Notice of a public meeting of

Climate Change Policy and Scrutiny Committee

To: Councillors Vassie (Chair), Baker (Vice-Chair), S Barnes, Fisher, Melly, D Myers and Wann

Date: Tuesday, 8 December 2020

Time: 5.30 pm

Venue: Remote Meeting

AGENDA

1. Declarations of Interest

At this point, 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 Tuesday 10 March 2020.

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 have changed to 2 working days before the meeting, in order to facilitate the management of public participation at remote meetings. The deadline for registering at this meeting is at **5.00pm on Friday 4 December 2020**.

To register to speak please visit www.york.gov.uk/AttendCouncilMeetings to fill out an online registration form. If you have any questions about the registration form or the meeting please contact the Democracy Officer for the meeting whose details can be found at the foot of the agenda.

Webcasting of Remote Public Meetings

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

During coronavirus, we've made some changes to how we're running council meetings. See our coronavirus updates (www.york.gov.uk/COVIDDemocracy) for more information on meetings and decisions.

4. Climate Change Strategy (Pages 7 - 20)
The Head of Carbon of Reduction will be in attendance to give a presentation on the Climate Change Strategy.

5. York Emissions Reporting & Carbon Neutral Ambition (Pages 21 - 28)
The committee are presented with a report detailing the work undertaken to report on the carbon emissions of City of York Council to date.

6. York Climate Commission (Pages 29 - 72)
The committee will receive a report from the Head of Carbon Reduction on the creation of the York Climate Commission.

7. Urgent Business

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

Democracy Officer:

Name: Chris Elliott
Telephone: (01904) 553631
E-mail: Christopher.elliott@york.gov.uk

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 Change Policy and Scrutiny Committee
Date	10 March 2020
Present	Councillors Vassie (Chair), Baker (Vice-Chair), Hook, D Myers, Wann and Norman (Substitute for Barnes)
Apologies	Councillors Barnes and Fisher

33. Declarations of Interest

At this point, Members were asked to declare any personal interests not included on the Register of Interests, prejudicial interest or any disclosable pecuniary interests which they may have in respect of business on the agenda. None were declared.

34. Minutes

Resolved: That the chair would discuss with the Scrutiny and Democracy Officers regarding amending the minutes from the 14 January 2020 meeting of the Committee. The Minutes will then be brought back to the Committee's next meeting.

35. Public Participation

It was reported that there had been eight registrations to speak under the Council's Public Participation Scheme.

Geoff Beacon raised the discussion of land value from the 14 January 2020 meeting of the committee. He noted that he believed the difference stated between building land and agricultural land value at the meeting was low and asked if work could be carried out to assess the figures?

Caroline Jones discussed her concerns regarding the City of York Council's current recycling policy in comparison to what she had seen in other cities. She asked whether the Council's new recycling fleet would improve plastic waste recycling and food waste collection in York and whether One Planet York would have a part in improving recycling?

Adam Myers noted that he believed the Council needed to divest from fossil Fuels. He noted that if the Council didn't wish to divest for environmental reasons, then it should divest as he believed that Fossil Fuel

companies were going to devalue. He suggested that procurement could be structured to favour small local companies which have less of an environmental impact.

Eddy Adams discussed the scope the Council had to talk to other cities about how they were tackling the Climate Emergence. He noted the Preston Model for procurement and how it was being transferred to cities in Europe and highlighted the co-benefits to local procurement.

Deborah Cobbett noted her support for One Planet York's proposal to introduce Carbon Literacy in schools as well as work Sustrans was doing with schools. She highlighted the need for good alternative transport to cars to be available ahead of a ban on cars in the city centre and noted that world government's response to COVID-19 should be a template to tackling climate change.

Claire Duddington requested that the Council cut all ties with the Fossil Fuel industry and noted the impact the divestment campaign had on multiple cities and universities.

Beth Carter noted the potential dangers of divestment, but that the potential drop in value of Fossil Fuel companies highlighted the need to divest to protect investments. She requested that the Council focus investment in Low Carbon producing companies.

Jacob Horn highlighted that the University of York had targeted total divestment from Fossil Fuels by 2030 while still meeting the requirements of its pension fund. He suggested that the Council would need do the same in order to meet even the most modest of central government targets. He asked that the Council look at best practice from Local Authorities and cities around Europe on how to effectively divest.

36. One Planet York Update

The Committee were joined by June Tranmer and Peter Watkins from One Planet York (OPY). They outlined OPY's progress since the Committee last received an update covering OPY's governance, membership, and potential funding. They highlighted potential projects for OPY including the setting up of a mentoring program and in line with the Carbon Disclosure Project creating a questionnaire for small and medium business in the city to participate in. This would allow OPY to assess what business' were already doing in the city and facilitate conversations about what is coming up. They also noted that OPY needed to be clearer with its messaging and improve its social media presence, they noted the need for work to be

carried out to improve their website, and that the organisation needed to improve on how it engages with business and residents around the city.

Members highlighted their support for the work OPY were undertaking. They noted the importance of promoting Carbon Literacy within the city and discussed whether City of York Council could be more active in supporting OPY and whether this should include funding as well as assistance to build partnerships within the city. The importance of COP 26 was emphasised and the planning of events around the event were suggested, OPY noted that they were going to be taking part in events during COP 26 week with the York Environment Forum.

Resolved:

i. That the Committee recommended to the Executive that it explore OPY's involvement in any Climate Change Committee that could be set up.
ii. That the Committee Recommended to the Executive that it explore options to support OPY in organising an event to coincide with COP 26.

Reason: To support City of York Council's ambition for the city to be at Net Zero by 2030.

37. Renewing City of York Council's Pledge to Covenant of Mayors

The Committee considered the next steps for renewing City of York Council's commitment to the Covenant of Mayors for Energy and Climate Change, as agreed by full council motion. Officers noted that if the recommendations were agreed then they would discuss with the Executive to agree a date for an announcement that the Council will sign and re-submit to the Global Covenant of Mayors (GCoM) pledge and agree a timescale for the Council to disclose the cities greenhouse gas emissions. It was noted that while the Council does not need to re-submit in order to begin re-engaging with the GCoM, re-submitting would provide renewed opportunity for City of York Council to highlight its commitment to climate action and its intention to take an evidence based and planned approach to carbon reduction that is regularly monitored and publicly reported.

Resolved:

i. That the Committee support the recommendation to the Executive that, In line with the agreed Council motion, that the council formally signs and re-submits the GCoM pledge in full

knowledge of the commitments set out in the official Commitment Document.

ii. That the Committee support the recommendation to the Executive that, the council commences the process of regular 'disclosure' (progress reporting), by registering with CDP (Carbon Disclosure Project) and to take part in the 'Cities 2020' Questionnaire during April-July this year.

Reason: To support the City of York Council re-engaging with the Covenant of Mayors for Energy and Climate Change.

38. Responsible Investment

The Committee were joined by Council Officers and Cllr Victoria Mills Cabinet Member for Finance, Performance and Brexit and Alex Moylan Finance Manager for Pension Funds both of Southwark Council.

Officers outlined that City of York Council did not directly invest in Fossil Fuels and that the Executive had recently agreed that a 4th criterion was added to cover ethical, social and governance issues. Officers outlines that surplus cash was invested in money market funds and these could inadvertently see investment in fossil fuels and that as part of the North Yorkshire Pension Fund (NYPF) 1.26% of the fund was invested in oil and gas companies. They noted that expert opinions identified the benefit of socially responsible investment and that active engagement with companies were considered effective to create industry change. They also suggested that divestment alone would not close fossil fuel companies down and highlighted that a lot of investment in renewable energy was undertaken by those same companies.

Cllr Victoria Mills and Alex Moylan outlined the work undertaken at Southwark Council to divest while seeking not to damage assets. They noted that this was undertaken by assigning officers at their council the task of divesting when it was financially right to do so and not be left with an asset that they considered could collapse. It was noted that Southwark had more control over being able to choose where they invested their pension fund than City of York Council due to being part of the NYPF.

Members discussed the possibility a carbon foot print review of the NYPF. They also considered whether City of York Council could include ethical policies in the Council's investment policies, Members also recommended promoting these values within NYPF. While Climate Change would form part of an ethical policy Members suggested that this should also include policies such as those that seek to end poverty and modern slavery. Officers noted that this was being looked into and noted a workshop being

held by Boarders of the Coast Pension Fund around a Responsible Policy. Cllr Victoria Mills noted that Southwark Council had taken the opportunity when discussing investment with companies to promote other values of the Council such as diversity on company boards.

Resolved:

i. That NYPF be asked about undertaking comprehensive Carbon Foot Print review of the pension fund if not already being undertaken.
ii. That an update on Responsible Investment be brought back to Committee.

Reason: To support City of York Council practices an ethical investment strategy.

39. Sustainable Procurement

Members considered a report outlining the current Procurement Strategy and the process for updating this strategy over the coming months, with the view to optimise the opportunities for delivering social value and ensuring long term sustainability.

Members discussed the use of targets in procurement and it was confirmed that the council aimed to improve its contract monitoring. The idea of best value in procurement was raised as the council considered a variety of variables when procuring, Members confirmed support for procurement placing further focus on social impact that included climate impact and agreed with Officers the need for this to be included in any contract monitoring system that could be implemented.

Members raised the possibility or setting targets for local procurement in order to maintain both the economic benefits in the city, as well as, the potential benefits this could have on the climate. It was noted that setting percentages could be effected by major capital projects that require larger procurement from national companies or from companies involved in industries which do not operate in York and may not be industries the city would be seeking to operate locally. Membered highlighted the importance of Climate Change awareness in companies that the Council procures from, citing the possibility of assessing Carbon Literacy, as well as, discussing including carbon impact in value engineering in good project management.

Resolved:

i. That the Committee recommended that the Executive consider including Carbon Literacy criteria in the next Procurement Strategy that companies much meet.
ii. That the Committee recommended that the Executive consider the creation of performance indicators to monitor the performance of contracts.
iii. That the Committee recommended that the Executive consider incorporating Carbon Impact as part of value engineering undertaken as part of good project management.

Reason: To improve and increase the sustainability of City of York Council's procurement.

40. Work Plan 2019/20

Members considered the Committee's work plan for the remainder of the 2019/20 municipal year. Members agreed that they would put the Feasibility Report - Corporate Review into Poverty on hold due to the ongoing work by over Scrutiny Committees crossing over with the remit this committee identified. The Committee requested that a update report on pensions and procurement be added to the 12 May 2020 meeting of the Committee and that the End of Year Report scheduled for that meeting be postponed to the 7 July 2020 meeting.

Resolved:

i. That the draft work plan was approved, as submitted, subject to the above clarification.

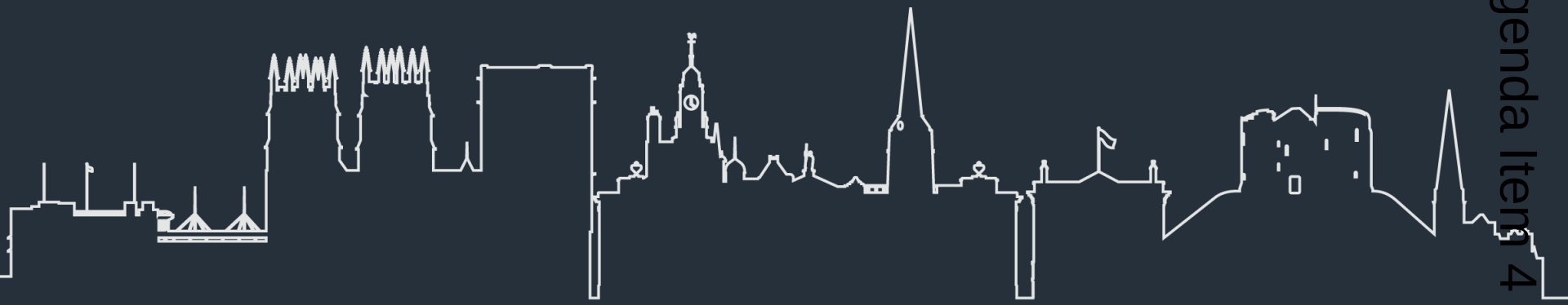
Reason: To ensure that the committee has a planned programme of work in place.

Chair Cllr C Vassie
[The meeting started at 5.32 pm and finished at 8.01 pm].

York Climate Change Committee

Shaun Gibbons
Head of Carbon Reduction
Shaun.gibbons@York.gov.uk

November 2020



Climate Emergency

- York Climate Emergency – March 2019

York to be a Carbon Neutral City by 2030

- Climate Change Policy and Scrutiny Committee – Sept 2019

Develop a 10 year plan showing current baseline and route map to zero-carbon

- York Climate Commission – December 2020

Place-based network for climate action

- York Climate Change Strategy – Spring 2021

Strategic direction for the city

Climate Commission

A Place-based Network for Climate Action

A city-wide partnership bringing together people from the public, private and civic sectors who will work collaboratively to help drive climate action.

The Commission is an independent advisory group with no direct decision making. The scope of activity is set by the Terms of Reference.

Working together to improve and make a difference

York Climate Change Strategy

1. Baseline & Reporting

- Raise collective consciousness
- Create transparency
- Provide accountability
- Focus attention on key areas
- Celebrate achievements

2. Decarbonisation Roadmap

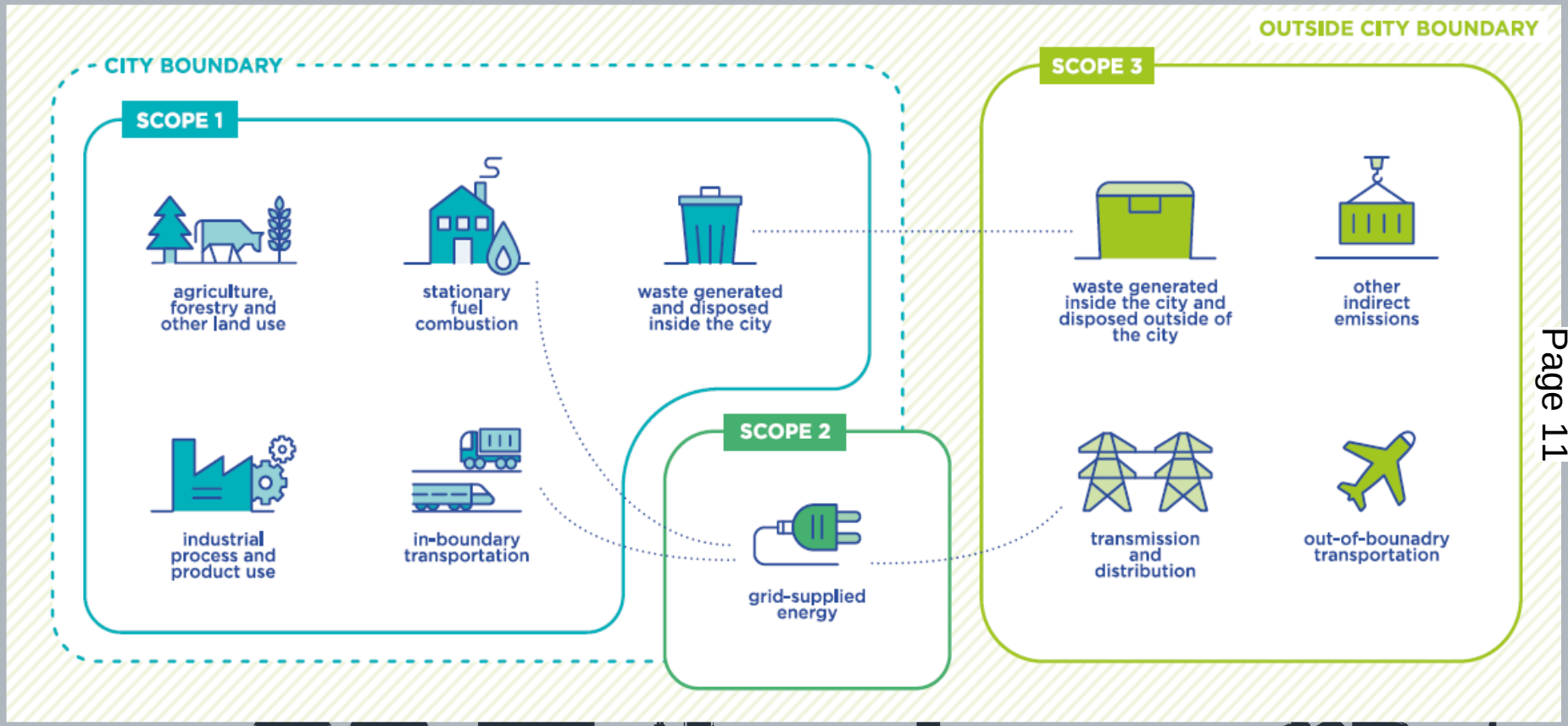
- What needs to happen by when
- Priority areas

