financial implications have been identified
- **Human Resources (HR) –** no HR implications have been identified
- **Equalities –** no equalities implications have been identified
- **Legal –** no legal implications have been identified
- **Crime and Disorder –** no crime and disorder implications have been identified
- **Information Technology (IT)** – *the majority of information being recorded is already captured in some format. Some of this information is reported through the York Open Data Platform. Consolidating this data into one place will make it easier for the public to access, increase transparency and collaborative working.*
- **Property –** no property implications have been identified

Risk Management

The following risks have been identified:

- **Transparency**: Wider emissions reporting refers in the main to city partner activity. Partners will use their own methodology to measure their own impact and there might be occasions when data is not aligned. City partners will work together to present a shared narrative about data as it is published.
- **Time**: with a 2.5 year time lag for the data, it will be some time before the impact of policies is really understood. This brings a risk that inadvertent and negative impacts are not acted on quickly enough. To mitigate this risk the council will work with city partners, and draw on available evidence to better understand impact until the accurate data is available

Contact Details

Author:	**Chief Officer Responsible for the report:**
Shaun Gibbons Head of Carbon Reduction Policy, Intelligence, Carbon and Communications 07923 222971	Claire Foale Assistant Director Policy & Strategy Report Approved ✓ Date 05/12/2022

Wards Affected: **All** ✓

For further information please contact the author of the report

Background Papers:

York Emissions Inventory Report 2021
https://modgov.york.gov.uk/documents/s153498/EMDS_York%20Emissions%20Inventory%20Report_2021.pdf

Climate Change Action Update
https://modgov.york.gov.uk/documents/s158862/EMDS_Climate%20Change%20Action%20Update_May%202022.pdf

Annexes

SCATTER York Summary 2019

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Summary Greenhouse Gas emissions (tonnes CO2e)

Sector	Sub-sector	Scope 1 Total tCO2e DIRECT
Stationary energy	Residential buildings	211,617.78
	Commercial buildings & facilities	29,871.23
	Institutional buildings & facilities	24,237.14
	Industrial buildings & facilities	70,983.18
	Agriculture	3,827.67
	Fugitive emissions	29,661.16
Transportation	On-road	250,781.81
	Rail	6,789.95
	Waterborne navigation	950.57
	Aviation	NO
	Off-road	2,507.82
Waste	Solid waste disposal	12,923.78
	Biological treatment	NO
	Incineration and open burning	NO
	Wastewater treatment and discharge	12,355.44
IPPU	Industrial process	53,169.71
	Industrial product use	0.00
AFOLU	Livestock	24,099.56
	Land use	- 7,352.09
	Other AFOLU	NE
Generation of grid-supplied energy	Electricity-only generation	NO
	CHP generation	1,476.54
	Heat/cold generation	NO
	Local renewable generation	6.54

Scope 2	Scope 3	
Total tCO2e	Total tCO2e	Total tCO2e
INDIRECT	OTHER	TOTAL
86,053.16	44,777.90	342,448.85
50,720.02	12,371.77	92,963.02
11,012.67	5,141.39	40,391.20
61,912.61	21,771.98	154,667.77
1.21	903.60	4,732.49
-	NE	29,661.16
IE	IE	250,781.81
IE	1,599.07	8,389.02
IE	IE	950.57
IE	108,110.88	108,110.88
IE	NE	2,507.82
-	IE	12,923.78
-	IE	-
-	IE	-
-	NO	12,355.44
-	NE	53,169.71
-	NE	0.00
-	NE	24,099.56
-	NE	- 7,352.09
-	NE	-
-	NO	-
-	256.96	1,733.49
-	NO	-
NO	NO	6.54

Notation keys:
Not Occuring
Integrated Elsewhere
Not Estimated
Confidential
Combination of notation keys
N/A
Required
Optional