3. Zero-carbon Action Plan

- How we will deliver zero-carbon
- Actions around key themes
- Consider influence of control

Working together to improve and make a difference

Scope



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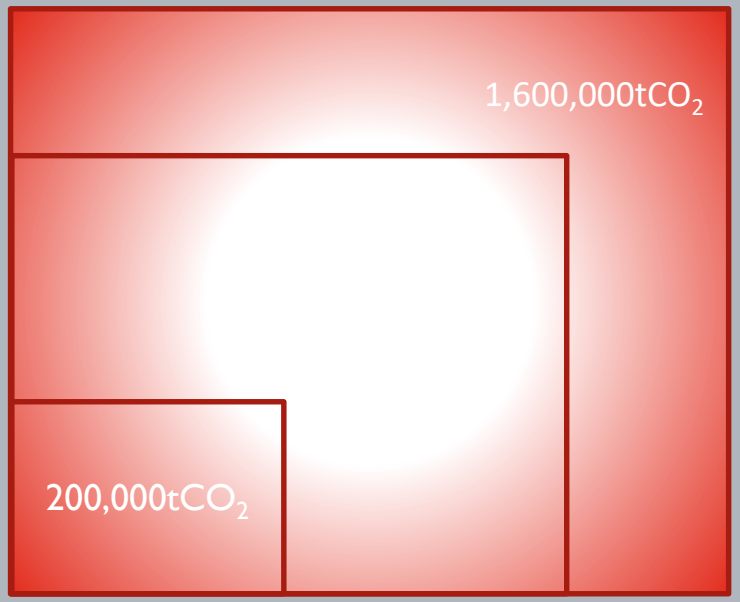
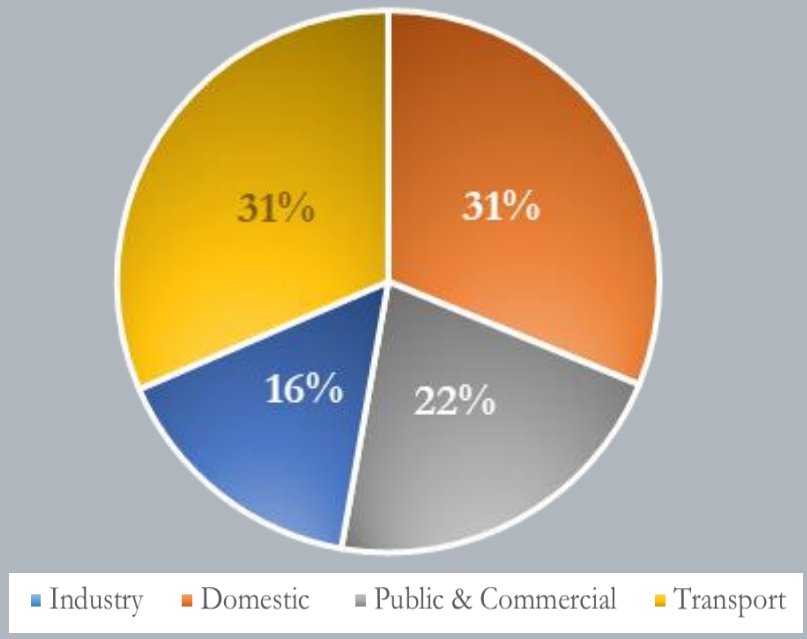
Baseline & Reporting



City of York Emissions
2000 – Present – 2030



Emissions by Sector

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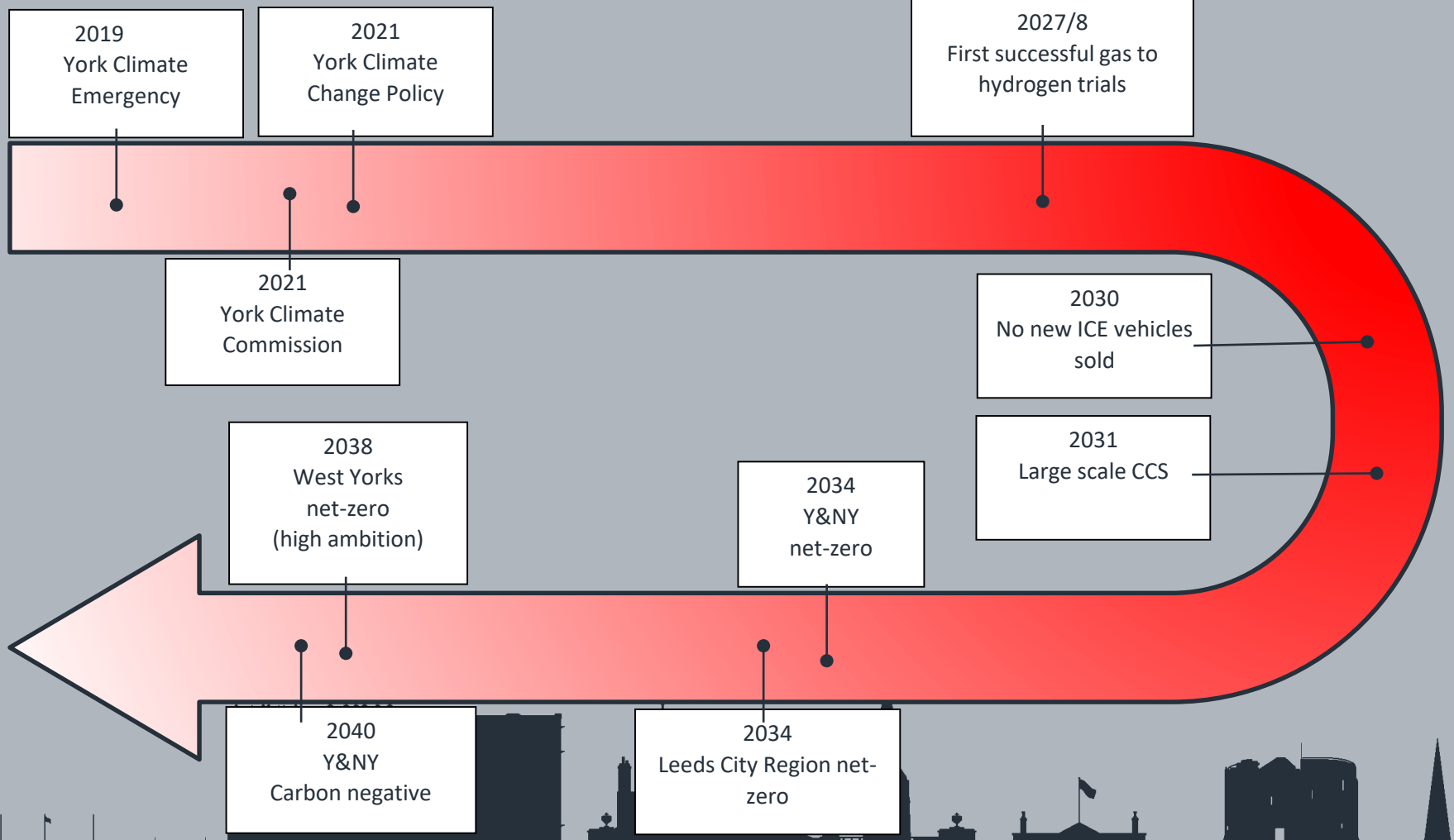
Roadmap



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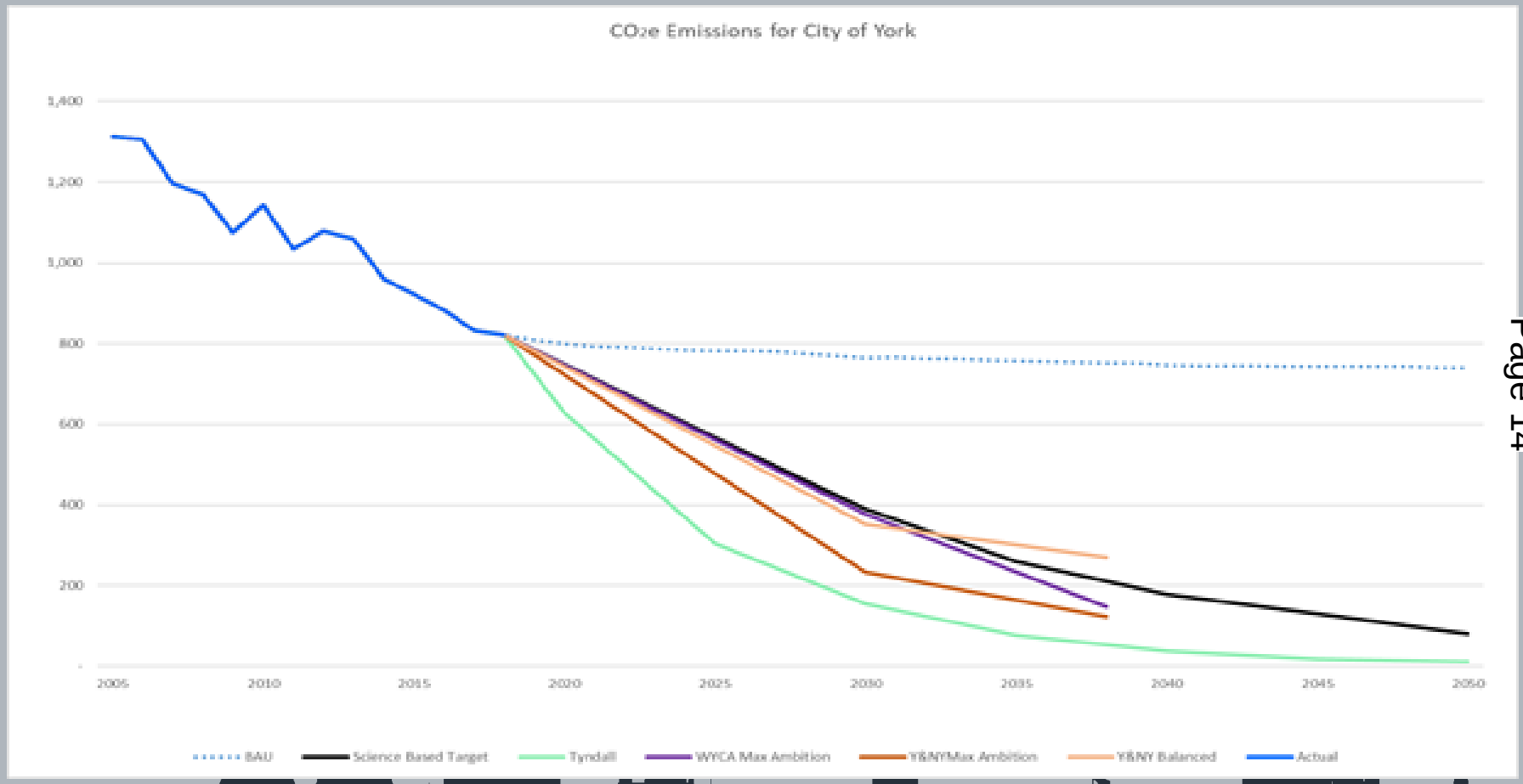
Zero-Carbon Pathway for York



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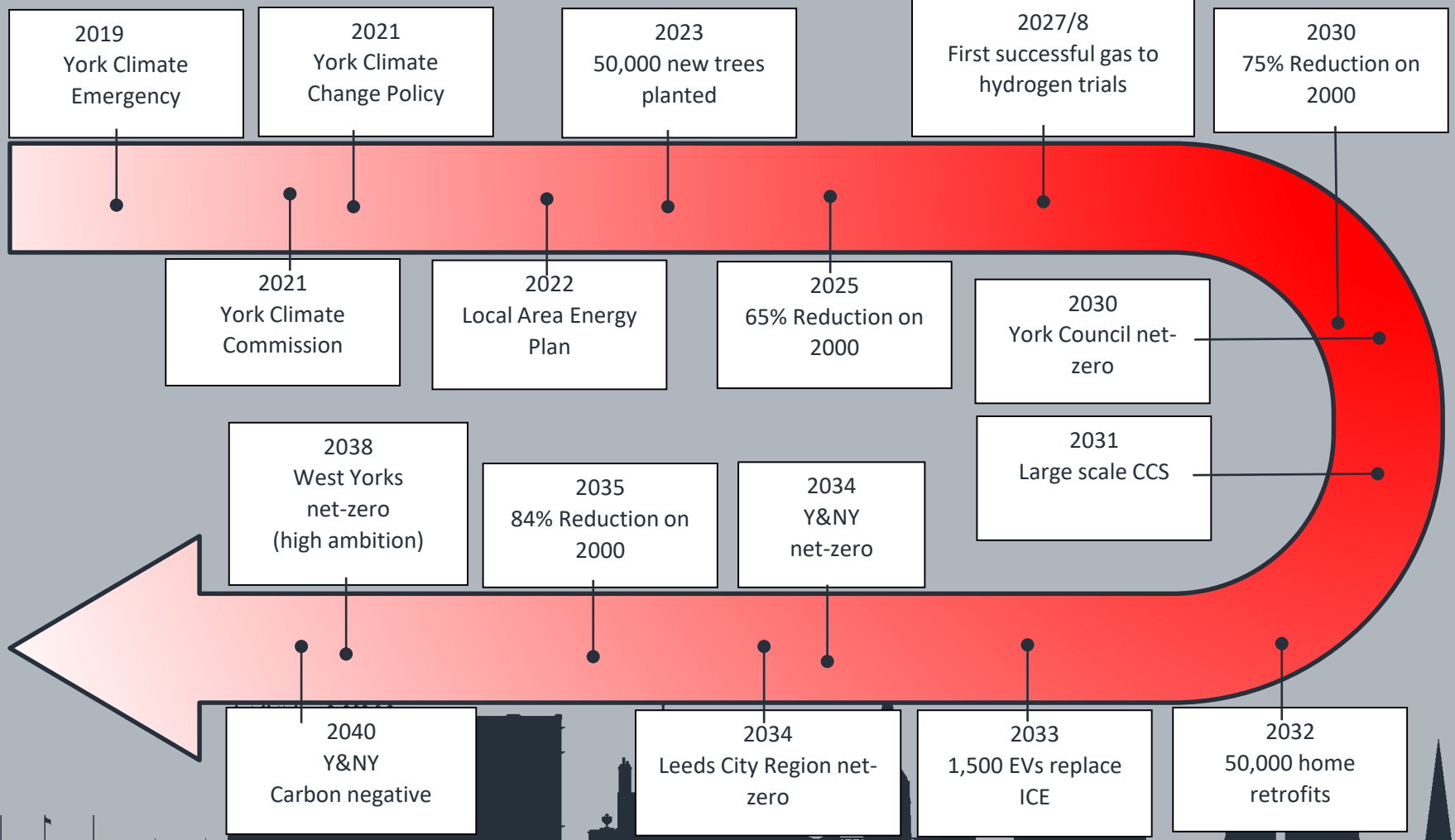
A net-zero date for York