Summary of notation keys available

Scope / table tag
Direct/AFOLU > Land use
Direct/AFOLU > Land use
Direct/AFOLU > Land use
Direct/AFOLU > Livestock
Direct/AFOLU > Other AFOLU
Direct/Generation of grid-supplied energy > CHP gen
Direct/Generation of grid-supplied energy > Electricit
Direct/Generation of grid-supplied energy > Heat/col
Direct/Generation of grid-supplied energy > Local ren
Direct/IPPU > Industrial process
Direct/IPPU > Product use
Direct/Stationary energy > Agriculture
Direct/Stationary energy > Agriculture
Direct/Stationary energy > Commercial buildings & fa
Direct/Stationary energy > Fugitive emissions
Direct/Stationary energy > Industrial buildings & facil
Direct/Stationary energy > Institutional buildings & fa
Direct/Stationary energy > Residential buildings
Direct/Transportation > Aviation
Direct/Transportation > Off-road
Direct/Transportation > On-road
Direct/Transportation > Rail
Direct/Transportation > Waterborne navigation
Direct/Waste > Biological treatment
Direct/Waste > Incineration and open burning
Direct/Waste > Solid waste disposal
Direct/Waste > Wastewater
Indirect/Generation of grid-supplied energy > Local re
Indirect/Stationary energy > Agriculture
Indirect/Stationary energy > Commercial buildings &
Indirect/Stationary energy > Industrial buildings & fac
Indirect/Stationary energy > Institutional buildings &
Indirect/Stationary energy > Residential buildings
Indirect/Transportation > Aviation
Indirect/Transportation > On-road
Indirect/Transportation > Rail
Indirect/Transportation > Waterborne navigation
Other/Generation of grid-supplied energy > CHP gene
Other/Generation of grid-supplied energy > Electricity
Other/IPPU > Product use
Other/Stationary energy > Agriculture
Other/Stationary energy > Agriculture
Other/Stationary energy > Commercial buildings & fa
Other/Stationary energy > Industrial buildings & facili
Other/Stationary energy > Institutional buildings & fa
Other/Stationary energy > Residential buildings
Other/Transportation > Aviation
Other/Transportation > Off-road

Other/Transportation > On-road
Other/Transportation > On-road
Other/Transportation > Rail
Other/Transportation > Rail
Other/Transportation > Waterborne navigation
Other/Transportation > Waterborne navigation
Other/Waste > Biological treatment
Other/Waste > Incineration and open burning
Other/Waste > Solid waste disposal
Other/Waste > Wastewater
Grand Total

Livestock
Land use
Other AFOLU
Industrial Process
Fugitive emissions
end

Scope / summary	Reason Code (pulled through only where applicable)		
Direct/Land use	IE	*Integrated Elsewhere*	*Not Occuri*
Direct/Land use	NE	*Not Estimated*	*Integrated*
Direct/Land use	NO	*Not Occuring*	*Not Estima*
Direct/Livestock	NO	*Not Occuring*	
Direct/Other AFOLU	NE	*Not Estimated*	
Direct/CHP generation	NO	*Not Occuring*	
Direct/Electricity-only generation	NO	*Not Occuring*	
Direct/Heat/cold generation	NO	*Not Occuring*	
Direct/Local renewable generation	NO	*Not Occuring*	
Direct/Industrial process	NO	*Not Occuring*	
Direct/Industrial product use	NO	*Not Occuring*	
Direct/Agriculture	NE	*Not Estimated*	
Direct/Agriculture	NO	*Not Occuring*	
Direct/Commercial buildings & facilities	NO	*Not Occuring*	
Direct/Fugitive emissions	NO	*Not Occuring*	
Direct/Industrial buildings & facilities	NO	*Not Occuring*	
Direct/Institutional buildings & facilities	NO	*Not Occuring*	
Direct/Residential buildings	NO	*Not Occuring*	
Direct/Aviation	NO	*Not Occuring*	
Direct/Off-road	NO	*Not Occuring*	
Direct/On-road	NO	*Not Occuring*	
Direct/Rail	NO	*Not Occuring*	
Direct/Waterborne navigation	NO	*Not Occuring*	
Direct/Biological treatment	NO	*Not Occuring*	
Direct/Incineration and open burning	NO	*Not Occuring*	
Direct/Solid waste disposal	NO	*Not Occuring*	
Direct/Wastewater treatment and discha	NO	*Not Occuring*	
Indirect/Local renewable generation	NO	*Not Occuring*	
Indirect/Agriculture	NO	*Not Occuring*	
Indirect/Commercial buildings & facilities	NO	*Not Occuring*	
Indirect/Industrial buildings & facilities	NO	*Not Occuring*	
Indirect/Institutional buildings & facilities	NO	*Not Occuring*	
Indirect/Residential buildings	NO	*Not Occuring*	
Indirect/Aviation	IE	*Integrated Elsewhere*	
Indirect/On-road	IE	*Integrated Elsewhere*	
Indirect/Rail	IE	*Integrated Elsewhere*	
Indirect/Waterborne navigation	IE	*Integrated Elsewhere*	
Other/CHP generation	NO	*Not Occuring*	
Other/Electricity-only generation	NO	*Not Occuring*	
Other/Industrial product use	NE	*Not Estimated*	
Other/Agriculture	NE	*Not Estimated*	
Other/Agriculture	NO	*Not Occuring*	
Other/Commercial buildings & facilities	NO	*Not Occuring*	
Other/Industrial buildings & facilities	NO	*Not Occuring*	
Other/Institutional buildings & facilities	NO	*Not Occuring*	
Other/Residential buildings	NO	*Not Occuring*	
Other/Aviation	NO	*Not Occuring*	
Other/Off-road	NE	*Not Estimated*	