Region	Year	Residual Emissions (tCO_2e)	Estimated Offset Cost	£/person
York	2030	386,000	£4.4m	21
Y&NY	2034	289,000	£3.3m	16
Leeds City Region				
WYCA	2038	209,000	£2.4m	11
UK	2050	80,000	£925,000	4

An estimated investment of £1.1b - £2.3b will be required to achieve net-zero

Roadmap



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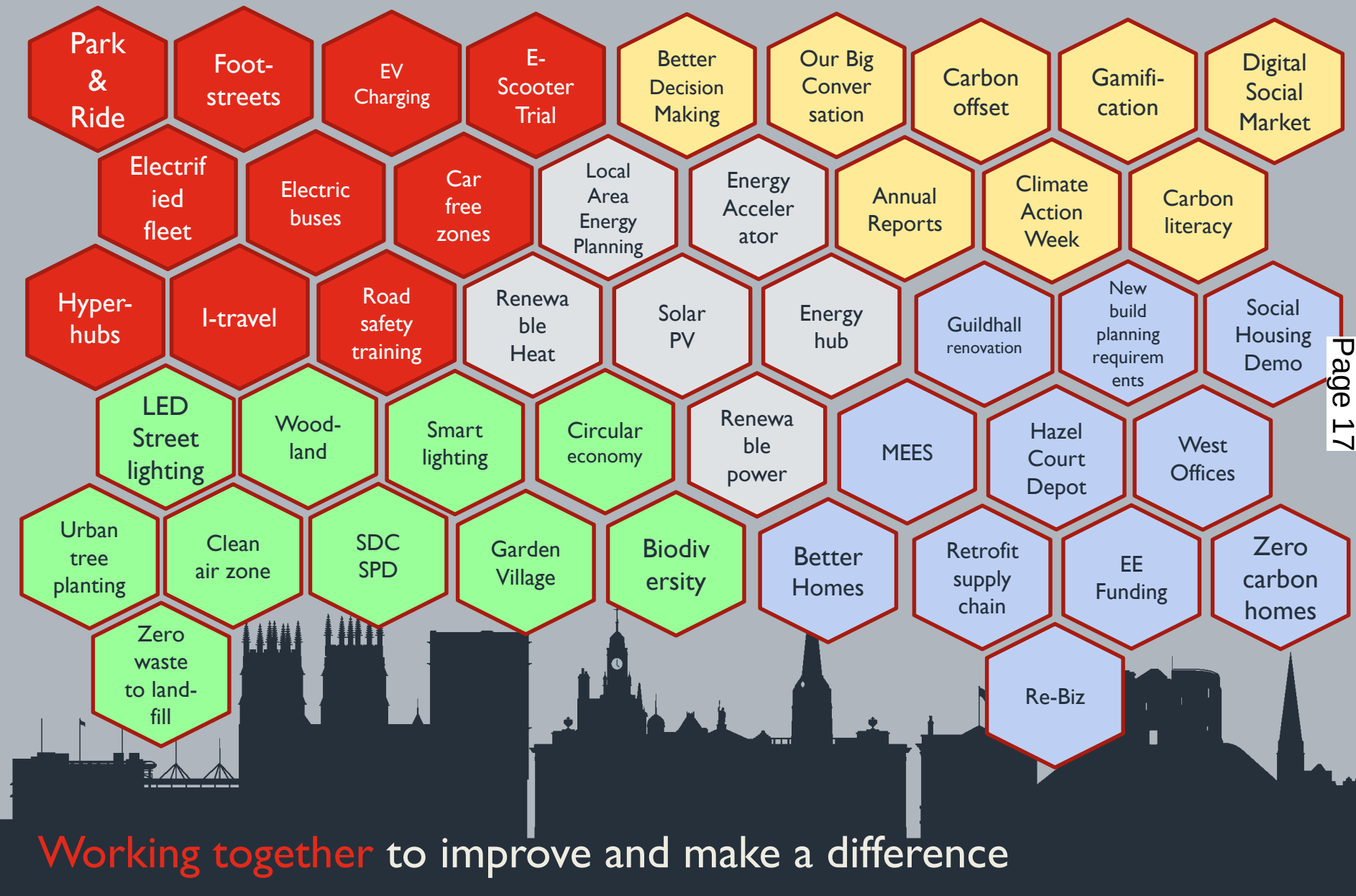
Carbon Reduction Activity



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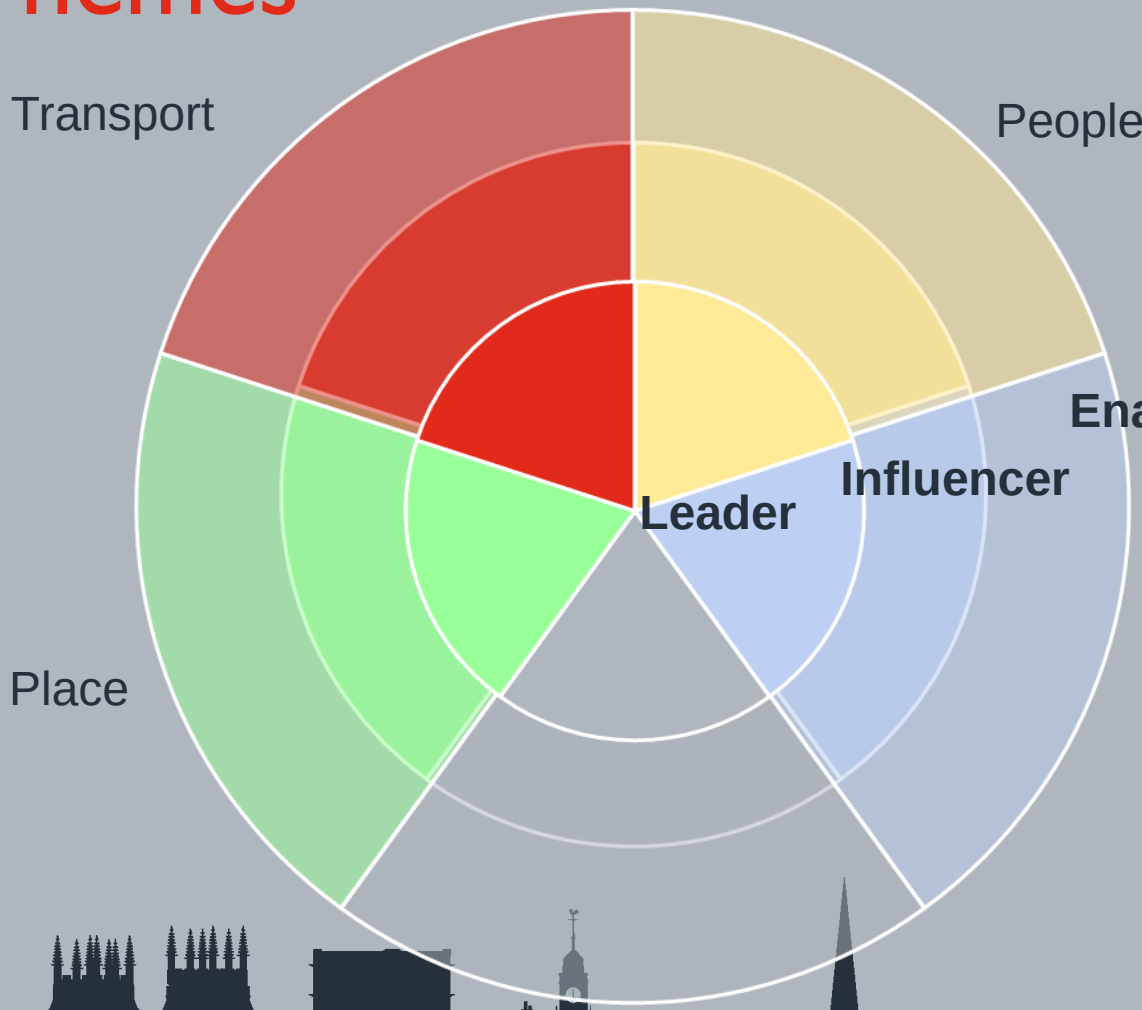
Key Themes



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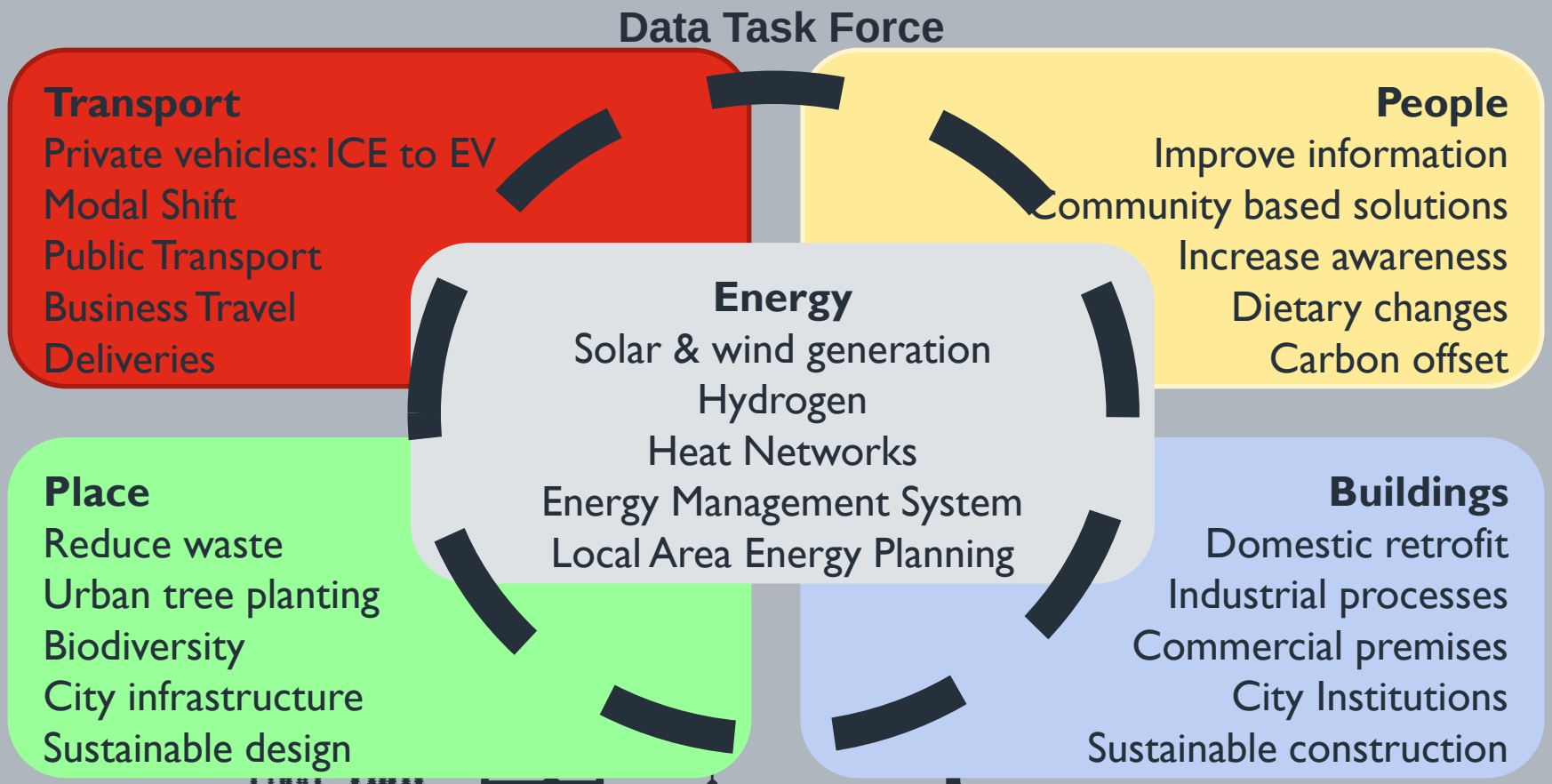
Working Groups



Working together to improve and make a difference

Next Steps

- Baseline & reporting
- Zero-Carbon Pathway
- Roadmap for York
- York Action Plan
- Develop Data-led approach
- Consultation & Engagement

Climate Change Policy and Scrutiny Committee **8 December 2020**

Report of the Chief Operating Officer

York Emissions Reporting & Carbon Neutral Ambition

Summary

1. This report presents the work undertaken to report on the carbon emissions of City of York Council (CYC) and the City of York to date. Using historical data, it projects emission reductions based on business-as-usual and various intervention scenarios using previously published research.

2. These scenarios are compared with a science based approach to emissions reduction that will likely limit average global temperature increase to within 1.5^{o}C of pre-industrial levels.[1]

3. The scenarios are then compared with each other, using a methodology that considers cost; delivery capacity; integration with local, regional and national policy; and social impact.

4. The projected pathways to net-zero suggest a carbon neutral date between 2034 and 2038 is achievable at lowest cost for the City.

5. All scenarios indicate that residual emissions for the city of York will remain beyond 2040.

Background

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

7. The Council will demonstrate leadership in this area and produce a Climate Change Policy which will include a decarbonisation Action Plan for its own operation as well as wider actions for the City.

8. CYC last produced a Greenhouse Gas (ghg) Inventory in 2011/12.This calculated that the Scope 1 & Scope 2 CO_2 equivalent (CO_2e) emissions for the council's operations to be 25,000 tonnes in that year.[2]

[1] IPCC Special Report: Global Warming of 1.5^{o}C (2018) https://www.ipcc.ch/sr15/

9. The nationally available dataset indicates that CO_2e emissions for the whole of York were 1.116 million tonnes during the same period.

Emissions Reporting

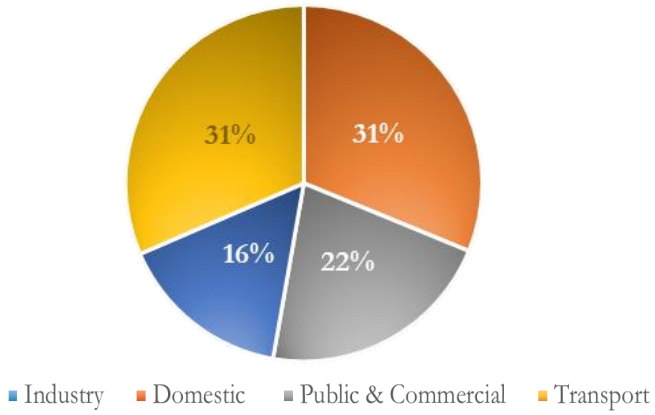
10. Refreshing and regularly reporting on the emissions of CYC and York are important for a number of reasons:
    i. Raising collective consciousness of carbon emissions within both the council and the city
    ii. Provides transparency and accountability
    iii. Emphasises shared ownership of the challenge
    iv. Creates a measure for success
    v. Allows for informed and targeted policy interventions

11. It is proposed that we report emissions for CYC and the national emissions data for York[3] on an annual basis.

12. Work has begun to calculate the CO_2e emissions for CYC in 2019/20. Emissions from our transport fleet have reduced from 2,450t in 2011/12 to 1,800t in 2019/20, a 26% reduction. Emissions from street lighting reduced from 4,142t in 2011/12 to 1,322 in 2019/20, a 68% reduction. A similar process is underway to calculate emissions associated with our corporate buildings to provide the complete picture of scope 1 and 2 emissions.

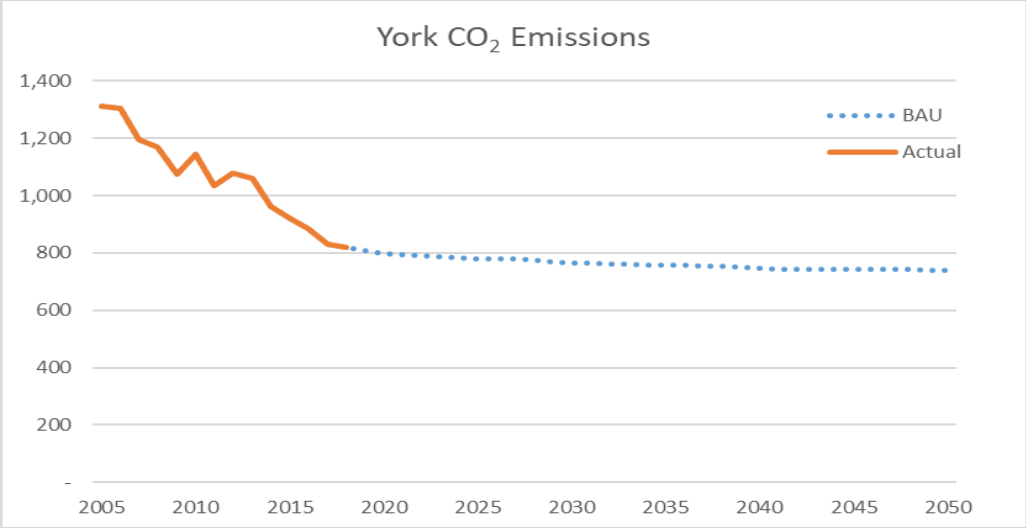
13. Using the most recent data available, emissions across the city have reduced from 1.116million tonnes in 2012 to 821,000t in 2018, a 26% reduction.

14. A sectoral assessment of these emissions shows that Transport and Domestic energy use accounts for almost two-thirds of York's emissions, with Industry and Public & Commercial responsible for the remainder.



15. Based on a 'Business-as-Usual scenario' with anticipated economic and population growth, York would be emitting 764,000t of CO_2e in 2030.

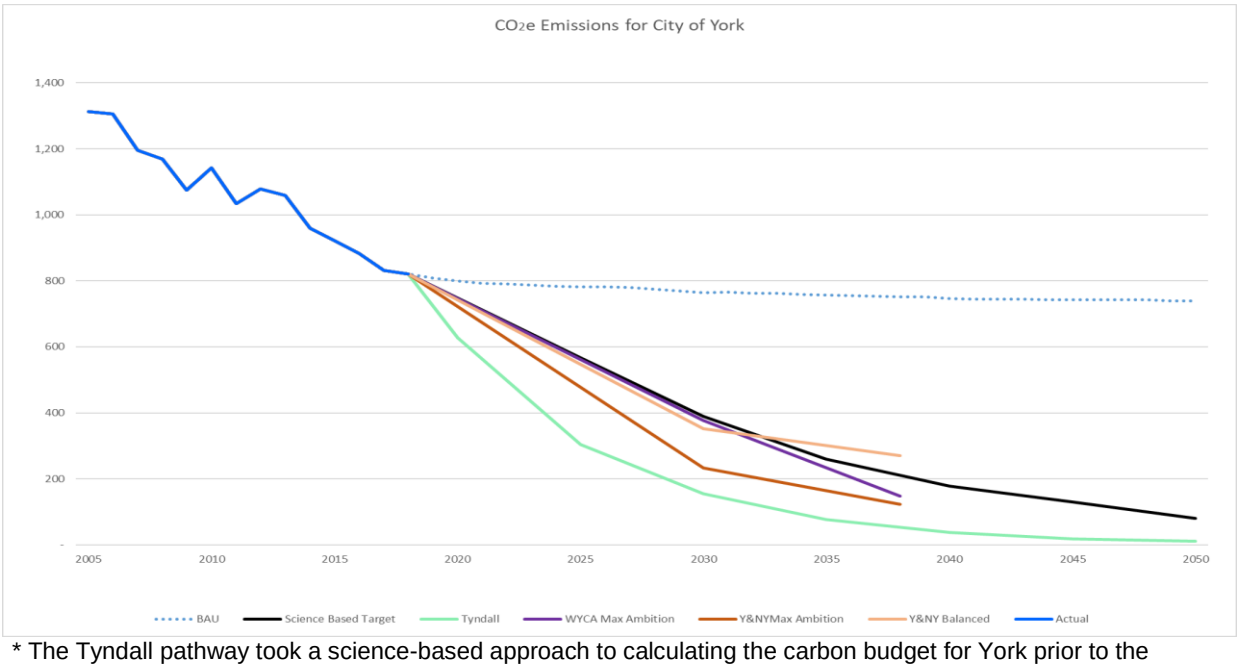
[2] https://www.york.gov.uk/downloads/file/691/coyc-greenhouse-gas-emissions-inventory-2011-12
[3] Most recent data is always for 2-years prior due to the time it takes to compile the dataset



16. A science based approach to setting a carbon budget for York which would reduce the city's carbon emissions to a level that would likely limit average global temperature increase to below 1.5ºC of pre-industrial levels, as recommended by the IPCC, would require a more rapid rate of emissions reduction than currently experienced.

Carbon Abatement Pathways

17. Carbon Abatement Pathways have been produced by various sources over the last 3 years. A summary of these is provided below and compared to the science based carbon budget (produced by Leeds University, 2020)[4]:



* The Tyndall pathway took a science-based approach to calculating the carbon budget for York prior to the IPCC expanded the global carbon budget in 2018[5] and is not considered in further analysis.

* Y&NY Max Ambition scenario includes BioEnergy Carbon Capture and Storage (BECCS) from Drax which is not within scope for York

[4] A Net Zero Carbon Roadmap for York (2020); A. Gouldson et al.
[5] https://www.carbonbrief.org/analysis-why-the-ipcc-1-5c-report-expanded-the-carbon-budget

18. None of the pathways presented achieve zero emissions before 2040. A net-zero target before this date would require carbon offset.

19. The only pathway that would exceed the science based carbon budget for York is York & North Yorkshire's Balanced Scenario.

20. The various local, regional and national net-zero ambition dates are presented below, along with estimated emissions remaining at that date and the associated offset cost[6].

Region	Year	Residual Emissions (tCO_2e)	Estimated Offset Cost	£/person
York	2030	386,000	£4.4m	21
Y&NY	2034	289,000	£3.3m	16
Leeds City Region				
WYCA	2038	209,000	£2.4m	11
UK	2050	80,000	£925,000	4

A Pathway for York

21. There are a number of factors to consider when selecting a carbon neutral pathway for York:

Technical Potential

22. The Maximum Ambition Scenario's for WYCA and Y&NY LEP are dependent on national infrastructure projects such as Hydrogen and Carbon Capture Storage. Estimated delivery dates for these solutions are anticipated to be late 2020's at the earliest, with wider roll-out coming several years later.

23. Without these infrastructure projects, or significant Government investment into heat pumps and sustainable transport well in advance of its own 2050 carbon neutral ambition, it is difficult to see a scenario in which York can achieve carbon neutrality by 2030. It is, therefore, apparent that a pathway to 2030 will require a significant contribution from technologies that are not on stream yet.

24. In the absence of hydrogen or CCS by 2030, alternative technology deployment may be possible; however, this would be at greater cost to York.

[6] Based on average cost of offsetting £11.50/t set by Carbon Earth

Regional Alignment

25. The two sub-regional bodies that York has membership of have set regional carbon neutral targets of 2034 (Y&NY) and 2038 (WYCA). With the anticipation that York may, through the devolution process, become part of York and North Yorkshire Combined Authority, aligning our carbon abatement pathways could present opportunities from regional policy decisions.

Financial Cost

26. An estimated investment of £1.1b - £2.3b will be required to become carbon neutral at a city level. With the current ambition, at the highest assumed cost, this would mean annual investment of £230m, compared with £160m/yr or £130m/yr for a 2034 or 2038 ambition.

27. In addition to the investment costs, the cost of offsetting residual emissions must be considered. While investment will have a direct benefit to York through infrastructure improvements, utility savings and job creation, offset payments are sunk costs. The cost of offsetting residual emissions in 2030 is estimated at £4.4m; compared with £3.3m and £2.4m for 2034 and 2038.

Climate Change Impact

28. Adopting the science based carbon reduction targets would reduce the city's carbon emissions to a level that would likely limit average global temperature increase to below 1.5^{o}c of pre-industrial levels, as recommended by the IPCC.

29. A pathway that achieves this would require the following reductions (based on 2000 levels):

    65% by 2025
    76% by 2030
    84% by 2035
    89% by 2040
    92% by 2045
    95% by 2050

30. Adopting these targets would make both a 2034 and 2038 carbon neutral pathway compatible with the IPCC's 1.5^{o}c limit of warming.

Considerations

31. In response to the climate emergency CYC set an ambition for York to be carbon neutral by 2030. The technical, financial and social impacts of this are now better understood.

32. An ambition for a carbon neutral York by 2030, 2034 or 2038 are all compliant with the IPCC's recommendation for avoiding the most harmful effects of climate change if combined with the science based reduction targets.

33. The estimated investment required for a carbon neutral York by 2030 is £110m - £230m/yr; £78m - £160m/yr for a 2034 deadline; and £61m - £130m/yr for 2038.

34. To achieve carbon neutral, offsetting will be required. The cumulative cost of offsetting residual emissions from 2030 – 2050 is estimated to be £44m; £28m from 2034 – 2050; and £16m from 2038 – 2050.

35. It should be noted that a pathways to 2034 or 2038 create flexibility for the deployment of large-scale infrastructure projects in York that would have a significant impact on reducing carbon emissions of the city at lowest cost – particularly hydrogen CCS. Ensuring a close fit with these pathways creates regional policy alignment and a greater opportunity for regional collaboration.

36. It is both technically and financially possible for the Council to decarbonise its own operations by 2030. However, emissions need to fall significantly to minimise or avoid the need for offset.

Recommendations

37. The Climate Change Policy Scrutiny Committee are requested to consider the evidence for setting a decarbonisation pathway for York and the ambition for making the city carbon neutral ahead of the Climate Change Policy which will be produced in Spring 2021.

Consultation

38. This report and associated documents has been developed in consultation with the WYCA, Y&NY LEP and Leeds University.

Council Plan

39. This report link with the Council Plan 2019-2023 in regard to the following core outcomes of the Plan:
    - A greener and cleaner city – Working towards becoming a carbon neutral city by 2030
    - Getting around sustainably – Cutting congestion, pollution and carbon emissions
    - Good health and wellbeing – Promoting active travel, healthy eating and improving air quality
    - Safe communities and culture for all – Supporting groups who are at greatest risk of climate change
    - Well paid jobs and an inclusive economy – Creating employment opportunities in the green economy

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Ian Floyd
Chief Operating Officer

Report approved: √ **Date: 30.11.20**

Wards Affected: **All** X

For further information please contact the author of the report

Background Papers:

- Council Plan 2019-2023

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Climate Change Policy and Scrutiny Committee 8 December 2020

Report of the Chief Operating Officer

York Climate Commission

1. The report sets out the rationale for the creation of a York Climate Commission (the Commission)

Recommendations

2. The Climate Change Policy and Scrutiny Committee are asked to:
   - Provide recommendations on the establishment of a York Climate Commission
   - Review and provide recommendations on the Commission's Terms of Reference

Background

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

4. The Council will demonstrate leadership in this area and produce a Climate Change Policy which will include a decarbonisation Action Plan for its own operation and the City.

5. CYC recognises that no single organisation has the power, authority, resources or ability to achieve the city-level change needed to deliver our ambition.

6. It will be necessary to bring together key partners across the city to create shared ownership and accountability, and also to benefit from the collective experience and expertise that exists within York.

7. In August 2020, CYC commissioned Leeds University to produce a Zero Carbon Roadmap for York (annex 1). One of the recommendations from this work was to establish an independent York Climate Commission to help draw actors together and build capacity to take and track action.

Role of the York Climate Commission

8. The Climate Commission will:

i. Promote leadership in the city on climate change, encouraging stakeholders to take effective action now, while maintaining a long term perspective.

ii. Provide authoritative independent advice on the most effective steps required to meet the city's carbon reduction target so as to inform policies and actions of local stakeholders and decision makers.

iii. Monitor and report on progress towards meeting the city's carbon targets and recommend actions to keep on track.

iv. Make the economic case for project development, implementation and investment in low carbon and climate resilient projects in the city; and promote best practice in public engagement on climate change and its impacts in order to support robust decision-making.

v. Bring together major organisations and key groups in York to collaborate on projects that result in measurable contributions towards meeting the city's climate reduction target

vi. Act as a forum where organisations can exchange ideas, research findings, information and best practice on carbon reduction and climate resilience

Membership

9. Membership of the Commission is open to individuals representing key organisations from the public, private and civic sectors across the city who can contribute to the development and delivery of a low carbon and/or climate resilient economy/society in York. The balance of membership of the Commission reflects the need for cross-city representation and for it to address both climate mitigation and resilience.

10. The York Climate Commission will comprise of the following founding members reflecting the desired representation of key organisations across the city:
    i. City of York Council – Executive Member for the Environment and Climate Change
    ii. City of York Council – Head of Carbon Reduction
    iii. University of York – Pro-Vice-Chancellor for Research
    iv. Biovale – Chief Executive
    v. Nestle – Head of Value Chain Sustainability
    vi. Rollits – Partner
    vii. First Group – Managing Director
    viii. Joseph Rowntree Foundation – Group Chief Executive

11. Members of the Commission are recruited periodically via an open process. Individuals wishing to become members of the Commission are invited to express their interest in email to the current Chair.

Ways of Working

12. The Commission will be Chaired by the Executive member for Environment and Climate Change for an initial 12 months from formation. At which point, the Chair will be appointed from amongst the other Commission members, with the Executive member for Environment and Climate Change taking up the role of Co-chair.

13. Decisions within the Commission are made with a preference for a consensus-based approach to decision-making; however, when necessary a vote can be taken to secure the decision.

14. To ensure accountability and scrutiny of the work of the Commission and to report the progress that is being made by all sectors and partners towards the city's carbon reduction target, the Commission will discuss progress on a 6 monthly basis to CYC Climate Change Policy Scrutiny Committee.