Other/On-road	IE	*Integrated Elsewhere*
Other/On-road	NO	*Not Occuring*
Other/Rail	IE	*Integrated Elsewhere*
Other/Rail	NO	*Not Occuring*
Other/Waterborne navigation	IE	*Integrated Elsewhere*
Other/Waterborne navigation	NE	*Not Estimated*
Other/Biological treatment	IE	*Integrated Elsewhere*
Other/Incineration and open burning	IE	*Integrated Elsewhere*
Other/Solid waste disposal	IE	*Integrated Elsewhere*
Other/Wastewater treatment and discha	NO	
Indirect/Off-road	**IE**	
Other/Heat/cold generation	**NO**	
Other/Local renewable generation	**NO**	
Other/Livestock	**NE**	
Other/Land use	**NE**	
Other/Other AFOLU	**NE**	
Other/Industrial Process	**NE**	
Other/Fugitive emissions	**NE**	
end	*end*	

CITY OF YORK COUNCIL

13 December 2022

Climate Emergency Policy & Scrutiny Committee

Report of the Head of Carbon Reduction
Portfolio of the Executive Member for Environment and Climate Change

Pollinator Strategy Update

Summary

1. The 'City of York Pollinator Strategy 2020 – 2025' was approved by Executive on 18 March 2021.

2. The Strategy sets out the council's vision: "Our local environment will be rich in pollinator friendly habitats, helping support sustainable pollinator populations and making places more attractive for people to live and work in."

3. This report provides an update against the strategic objectives and actions within the Strategy.

Recommendations

4. Scrutiny Committee is asked to:

   i. Review the content of the update and provide any recommendations to the Executive Member for Environment and Climate Change

   Reason:
   To improve suitable habitat within York for pollinators

Background

5. In July 2019 Council resolved "to request a paper to Executive setting out the options for a comprehensive Pollinator Action Plan to include consideration of the management of appropriate verges, parks and other open spaces for wildflowers and biodiversity; other possible measures to support pollinators and the options for working collaboratively to develop and implement the plan with other local organisations."

6. The Pollinator Strategy was approved by Executive on 18 March 2021 for adoption.

Council Plan

7. This proposal supports and contributes to the following Council Plan priority - A greener and cleaner city.

Implications

- **Financial** – Where the strategy requires a change in other policies there are no financial implications. Where it requires action on the ground this will have to be funded by Wards or 3rd parties otherwise the Public Realm budget and their limited resources will be stretched further. There is no capacity to lead or coordinate city wide projects.

Contact Details

Author:	**Chief Officer Responsible for the report:**
Shaun Gibbons Head of Carbon Reduction Tel No. 07923 222971	James Gilchrest Director of Environment, Transport and Planning **Report Approved** ✓ **Date** 05/12/2022

Wards Affected: **All** ✓

For further information please contact the author of the report

Background papers

Executive Report: Pollinator Strategy (18/03/2021)
https://modgov.york.gov.uk/documents/s148143/Exec%20Report%20Pollinator%202021.%20docx.pdf

Annexes

Annex A: Pollinator Strategy Update

Annex B: Pollinator Strategy
https://modgov.york.gov.uk/documents/s148144/Annex%201%20CYC%20Pollinator%20Strategy.pdf

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Strategy Objectives and Actions

Aim 1: To ensure the needs of pollinators are represented in local plans, policy and guidance.

	Objective	Specific Action	Update December 2022
1.1	Increase the protection afforded to pollinator habitats and the species they support by ensuring appropriate recognition in local plans and policies where relevant.	Ensure the needs of pollinators are incorporated within the City of York Local Plan Green Infrastructure Strategy and Supplementary Planning Document.	
		Update the ‘Land Use and Wildlife’ section of the CYC One Planet Better Decision Tool to include specific reference to pollinators.	
1.2	Recognise and capitalise on opportunities to create pollinator friendly habitats as part of new development.	Raise awareness of and promote the creation of pollinator friendly features with developers through the development management process, in particular pre-application advice, drawing on our own best practice as demonstration examples.	

		Ensure the value of Brownfield habitat for pollinators is taken account of in the development management process.	

Aim 2: To protect, increase and enhance the amount of pollinator habitat on council owned or managed land, and help to improve the status of any locally threatened species.

	Objective	Specific Action	Update December 2022
2.1	Increase the value for pollinators of Sites of Importance for Nature Conservation (SINC) and Local Nature Reserves (LNR)	Ensure the needs of pollinators are taken into account in the management of SINCs and LNRs.	
2.2	Increase the value of parks and other greenspace for pollinators.	Implement a proactive management regime including reduced cutting and meadow management in suitable locations. The Council's network of green spaces is used for a variety of roles e.g., picnics, football, running etc and are highly responsive to local resident's needs. Therefore, any changes to the management regime needs to take theses numerous activities into account	Work on this Objective continues when and where opportunities arise. Millennium Bridge Field, Fishergate. The expansion of the grassland areas south of the bridge in support of a more proactive management funded by Fishergate Ward Committee. New Walk, Fishergate. Restoration of flood and foot traffic damaged grassland by the introduction of new flood tolerant species of plants. City Ramparts, Guildhall. Friends of the City Walls / Bug life plug and bulb planting day in October which saw the introduction of early flowering plants in the area adjacent to Fishergate Postern.

		and be developed, considered and agreed at a local level.	Water End, Clifton – the creation of a more diverse woodland / meadow landscape– supported by the Environment Agency tree planting. Clarence Gardens, Guildhall – for 2023 the opportunity exits to repurpose land which was previously used for two bowling greens. Community consultation on this will commence in the New Year via the Ward Committee and Residents Association
		Work with local 'Friends of' groups to develop a balanced approach to park management to support a range of uses and wildlife benefits.	"Friends of" groups continue to play an active and supporting role in the management of the city's green spaces. Groups both drive landscape change e.g., The Friends of Rowntree Park and their care of the Long Borders and are consultees where the council takes the lead
		Only use bedding plants that provide forage for a wide variety of pollinating insects	The bedding contract is due for renewal in 2023 (possibly later than previously advised) so this will be a key factor in the new contract. The council will have the ability to monitor the effect of its bedding choices in 2023 – see item 3.1 below
2.3	Reduce the impact of pesticides on pollinators and other wildlife.	Review use of herbicides in grounds maintenance by trialling alternative methods of weed control.	This is an ongoing process and was consider at the Decision Session Executive Member for Environment and Climate Change 12th January 2022 *Weed Management of Highways and Associated Areas,* and, at the Customer and Corporate Services Scrutiny Management Committee (Calling In) 7th February 2022 – *Weed Treatment Options*.

			A report back on this year trials and discussion is due to be considered by the Decision Session Executive Member for Environment and Climate Change 14th December 2022
		Cease the use of all neonicotinoids including seed dressings, plants and turf from the supply by end of 2021.	The existing bedding contactor and main wildflower seed suppliers have confirmed that do not use such chemicals
2.4	Make council owned land and buildings more pollinator friendly.	Ensure the pollinator strategy we have developed links together wildflower-rich habitats and is informed by B-lines established across our region and work with other local authorities, landowners and wildlife organisations to enable delivery	
		Encourage Ward Teams to work with neighbouring wards and authorities, land owners and wildlife organisations to link and expand B Lines by creating new areas for pollinators.	
		Include pollinator friendly habitats as part of new Highways schemes where doing so will create a benefit.	
		Establish and maintain a network of ‘Bee Hotels, across the parks and open spaces.	

Aim 3: To improve our knowledge and understanding of pollinators in our local area.