15. Additional details are provided in the Terms of Reference (Annex 2).

Structure

16. The York Climate Commission will consist of the Climate Commission Group and Working Groups established around key topic areas.

17. The Climate Commission Group will comprise the Chair, a Co-Chair and representatives from key organisations or sectors across the city. The Climate Commission Group will meet four times per year.

18. Working Groups will comprise of Climate Commission Group members (who join Working Groups) and technical or subject specialists. Working Groups will concentrate on key areas of climate action; the Working Groups are under development and will be formalised within the first 3 months of the Commission.

Deliverables

19. The Commission will collate existing carbon reduction targets and measures for organisations across the city using an agreed methodology and will agree the strategic and shared priorities and opportunities for carbon reduction and climate resilience.

20. Collaborate with other organisations to identify effective carbon reduction and climate resilience measures, research and develop projects, and attract funding for project development and/or delivery.

21. An annual report monitoring project delivery and evaluating progress across the city.

Recommendations

22. The Climate Change Policy Scrutiny Committee are asked to:
    - Provide recommendations on the establishment of a York Climate Commission
    - Review and provide recommendations on the Commission's Terms of Reference

Consultation

23. This report and associated documents has been developed in consultation with the Place-Based Climate Action Network (PCAN), Leeds University, Leeds Climate Commission and York University.

24. The recommendations of this committee will be reported as part of a decision paper to the Executive Member on the establishment of the committee.

Council Plan

25. The project accords with the Council Plan 2019-2023 in regard to the following core outcomes of the Plan:

    - A greener and cleaner city – Working towards becoming a carbon neutral city by 2030
    - Getting around sustainably – Cutting congestion, pollution and carbon emissions
    - Good health and wellbeing – Promoting active travel, healthy eating and improving air quality
    - Safe communities and culture for all – Supporting groups who are at greatest risk of climate change
    - Well paid jobs and an inclusive economy – Creating employment opportunities in the green economy

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	Report approved: √ **Date: 30.11.20**

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Background Papers:

- Council Plan 2019-2023

Annexes

- Annex 1 – Zero Carbon Roadmap for York
- Annex 2 – York Climate Commission: Terms of Reference

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ANNEX 1

A Net Zero Carbon Roadmap for York

Andy Gouldson, Robert Fraser Williamson, Andrew Sudmant & Amelia Duncan

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www.pcancities.org

CITY OF YORK COUNCIL

UNIVERSITY OF LEEDS

wrc

UKRI Economic and Social Research Council

PCAN PLACE-BASED CLIMATE ACTION NETWORK

Contents

Executive Summary

Background:

- Scientific evidence calls for rapid reductions in global carbon[1] emissions if we are to limit average levels of warming to 1.5°C and so avoid the risks associated with dangerous or runaway climate change.
- Globally, the IPCC suggests that we will have used up the global carbon budget that gives us a good chance of limiting warming to 1.5°C degrees within a decade. This science underpins calls for the declaration of a climate emergency.
- Dividing the global carbon budget up by population gives York a total carbon budget of just over 10 million tonnes from 2020. Based only on the fuel and electricity directly used within its boundaries (i.e. it's scope 1 and 2 emissions), York currently emits c.888,000 tonnes of carbon a year, and as such it would use up its carbon budget just over 12 years.
- This assessment does not include it's broader carbon footprint – for example relating to longer distance travel or the goods and services that are produced elsewhere but consumed within York (i.e. it's scope 3 emissions).

Baselines and Targets:

- Scope 1 and 2 carbon emissions from York have fallen by 44% since the turn of the millennium. With on-going decarbonisation of grid electricity, and taking into account population and economic growth within the city-region, we project that York's 2000 level of annual emissions will have fallen by a total of 51% in 2030 and 54% in 2050.
- If it is to stay within its carbon budget, York needs to add to adopt science-based carbon emissions reduction targets the build on the emissions reductions already achieved to secure 65% reductions on its 2000 level of emissions by 2025, 76% by 2030, 84% by 2035, 89% by 2040, 92% by 2045 and 95% by 2050.
- Without further activity to address its carbon emissions, we project that York's annual emissions will exceed its carbon budget by 802,000 tonnes in 2030, and 746,000 tonnes in 2050.

The Cost-Effective Options:

- To meet these carbon emissions reduction targets, York will need to adopt low carbon options that close the gap between its projected emissions in future and net zero emissions. This can be partially realised through cost-effective options that would more than pay for themselves through the energy cost reductions they would generate whilst often also generating wide social and environmental benefits in the area.
- More specifically, the analysis shows that York could close the gap between its projected emissions in 2030 and net zero emissions by 47% purely through the adoption of cost-effective options in houses, public and commercial buildings, transport and industry.
- Adopting these options would reduce York's total projected annual energy bill in 2030 by £287 million whilst also creating 3,570 years of employment in the city. They could also help to generate wider benefits including helping to tackle fuel poverty, reducing congestion and productivity losses, improving air quality, and enhancements to public health.
- The most carbon effective options for the city to deliver these carbon cuts include improved deep retrofitting of heating, lighting and insulation in houses, cooling and insulation in offices, shops and restaurants, and a range of measures across the transport sector including mode shift to non-motorised transport and the wider up-take of electric vehicles.

[1] For simplicity, we use the term 'carbon' as shorthand for all greenhouse gases, with all figures in this report relating to the carbon dioxide equivalent (CO_2e) of all greenhouse gases unless otherwise stated. Note that our assessment therefore differs from other assessments that focus only on CO_2.

The Need for Ambition and Innovation:

- The analysis also shows that York could close the projected gap to net-zero emissions in 2030 by 69% through the adoption of options that are already available, but that some of these options would not pay for themselves directly through the energy savings that they would generate. Many of these options would, however, generate wider indirect benefits both economically and socially in the city.
  This means that although it can achieve significant reductions in emissions by focusing on established cost-effective and technically viable measures, York still has to identify other more innovative interventions that could deliver the last 31% of shortfall between projected emissions in 2030 and a net zero target.
- Options identified elsewhere that could be considered in York include targeting a complete transition to net zero homes and public/commercial buildings by 2030, promoting the rapid acceleration of active travel (e.g. walking and cycling), tackling food waste, reducing meat and dairy consumption and reducing concrete and steel consumption/promoting adoption of green infrastructure including accelerated tree planting plans.
- As well as reducing York's direct (scope 1 and 2) carbon footprint, some of these more innovative measures (e.g. reducing meat and dairy or concrete and steel consumption) could start to focus on tackling York's broader consumption-based (i.e. scope 3) carbon footprint.

Next Steps:

- York needs to adopt a clear and ambitious climate action plan. The case for the adoption of such a plan is supported by the evidence that much – but not all - of the action that is required can be based on the exploitation of win-win low carbon options that will simultaneously improve economic, social and health outcomes across the city.
- The climate action plan should adopt science-based targets for emissions reduction. As well as longer term targets, it should adopt 5-yearly carbon reduction targets.
- The action plan should focus initially on York's direct (scope 1 and 2) carbon footprint as these emissions are most directly under the city's influence, but in time it should also widen its scope to consider its broader (scope 3) carbon footprint.
- The action plan should also set out the ways in which York will work towards achieving these science-based targets, drawing on the deployment KPIs listed in this report. Action should also be taken to monitor and report progress on emissions reductions.
- It is important to stress that delivering on these targets will require action across the city and the active support of the public, private and third sectors. Establishing an independent York Climate Commission could help to draw actors together and to build capacities to take and track action.
- Leadership groups should be formed for key sectors such as homes, public and commercial buildings, transport and industry, with clear plans for delivery of priority actions in each sector. All large organisations and businesses in the city should be asked to match broader carbon reduction commitments and to report back on progress.

1. Introduction

Climate science has proven the connection between the concentration of greenhouse gases in the atmosphere and the extent to which the atmosphere traps heat and so leads to global warming. The science tells us – with a very high level of confidence – that such warming will lead to increasingly severe disruption to our weather patterns and water and food systems, and to ecosystems and biodiversity. Perhaps most worryingly, the science predicts that there may be a point where this process becomes self-fuelling, for example where warming leads to the thawing of permafrosts such that they release significant quantities of greenhouse gases leading to further warming. Beyond this point or threshold, the evidence suggests that we may lose control of our future climate and become subject to what has been referred to as dangerous or 'runaway' climate change.

Until recently, scientists felt that this threshold existed at around 2 degrees centigrade of global warming, measured as a global average of surface temperatures. However, more recent scientific assessments (especially by the Intergovernmental Panel on Climate Change or IPCC in 2017) have suggested that the threshold should instead be set at 1.5 degrees centigrade. This change in the suggested threshold from 2 degrees to 1.5 degrees has led to calls for targets for decarbonisation to be made both stricter (e.g. for the UK to move from an 80% decarbonisation target to a net zero target), and to be brought forward (e.g. from 2050 to 2030).

Globally, the IPCC suggests that from 2020 we can only emit 344 billion tonnes of CO_2 if we want to give ourselves a 66% chance of avoiding dangerous climate change. We are currently emitting over 37 billion tonnes of CO_2 every year, which means that we will have used up our global carbon budget within a decade. It is this realisation – and the ever accumulating science on the scale of the impacts of climate change - that led to calls for organisations and areas to declare a climate emergency and to develop and implement plans to rapidly reduce GHG emissions.

2. Our Approach

2(a). Measuring an Area's Carbon Footprint

Any area's carbon footprint – measured in terms of the total impact of all of its greenhouse gas emissions - can be divided into three types of greenhouse gas emissions.

- Those coming from the fuel (e.g. petrol, diesel or gas) that is directly used within an area and from other sources such as landfill sites or industry within the area. These are known as Scope 1 emissions.
- Those coming from the electricity that is used within the area, even if it is generated somewhere else. These are known as Scope 2 emissions. Together scope 1 and 2 emissions are sometimes referred to as territorial emissions.
- Those associated with the goods and services that are produced elsewhere but imported and consumed within the area. After taking into account the carbon footprint of any goods and services produced in the area but that are exported and consumed elsewhere, these are known as Scope 3 or consumption-based emissions.

In this report we focus on Scope 1 and 2 emissions, and exclude consideration of long-distance travel and of Scope 3 or consumption-based emissions. We do this because Scope 1 and 2 emissions are more directly under the control of actors within an area, and because the carbon accounting and management options for these emissions are better developed. We stress though that emissions from longer distance travel (especially aviation) and consumption are very significant, and also need to be addressed.

2(b). Developing a Baseline of Past, Present and Future Emissions

Having a baseline of carbon emissions is key to tracking progress over time. We use local authority emissions data to chart changes in emissions from 2005 to the 2018. We also break this down to show the share of emissions that can be attributed to households, public and commercial buildings, transport and industry.

We then project current emissions levels for the period through to 2050. To do this, we assume on-going decarbonisation of electricity in line with government commitments and a continuation of background trends in *a*) economic and population growth, and *b*) energy use and energy efficiency. Specific numbers for the key variables taken into account in the forecasts are presented below. As with all forecasts, the level of uncertainty attached increases as the time period in question extends. Even so, it is useful to look into the future to gauge the scale of the challenge to be addressed in each area, especially as it relates to the projected gap between the forecasted emissions levels and those that are required if an area's emissions are to be consistent with a global strategy to limit average warming to 1.5 degrees.

2(c). Setting Science-Based Carbon Reduction Targets

To set science-based carbon reduction targets for an area, we take the total global level of emissions that the IPCC suggests gives us a 66% chance of limiting average levels of warming to 1.5 degrees, and divide it according to the share of the global population living in the area in question. This enables us to set the total carbon budget for an area that is consistent with a global budget. To set targets for carbon reduction, we then calculate the annual percentage reductions from the current level that are required to enable an area to stay within its overall carbon budget.

2(d). Identifying and Evaluating Carbon Reduction Opportunities

Our analysis then includes assessment of the potential contribution of c.130 * energy saving or low carbon measures for:

- households and for both public and commercial buildings (including better insulation, improved heating, more efficient appliances, some small scale renewables)
- transport (including more walking and cycling, enhanced public transport, electric and more fuel efficient vehicles)
- industry (including better lighting, improved process efficiencies and a wide range of other energy efficiency measures).

We stress that the list of options that is assessed may not be exhaustive; other options could be available and the list can potentially be expanded.

For the options included, we assess the costs of their purchase, installation and maintenance, the direct benefits (through energy and fuel savings) of their adoption in different settings and their viable lifetimes. We also consider the scope for and potential rates of deployment of each option. This allows us to generate league tables of the most carbon and cost-effective options that could be deployed within an area.

It is important to note that we base the analysis on current capital costs, although future costs and benefits are adjusted for inflation and discounting factors. This could be pessimistic if costs fall and benefits increase as some options become more widely adopted, or if the costs increase as the rates of deployment increase. It is also important to note that, although we consider the employment generation potential of different options, we do not consider the wider indirect impacts of the different options relating to their social, economic or environmental implications.

Beyond the range of currently available options, we also consider the need for more innovative or 'stretch' options to be developed and adopted within the area if it is to meet its carbon reduction targets. These need to be developed in each area, but the some of the ideas for innovative options identified elsewhere include targeting a full transition to net zero homes and public/commercial buildings by 2030, promoting the rapid acceleration of active travel (e.g. walking and cycling), tackling food waste, reducing meat and dairy consumption and reducing concrete and steel consumption/promoting adoption of green infrastructure.

2(e). Aggregating Up to See the Bigger Picture

Based on this bottom-up analysis of the potential for different options to be adopted within the area, we then aggregate up to assess the potential for decarbonisation within that area, and the costs and benefits of different levels of decarbonisation. We then merge the aggregated analysis of the scope for decarbonisation with the baseline projections of future emissions to highlight the extent to which the gap between the projected and required emissions levels that can be met through different levels and forms of action.

To break this gap down, we merge interventions into three broader groupings:

- ***Cost-Effective (CE)*** options where the direct costs of adoption are outweighed by the direct benefits that they generate through the energy savings they secure, meaning the portfolio of measures as a whole has a positive economic impact in present value. These options may also generate indirect benefits, for example through job creation, fuel poverty and improved air quality and public health.

* We evaluate over 130 separate low carbon technologies/interventions applied across sectors, with variable place-specific data on how their productivity and economics will change by application. This results in over 1000 unique data points customised to York's economy, infrastructures and demography.

- ***Cost-Neutral (CN)*** options where the portfolio of interventions mentioned above is expanded to consider investments that may not be as cost effective on their own terms, but where the range of measures as a whole will have near-zero net cost.
- ***The Technical Potential (TP)*** options where the direct costs are not (at present) covered by the direct benefits. However, the cost of many low carbon options is falling quickly, and again these options could generate important indirect benefits such as those listed above.

As it is unlikely that adopting all of the cost-effective or even technically viable options will enable an area to reach net-zero emissions, we also highlight the need for a fourth group of measures:

- ***The innovative or 'stretch' options*** that includes low-carbon measures that are not yet widely adopted. Some of the options within this group may well be cost and carbon effective, and they may also generate significant indirect benefits, but whilst we can predict their carbon saving potential, data on their costs and benefits is not yet available.

2(f). Developing Targets and Performance Indicators

Linked to the analysis detailed above, we extend our evaluation of potential emissions reductions across York's economy to substantive, real-life indicators for the levels of investment and deployment required to achieve targets. These Key Performance Indicators (KPIs) illustrate the scale of ambition required to reach the emissions savings presented in the Technical Potential scenario and are disaggregated by sector.

2(g). Focusing on Key Sectors

As well as presenting an aggregated picture, we also focus on the emissions saving potential in the housing, public and commercial buildings, transport, and industry sectors. We focus in on overall investment needs and returns, and present more detailed league tables of the most carbon and cost effective options that could be adopted in each sector.

3. Developing a Baseline of Past, Present and Future Emissions for York

Analysis shows that York's baseline (scope 1 and 2) emissions have fallen by 44% since 2000, due to a combination of increasingly decarbonised electricity supply, structural change in the economy, and the gradual adoption of more efficient buildings, vehicles and businesses.

With full decarbonisation of UK electricity by 2050, and taking into account economic growth (assumed at 2.5% p.a.), population growth (assumed at 0.1% p.a.) and on-going improvements in energy and fuel efficiency, we project that York's baseline (scope 1 and 2) emissions will only fall by a further 7% by 2030, 9% by 2040, and 10% by 2050. This is a total of just under 54% between 2000 and 2050.

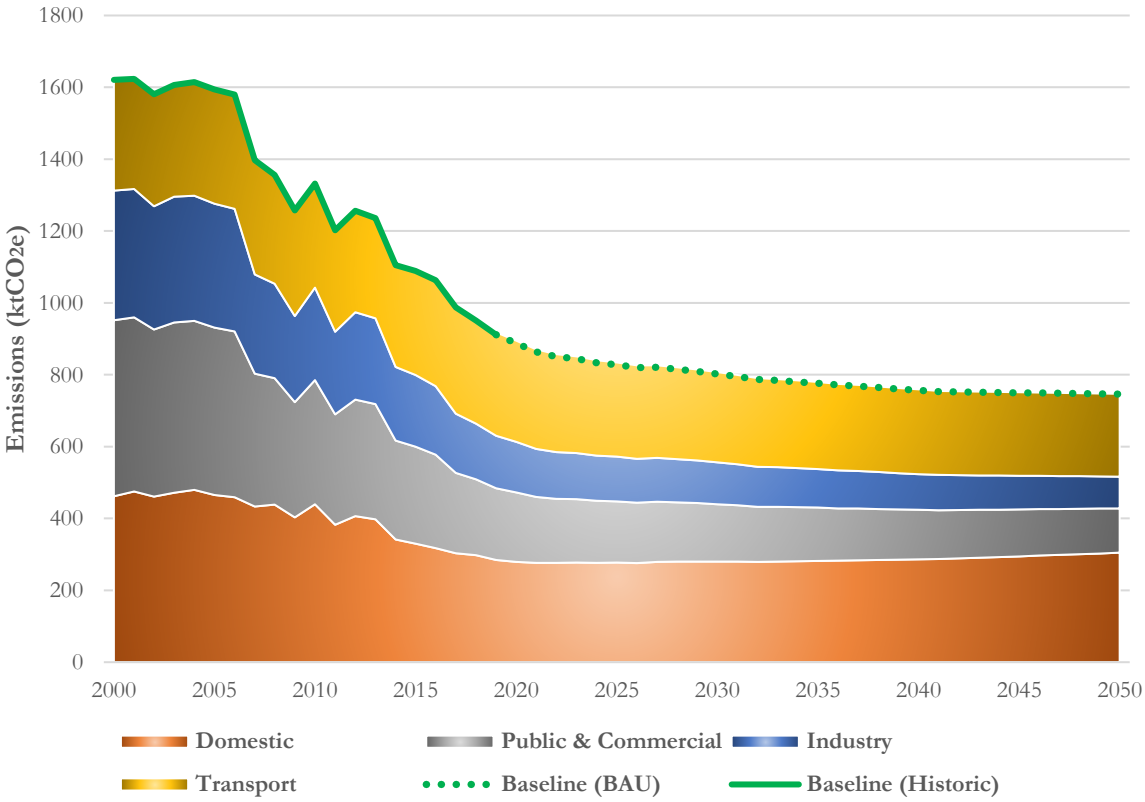


Figure.1: *York's Scope 1 and 2 GHG emissions (2000-2050)*

Currently, 32% of York's emissions come from transport, with the domestic housing sector then responsible for 31% of emissions, public & commercial buildings for 22% and industry 16%. Emissions related to land-use contribute c.0.5% and are not considered technically in this report. By 2050, we project emissions from transport will decrease very slightly (still producing c.31%) with a significant 10% increase in the proportion of emissions from housing. Small decreases are forecast in the proportion of emissions from public & commercial buildings and industry, largely a result of expansion in the output of the domestic buildings sector over this period.

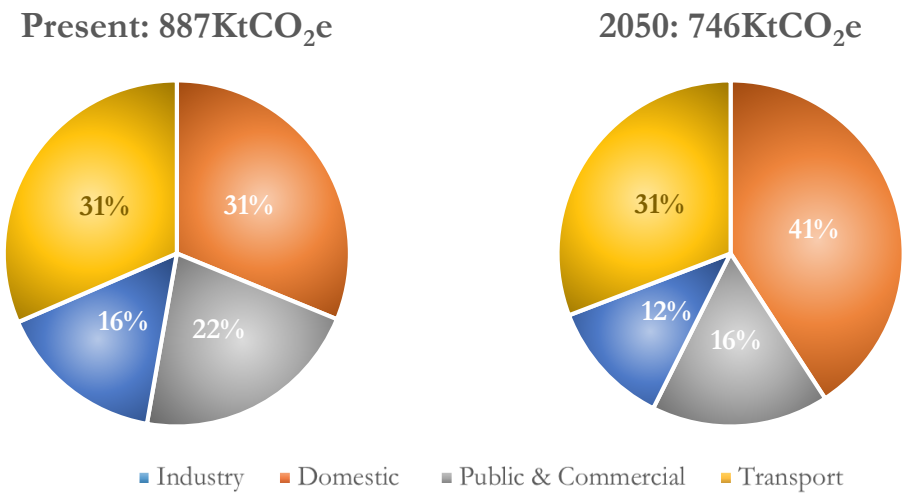


Figure.2: *York's Present and Projected Emissions by Sector*

Related to this emissions baseline, after evaluating the range of energy sources York consumes (spanning electricity, gas, all solid and liquid fuels across sectors) we find that in 2019 £299 million was spent on energy across the city. Transport fuels generated the majority of this demand (44%), followed by domestic buildings (35%) then public & commercial buildings and industry (13% and 9% respectively). By projecting demand and energy prices into future with reasonable baseline assumptions over population, inflationary measures and efficiency gains across the economy, we find that York's business as usual energy expenditure will likely grow to just under £320 million per year in 2030 and c.£435 million per year in 2050, with transport expenditure growing in its contribution to York's total (see Figure 3 below).

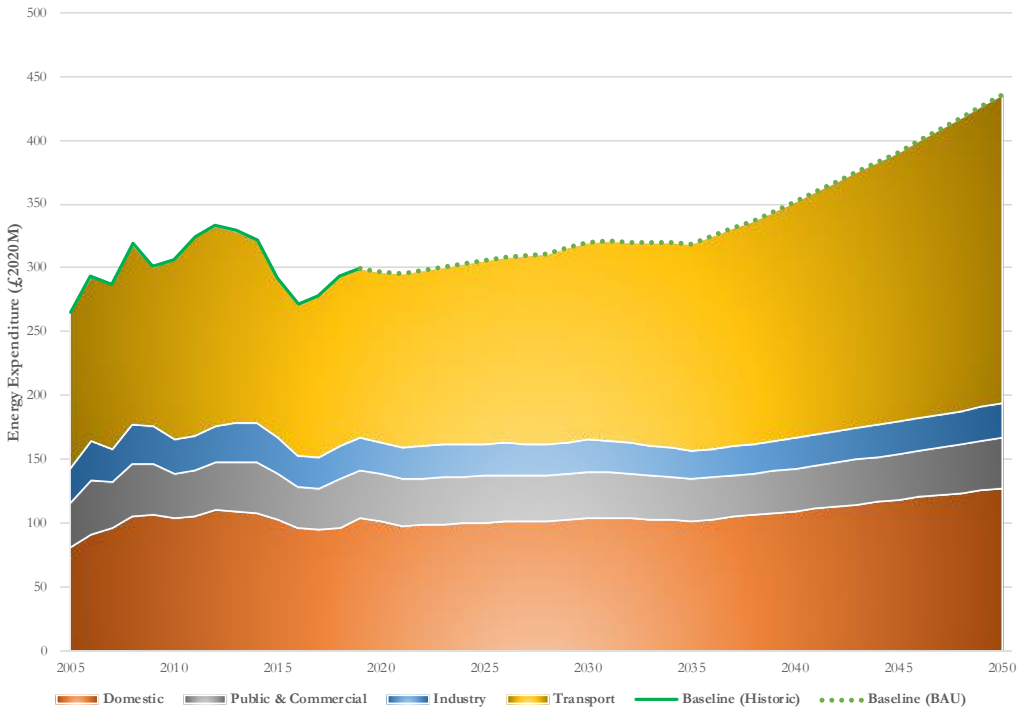


Figure.3: *York's Present and Projected Energy Expenditure by Sector*

4. Setting Science-based Carbon Reduction Targets for York

The Inter-governmental Panel on Climate Change (IPCC) has argued that from 2020, keeping within a global carbon budget of 344 gigatonnes (i.e. 344 billion tonnes) of CO2 emissions would give us a 66% chance of limiting average warming to 1.5 degrees and therefore avoiding dangerous levels of climate change. If we divide this global figure up on an equal basis by population, this gives York a total carbon budget of c.10 megatonnes (i.e. 10 million tonnes) over period between the present and 2050.

At current rates of emissions output, York would use up this budget in just over 12 years at some point during the spring of 2032. However, York could stay within its carbon budget by reducing its emissions by just over 7% year on year. This would mean that to transition from the current position where emissions are 44% lower than 2000 levels to a local pathway that is consistent with the world giving itself a 66% chance of avoiding dangerous, runaway climate change, York should adopt carbon reduction targets (on 2000 levels) of:

- 65% by 2025
- 76% by 2030
- 84% by 2035
- 89% by 2040
- 92% by 2045
- 95% by 2050.

Such a trajectory would mean that the majority of all future carbon cuts needed for York to transition to a 1.5 degree consistent pathway need to be delivered in the next 10 years.

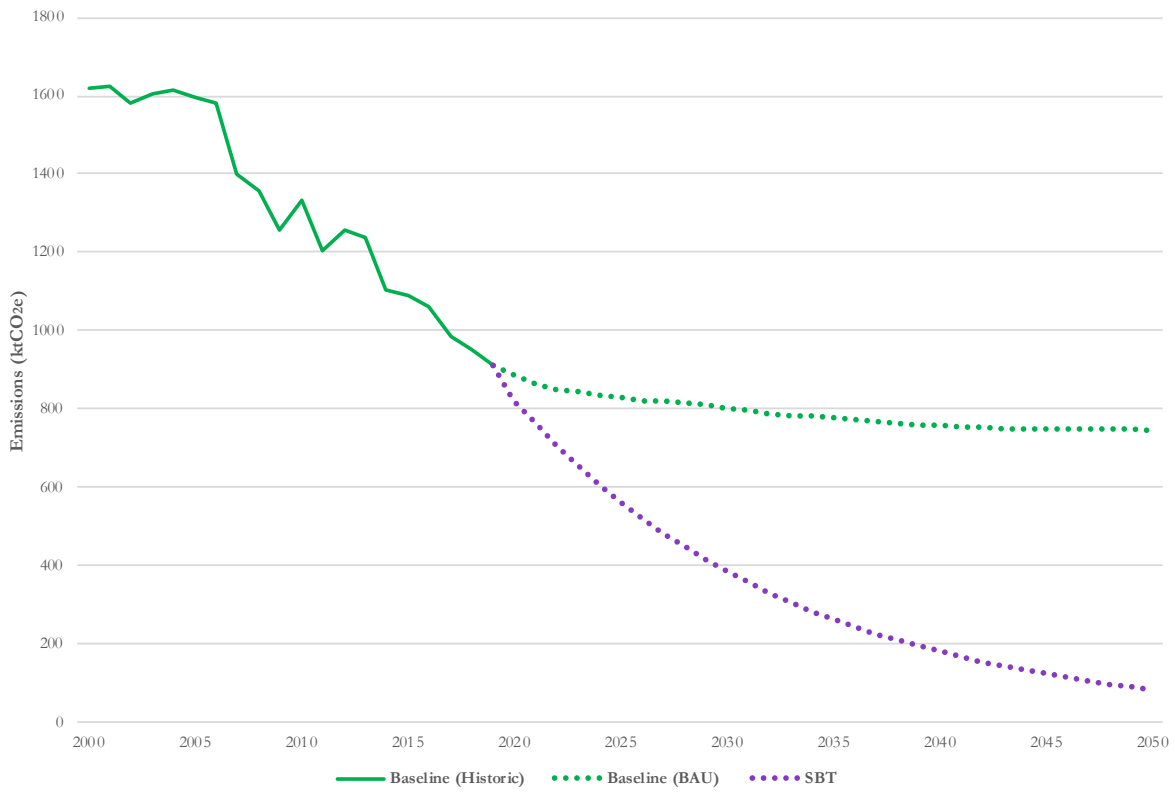


Figure.4: *York's Baseline and Science-Based-Target Emissions Pathways*

5. Aggregating Up: The Bigger Picture for York

a) Emissions reductions

Our analysis predicts that the gap between York's business as usual emissions in 2030 and the net zero target could be closed by 47 % (379ktCO_2e) through the adoption of Cost-Effective (CE) options, by a further 15% (118ktCO_2e) through the adoption of additional Cost-Neutral (CN) options at no net cost, and then by an additional 7% (53ktCO_2e) through the further adoption of all technically viable (TP) options. This means that York still has to identify the innovative or stretch options that could deliver the last 31% (252ktCO_2e) of the gap between the business as usual scenario and net zero in 2030.