	Objective	Specific Action	
3.1	Increase information on the status of pollinators.	Measure the abundance of pollinator friendly habitat on council-owned or council-managed land	No data is kept the abundance of pollinator friendly habitat on council-owned or council-managed land. To assist this objective the council has hired for three years 10 AgriSound pollinator monitors, see https://www.agrisound.io. In the New year these devices will be placed in 10 different locations across the city to minor pollinator visits. Suggested locations include the community managed highway verge in Wheldrake, a wildflower seeded roundabout, Glen Gardens shrub border, city walls grassland, and city centre hanging basket. Suggestions for other locations can be forwarded to dave.meigh@york.gov.uk
		Encourage local people to support national pollinator monitoring schemes and to submit local records to: the North and East Yorkshire Ecological Data Centre (https://www.neyedc.org.uk/), Big Butterfly Count https://bigbutterflycount.butterfly-conservation.org Great Yorkshire Creature Count https://www.ywt.org.uk/great-yorkshire-creature-count	

		Make this document available on the council's website with links to further advice and information available on the council's website.	

Other Possibilities Subject to Further Resource:

Aim to increase awareness of pollinators and their habitat needs across local residents, businesses and other landowners.

	Objective	Specific Action
	Increase awareness of pollinators in the local community and within local businesses.	Provide information on pollinator friendly gardening activities to local residents and local allotment holders.
		Create pollinator friendly flower beds in parks and link these to interpretation about pollinators.
		Promote pollinators to Ward Councils to encourage inclusion within their funding priorities. CYC Templates on best practise provided in 2020.
		Encourage local schools to develop wildflower areas in school grounds.

Annex 1: Useful Sources of Information

Buglife – Get Britain Buzzing: A manifesto for pollinators https://www.buglife.org.uk/pollinator-manifesto

National Pollinator Strategy for England 2014
https://www.gov.uk/government/publications/national-pollinator-strategy-2014-to-2024implementation-plan

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_ data/file/794668/pollinators-strategy-imp-plan.pdf

Buglife B-Lines Pollinator sheets -https://www.buglife.org.uk/our-work/b-lines/b-linesguidance/pollinator-leaflets/ and local authority guidance https://www.buglife.org.uk/our-work/b-lines/

Buglife information on Neonicotinoid insecticides
https://www.buglife.org.uk/campaigns/pesticides/neonicotinoid-insecticides/

Buglife Urban Buzz information - https://www.buglife.org.uk/our-work/pollinator-projects/urbanbuzz/

'Managing Transport Corridors for Pollinators' and 'Managing Urban Spaces for Pollinators' (Buglife)
https://cdn.buglife.org.uk/2020/04/Transport-Corridors.pdf https://cdn.buglife.org.uk/2019/07/managing-urban-areas-for-pollinators.pdf

'Living with Environmental Change: Managing urban areas for insect pollinators. As town and cities continue to grow how can land managers help insect pollinators in urban areas?' http://www.nerc.ac.uk/research/partnerships/ride/lwec/ppn/ppn20/

'Planning for a healthy environment: good practice guidance for green infrastructure and biodiversity', TCPA and the Wildlife Trusts, 2012
www.tcpa.org.uk/data/files/TCPA_TWT_GI-Biodiversity-Guide.pdf

Wildlife Trusts https://www.wildlifetrusts.org/savingbees

Status and value of pollinators and pollination - A report to DEFRA http://nora.nerc.ac.uk/505259/1/N505259CR.pdf

Friends of the Earth - Local Authority Bee Guide https://friendsoftheearth.uk/nature/developing-pollinator-action-plan

Bumblebee Conservation – Local Authority Pack
https://bumblebeeconservation.org/images/uploads/Local_authorities_pack_full.pdf

Climate Emergency Policy and Scrutiny Committee – Work Plan

Scrutiny Area	**Meeting Date**	**Meeting Type**	**Agenda**
CC	13/12/2022	Committee	1) Local Area Energy plan – discussion and comments on the draft plan. 2) CYC corporate emissions/performance data. 3) Update on pollinator strategy – including mow/no mow – plan and outcomes (noting weed control and pesticides are being covered by the Economy and Place Scrutiny Committee in January).
CC	28/02/2023	Committee	1) Tree canopy target update and Green street. 2) Adaptations: Climate Risk Resilience priorities for York. 3) Adaptations: Natural flood resilience project. 4) Community Woodland update. 5) Wild verges (creating a wildflower verge and habitat benefits) – exploring opportunities to create guide Wildflower Trust / Natural England / St Nicks Wheldrake wild verges and Hull Road wildflowering. 6) BioYorkshire. [Postponed from 13/12/22.] 7) Update on LED conversions and what's next (Solar lights trial). [Postponed from 13/12/22.]

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