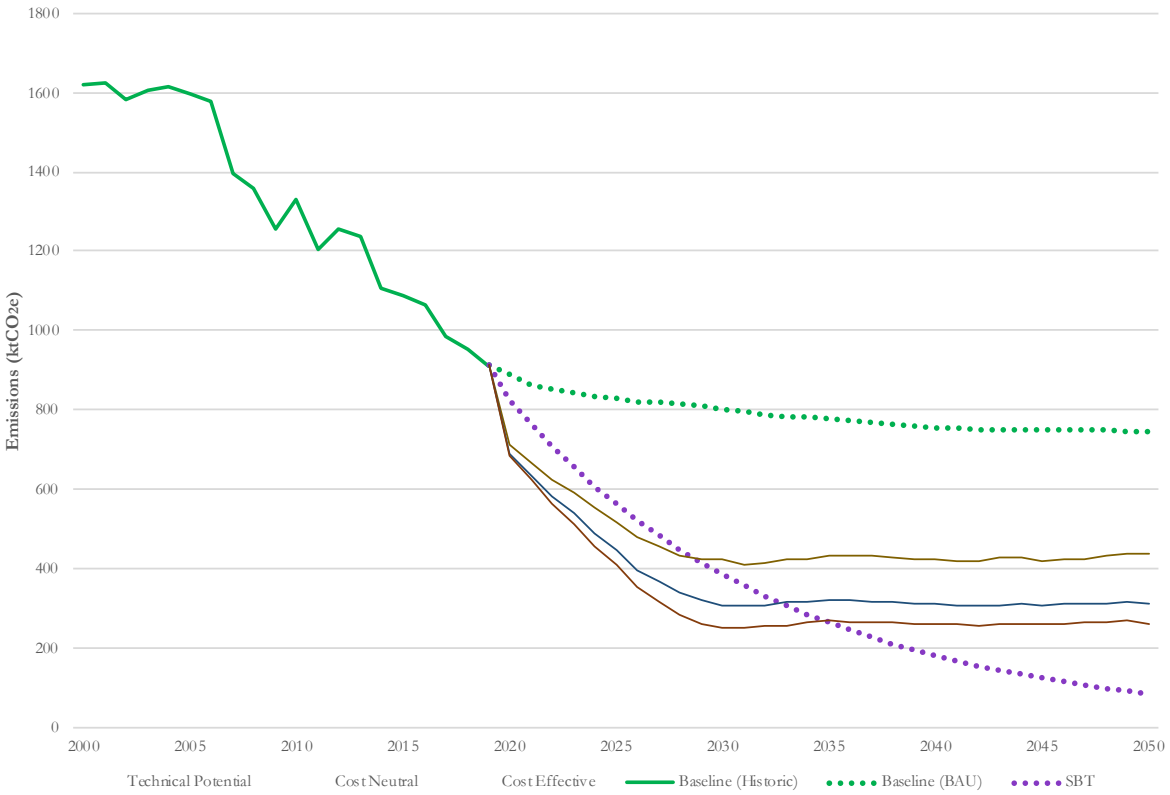


Figure.5: *York's BAU Baseline with Cost-Effective, Cost-Neutral, & Technical Potential Scenarios*

		2025	2030	2035	2040	2045	2050
Reduction on BAU Baseline	**CE**	38%	47%	44%	44%	44%	41%
	CN	46%	62%	59%	59%	59%	58%
	TP	51%	69%	65%	66%	65%	65%
Reduction on Present Emissions	**CE**	35%	43%	39%	37%	37%	35%
	CN	43%	56%	51%	50%	50%	49%
	TP	47%	62%	57%	56%	55%	55%

Table.1: *York's Potential 5-Year Emissions Reduction Percentages*

b) The most carbon and cost-effect options

Figure 6 below presents the emissions savings that could be achieved through different groups of measures in York. Appendices 1 and 2 present league tables of specific measures and their potential emissions savings over this period.

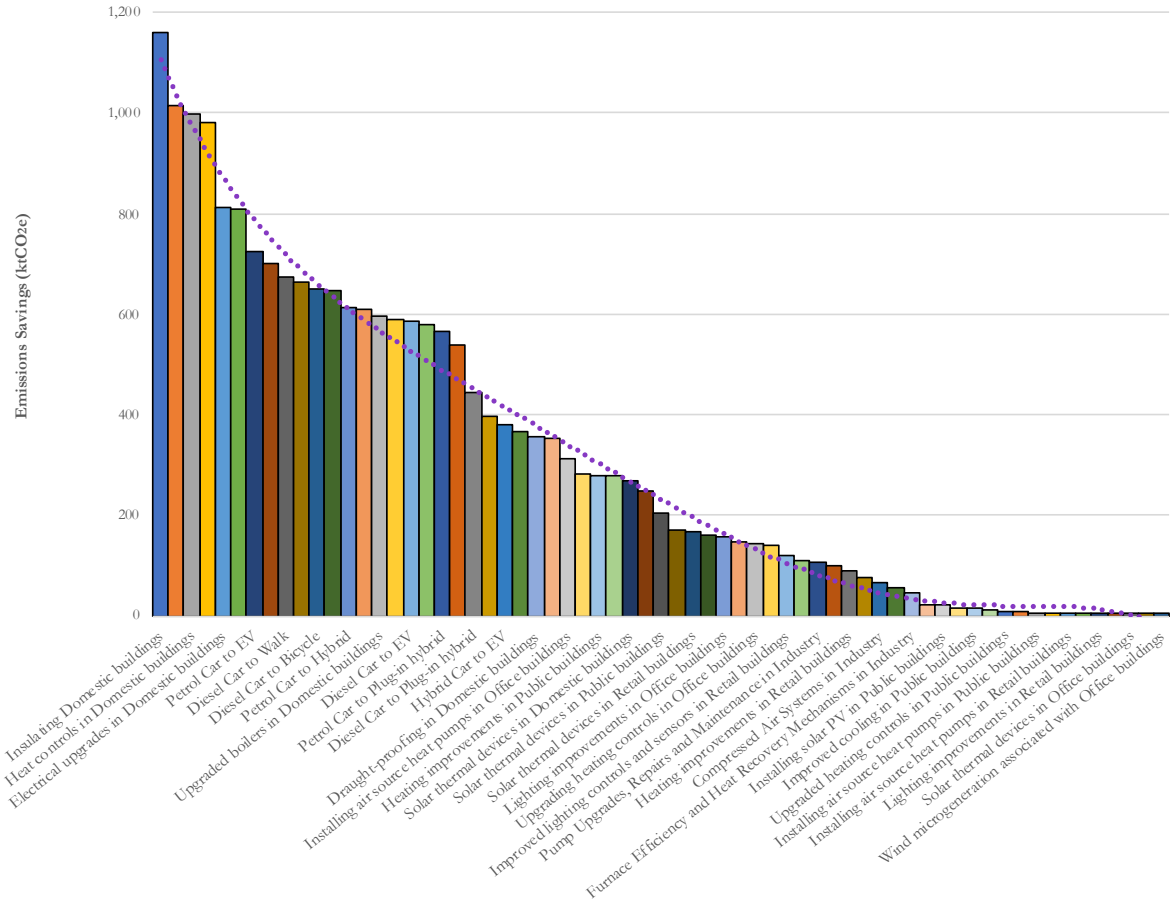


Figure.6: *Simplified Emissions Reduction Potential by Measure for York*

Simplified league tables of the most cost and carbon effective options in York are presented below (see Appendices 1 & 2 for more detailed league tables).

Rank	Measure	Cost Effectiveness (£/tCO2e)
1	Fabric improvements in Retail buildings	-571
2	Diesel Car to Bus (diesel) Journeys	-458
3	Improved cooling in Retail buildings	-393
4	Petrol Car to Bus (diesel) Journeys	-373
5	Diesel Car to Walk Journeys	-345
6	Diesel Car to Bicycle Journeys	-345
7	Petrol Car to Bicycle Journeys	-323
8	Petrol Car to Walk Journeys	-323
9	Fabric improvements in Public buildings	-276
10	Petrol Car to Plug-in hybrid Journeys	-214

Table.5: *York's Top-10 Most Cost-Effective Emission Reduction Options*

Rank	Measure	Emissions Reduction Potential 2020-50 ($ktCO_2e$)
1	Insulating Domestic buildings	906
2	Upgraded Heating controls in Domestic buildings	846
3	Electrical upgrades in Domestic buildings	669
4	Installing heat pumps in Domestic & Office buildings	653
5	Petrol Car to Bicycle Journeys	636
6	Petrol Car to Walk Journeys	636
7	Fabric improvements in Retail buildings	515
8	Petrol Car to Bus (electric) Journeys	485
9	Upgraded boilers in Domestic buildings	481
10	Electricity demand reduction in Domestic buildings	475

Table.6: *York's Top-10 Most Carbon Effective Emission Reduction Options*

Some of the ideas for innovative options identified elsewhere that could also be considered for York include targeting a full transition to net zero homes and public/commercial buildings by 2030, promoting the rapid acceleration of active travel (e.g. walking and cycling), tackling food waste, reducing meat and dairy consumption and reducing concrete and steel consumption/promoting adoption of green infrastructure. These are highlighted in section 8.

c) Investment needs, paybacks and employment creation

Exploiting the cost-effective options in households, public and commercial buildings, transport, industry and waste could be economically beneficial. Although such measures would require total investments of around £1.1 billion over their lifetimes (equating to investments of 110m a year across all organisations and households in the city for the next decade), once adopted they would reduce York's total energy bill by £287 million p.a. in 2030 whilst also creating 3,570 years of employment – or 357 full-time jobs for the next decade.

By expanding this portfolio of measures to at no net cost to York's economy (the Cost-Neutral scenario), investments of £2.3 billion over their lifetimes (or £230m a year for the next decade) would generate 5,887 years of employment (or 588 jobs for the next decade) whilst reducing York' emissions by 62% of projected 2030 levels.

Exploiting the all technically viable options would be more expensive (at least at current prices, c.£3 billion or £300m a year for the next decade) but realise further emissions savings – eliminating 69% of the projected shortfall in York's 2030 emissions, whilst saving hundreds of millions of pounds on an annual basis.

		2025	2030	2035	2040	2045	2050
Cumulative Investment (£M)	**CE**	763	1,160	1,162	1,163	1,164	1,164
	CN	1,442	2,223	2,254	2,256	2,257	2,257
	TP	1,934	2,964	2,995	2,997	2,997	2,997
Annual Energy Expenditure Savings (£M)	**CE**	203	287	284	285	281	284
	CN	188	258	256	248	239	233
	TP	187	255	252	245	235	227

Table.2: *Potential 5-Year Investments and Energy Expenditure Savings*

Sector	Scenario	Investment (£M)
Domestic	**CE**	584
	CN	924
	TP	1,170
Public & Commercial	**CE**	448
	CN	504
	TP	909
Industry	**CE**	17
	CN	198
	TP	287
Transport	**CE**	115
	CN	631
	TP	631

Table.3: *Potential Investments by Sector & Economic Scenario*

		Total	Domestic	Industry	Transport	Public & Commercial
Years of Employment	**CE**	**3,570**	1,250	58	157	2,106
	CN	**5,887**	1,975	676	864	2,371
	TP	**8,623**	2,503	982	864	4,274
Jobs (20-year Period)	**CE**	**179**	62	3	8	105
	CN	**294**	99	34	43	119
	TP	**431**	125	49	43	214

Table.4: *Potential Job Creation by Sector & Economic Scenario*

6. Developing Targets and Performance Indicators

To give an indication of the levels of activity required to deliver on these broader targets, the tables below detail total deployment across different sectors in York through to 2050. We also give an indication of the rate of deployment required in the city if it is to even approximate its climate targets. These lists are not exhaustive, and also apply by measure; any one building or industrial facility will usually require the application of several measures over the period. These figures effectively become Key Performance Indicators (KPIs) for the delivery of climate action across the city.

Domestic Homes:

Measure	Total Homes Applied	Mean Annual Rate of Installation (homes)
Lighting Upgrades	51,631	**2,963**
Floor Insulation	48,546	**2,732**
Glazing Upgrades	45,597	**2,589**
Gas Boiler Upgrades & Repairs	46,800	**2,506**
Solar PV	35,810	**2,055**
Thermostats & Heating Controls	35,116	**1,976**
Solar thermal	36,430	**1,955**
Loft insulation	32,283	**1,748**
Wall Insulation	23,111	**1,290**
Draught Proofing	18,401	**1,044**
Cavity wall Insulation	15,350	**856**
Heat Pumps	3,780	**215**

Public & Commercial Buildings:

Measure	Floorspace Applied (m^2)	Mean Annual Rate of Installation (m^2)
Lighting/Heating Controls and Sensors	1,450,231	**82,076**
Retail Heating Upgrades	1,420,740	**80,425**
Wind Turbines	795,241	**45,815**
Office Lighting Upgrades	398,040	**23,006**
Office Fabric Improvements	279,564	**15,595**
Office Heat Pumps	114,492	**6,328**
Office Solar PV	93,984	**5,168**

Transport:

Measure	Deployment
Additional EVs Replacing Conventional Private Cars	**1,536**
Additional Electric-Buses Procured and In-service	**85**
High Quality Protected Cycling Highways Built	**9** kilometres
Increase in Public Transport Ridership	**4M** trips per annum

Table.7: *York's Sectoral Emissions Reduction KPIs*

7. Focussing on Key Sectors in York

At full deployment (technical potential) across York, we calculate that there is potential to avoid over 14MtCO2e in emissions that will otherwise be produced in the city between 2020 and 2050. The transport sector will contribute most significantly toward this total, with a decarbonisation potential of between 4MtCO2e (cost-effective scenario) and 6MtCO2e (technical potential) through the period. However, domestic housing , industry and public and commercial buildings also play a major role:; upgrading and retrofitting of York's built environment (including the domestic, public and commercial sectors) could reduce emissions by up to c.8MtCO2e over the same period at full technical potential, with industry similarly showing the potential to decarbonise nearly 500ktCO2e under the same conditions.

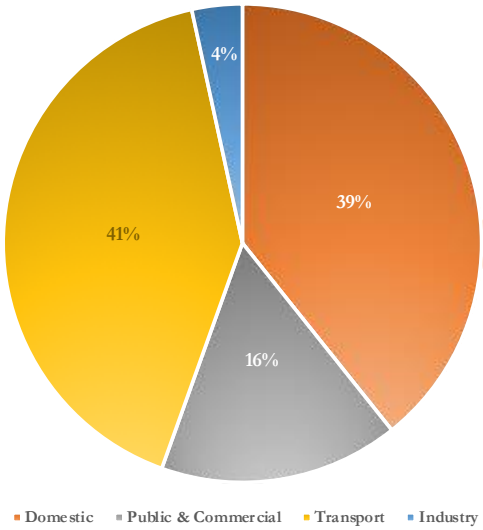


Figure.7 *York's Emissions Reduction Potential (2020-2050) by Sector*

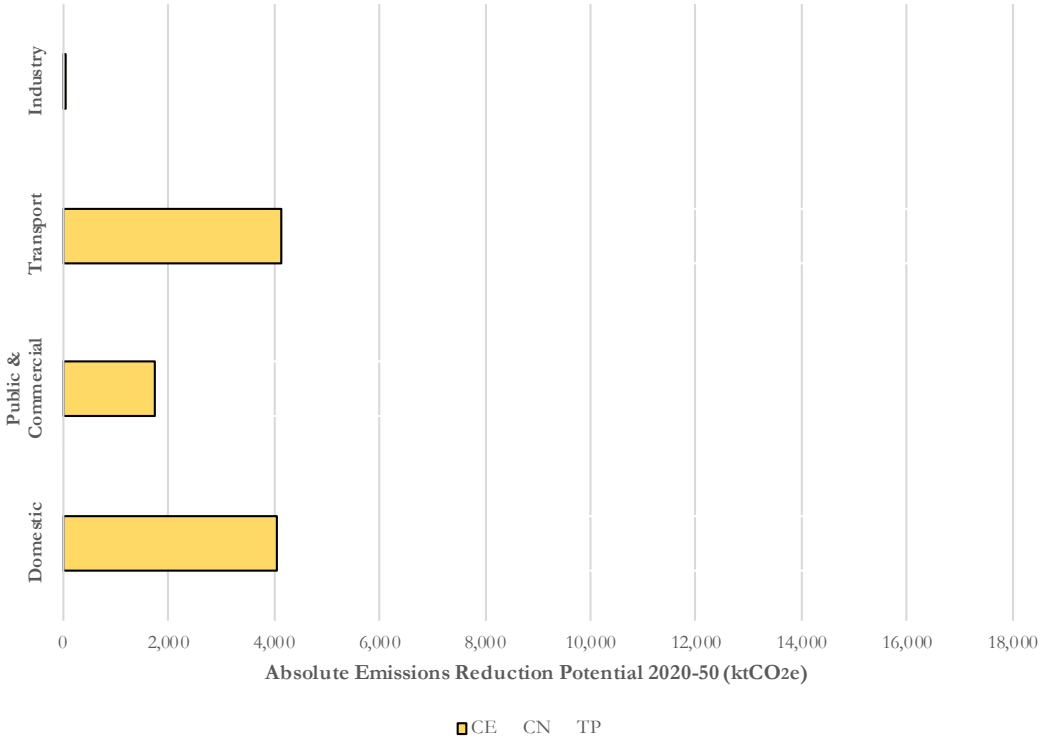
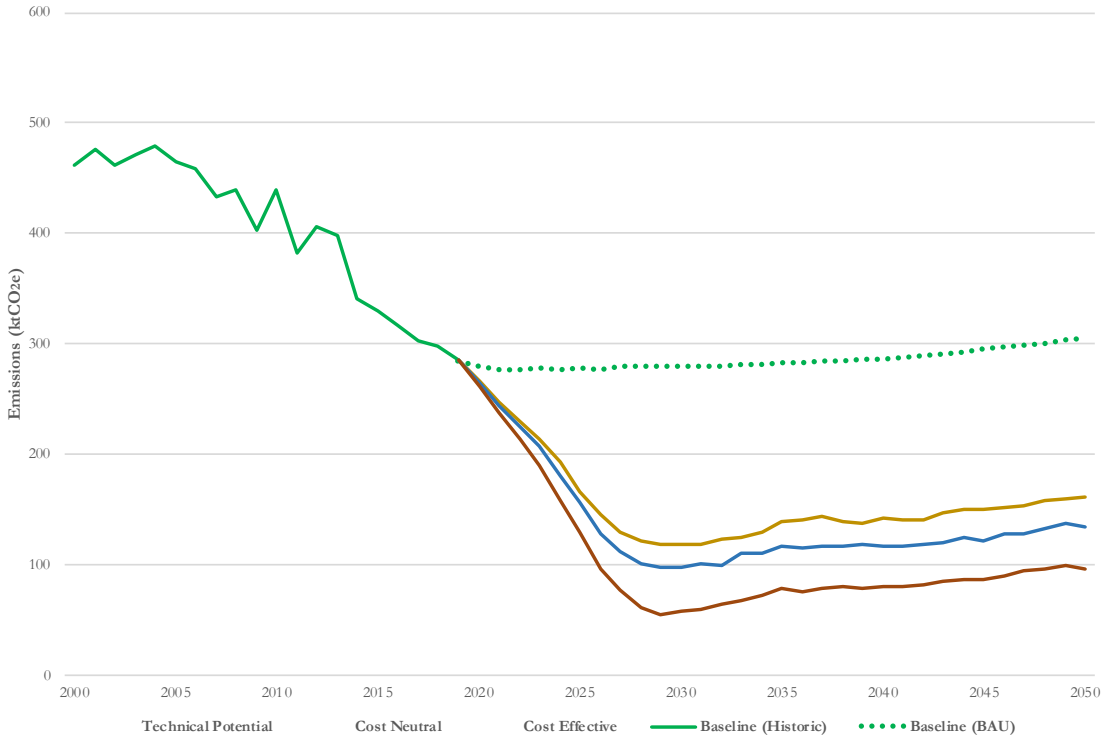


Figure.8: *York's Emissions Reduction Potential By Sector & Economic Scenario (2020-50)*

In the following section, summaries of the emissions reduction potential and economic implications of investment are presented for the four main sectors. For display and continuity purposes, each sector is displayed with a summary of the same metrics: (*1*) emissions reduction potential over time in the three economic scenarios, (*2*) 5-year totals for cumulative emissions savings, investment requirements and annual energy expenditure reductions, and (*3*) a simplified table of the most cost effective low carbon measures applied in each sector across York.

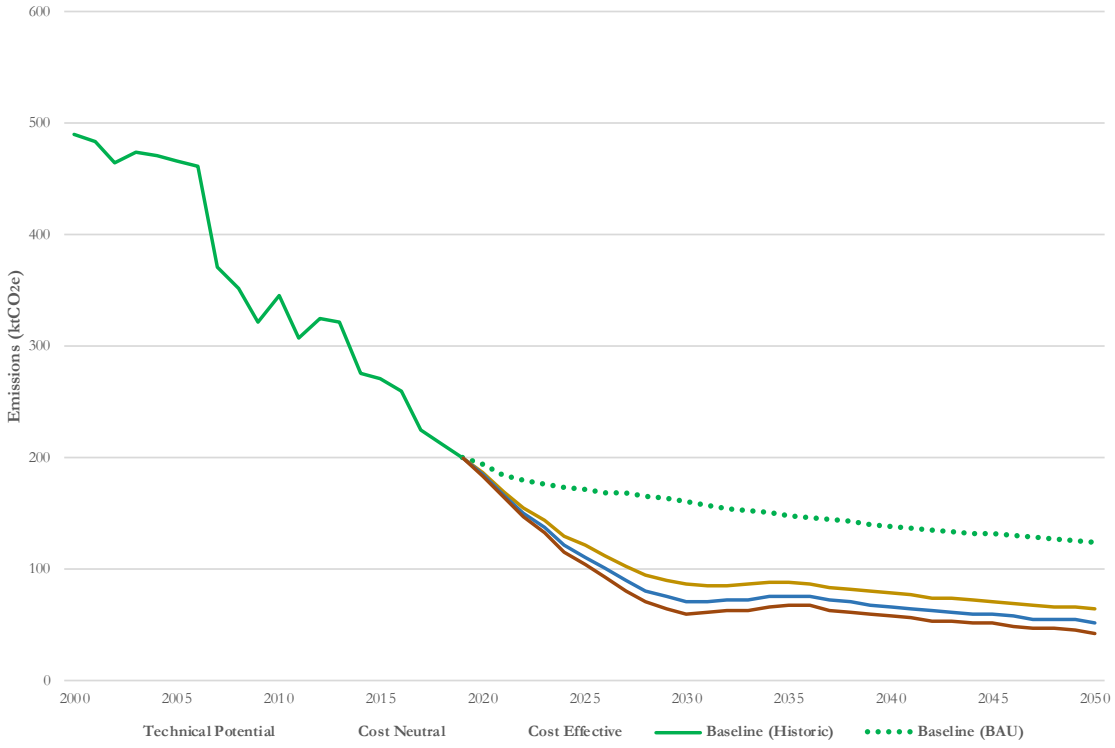
7(a). Housing



		2025	2030	2035	2040	2045	2050
Emissions Reductions ($ktCO_2e$)	**CE**	111	154	143	144	153	143
	CN	121	183	167	169	174	170
	TP	148	222	203	206	209	209
Annual Energy Expenditure Savings (£M)	**CE**	67	110	113	116	113	118
	CN	83	137	140	141	142	147
	TP	70	114	116	118	118	122
Cumulative Investment (£M)	**CE**	368	584	584	584	584	584
	CN	575	924	924	924	924	924
	TP	727	1,170	1,170	1,170	1,170	1,170

Rank	Measure	Cost Effectiveness (£/tCO_2e)
1	Electrical & Appliance upgrades in Domestic buildings	-208
2	Lighting improvements in Domestic buildings	-145
3	Electricity demand reduction in Domestic buildings	-137
4	Draught-proofing in Domestic buildings	-50
5	Installing heat pumps in Domestic buildings	-37
6	Upgraded Heating controls in Domestic buildings	-28
7	Glazing improvements in Domestic buildings	-27
8	Installing biomass boilers in Domestic buildings	-24
9	Solar thermal devices in Domestic buildings	-18
10	Upgraded boilers in Domestic buildings	-11

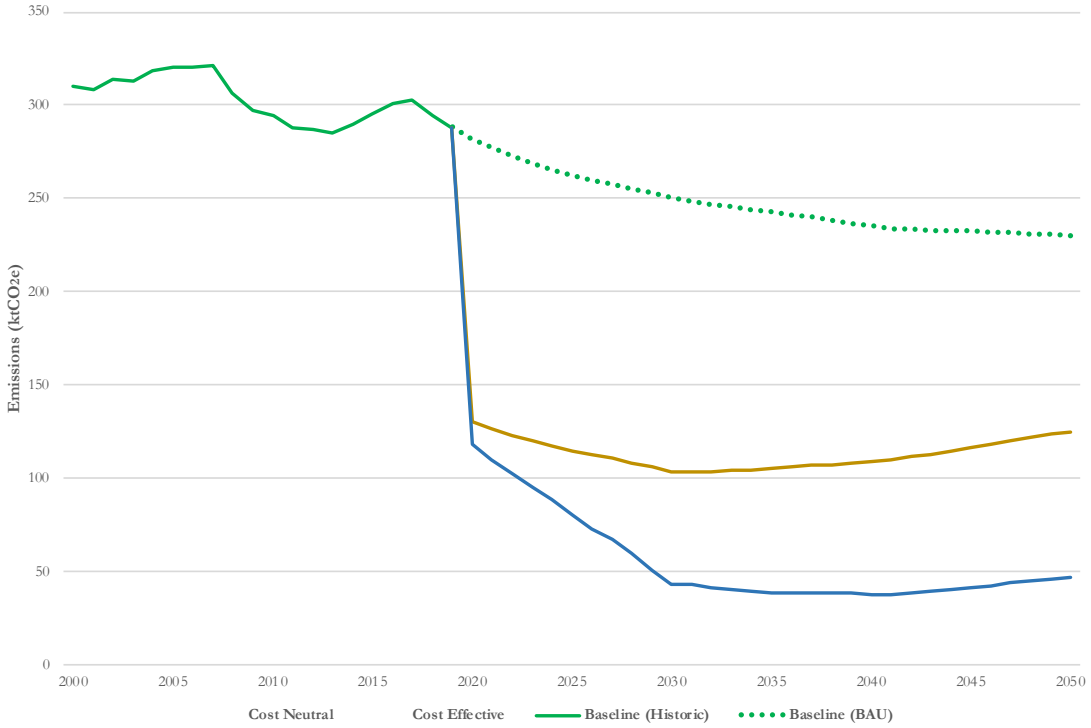
7(b). Public & Commercial Buildings



		2025	2030	2035	2040	2045	2050
Emissions Reductions ($ktCO_2e$)	**CE**	50	74	61	60	60	60
	CN	60	90	73	72	72	73
	TP	67	100	82	81	80	81
Annual Energy Expenditure Savings (£M)	**CE**	65	107	105	110	113	117
	CN	21	35	34	36	37	39
	TP	33	53	52	55	57	59
Cumulative Investment (£M)	**CE**	278	448	448	448	448	448
	CN	314	504	504	504	504	504
	TP	565	909	909	909	909	909

Rank	Measure	Cost Effectiveness (£/tCO_2e)
1	Fabric improvements in Retail buildings	-571
2	Improved cooling in Retail buildings	-393
3	Fabric improvements in Public buildings	-276
4	Lighting improvements in Public buildings	-200
5	Improved cooling in Office buildings	-198
6	Heating improvements in Public buildings	-139
7	Lighting improvements in Retail buildings	-132
8	Improved cooling in Public buildings	-97
9	Heating improvements in Office buildings	-82
10	Heating improvements in Retail buildings	-53

7(c). Transport



		2025	2030	2035	2040	2045	2050
Emissions Reductions ($ktCO_2e$)	**CE**	148	148	137	127	116	105
	CN	182	208	204	198	191	183
	TP	182	208	204	198	191	183
Annual Energy Expenditure Savings (£M)	**CE**	68	67	64	59	54	49
	CN	75	78	73	65	56	47
	TP	75	78	73	65	56	47
Cumulative Investment (£M)	**CE**	100	111	113	114	115	115
	CN	355	598	629	631	631	631
	TP	355	598	629	631	631	631

Rank[i]	Measure*	Cost Effectiveness (£/tCO_2e)
1	Diesel Car to Bus (diesel)	-458
2	Petrol Car to Bus (diesel)	-373
3	Diesel Car to Walk	-345
4	Diesel Car to Bicycle	-345
5	Petrol Car to Bicycle	-323
6	Petrol Car to Walk	-323
7	Petrol Car to Plug-in hybrid	-214
8	Diesel Car to Plug-in hybrid	-136
9	Petrol Car to EV	-133

Note: Due to the high cost-effectiveness of many transport mode-shift options, the TP scenario has been removed and emissions pathways are covered by CE and CN only.
* Journey transitions

10	Petrol Car to Bus (electric)	-129

7(d). Industry

		2025	2030	2035	2040	2045	2050
Emissions Reductions ($ktCO_2e$)	**CE**	5	4	2	0	0	0
	CN	19	16	12	8	7	7
	TP	24	21	16	11	10	10
Annual Energy Expenditure Savings (£M)	**CE**	3	3	3	1	1	0
	CN	9	9	9	6	4	0
	TP	10	10	10	7	5	0
Cumulative Investment (£M)	**CE**	3	17	17	17	17	17
	CN	40	198	198	198	198	198
	TP	57	287	287	287	287	287

Rank*	Measure	Cost Effectiveness (£/tCO_2e)
1	Improving Efficiency of Boilers and Steam Piping in Industry	307
2	Fan Correction, Repairs, & Upgrades in Industry	663
3	Condensing & Insulation Measures to Boilers & Steam Piping in Industry	719
4	Pump Upgrades, Repairs and Maintenance in Industry	825
5	Compressed Air Systems in Industry	1,055
6	Furnace Efficiency and Heat Recovery Mechanisms in Industry	3,213
7	Refrigeration Efficiency and Technical Upgrades in Industry	15,656

* For display purposes interventions in industry have been aggregated here into the 7 relevant process types

8. Innovative Stretch Measures in York

Even with full delivery of the broad programme of cross-sectoral, city-wide low carbon investment described above, there remains an emissions shortfall of 31% between York's 2030 BAU baseline and the net zero target. Here we briefly consider the productivity of certain key technologies and interventions that may well be able to plug this gap into the future. Many of these so-called 'stretch options' are innovative by nature but they will be required to reach York's targets in future.

		2025	2030	2035
Annual Emissions Reduction Potential ($ktCO_2e$)	Zero Carbon Heavy Goods Transport	11	48	48
	Industrial Heat and Cooling Electrification	12	12	7
	870 Ha. Reforested Annually 2020-29*	47	120	148
	Electrification of Domestic Heat	6	33	48
	Electrification of Domestic Cooking	2	11	15
	Electrification of Commercial/Public Heating	3	8	3

Table.7: *Stretch Measures' Decarbonising Potential (* Sequestration Values)*

Figure 10 below shows the impact that the adoption of these stretch measures would have on York's carbon emissions, with the red dotted line showing the 'business as usual' baseline, the purple dotted line showing emissions after adoption of all technically viable options and the blue dotted line showing emissions after all technically viable and stretch options. This indicates that York would still have some residual emissions through to 2050. For illustration, the green dotted line shows that in theory York could offset is residual emissions through a UK based tree planting scheme, however this would require the planting of 39 million trees, which even with the densest possible planting would require 8,700 hectares of land, equivalent to 32% of the total land area of the city.

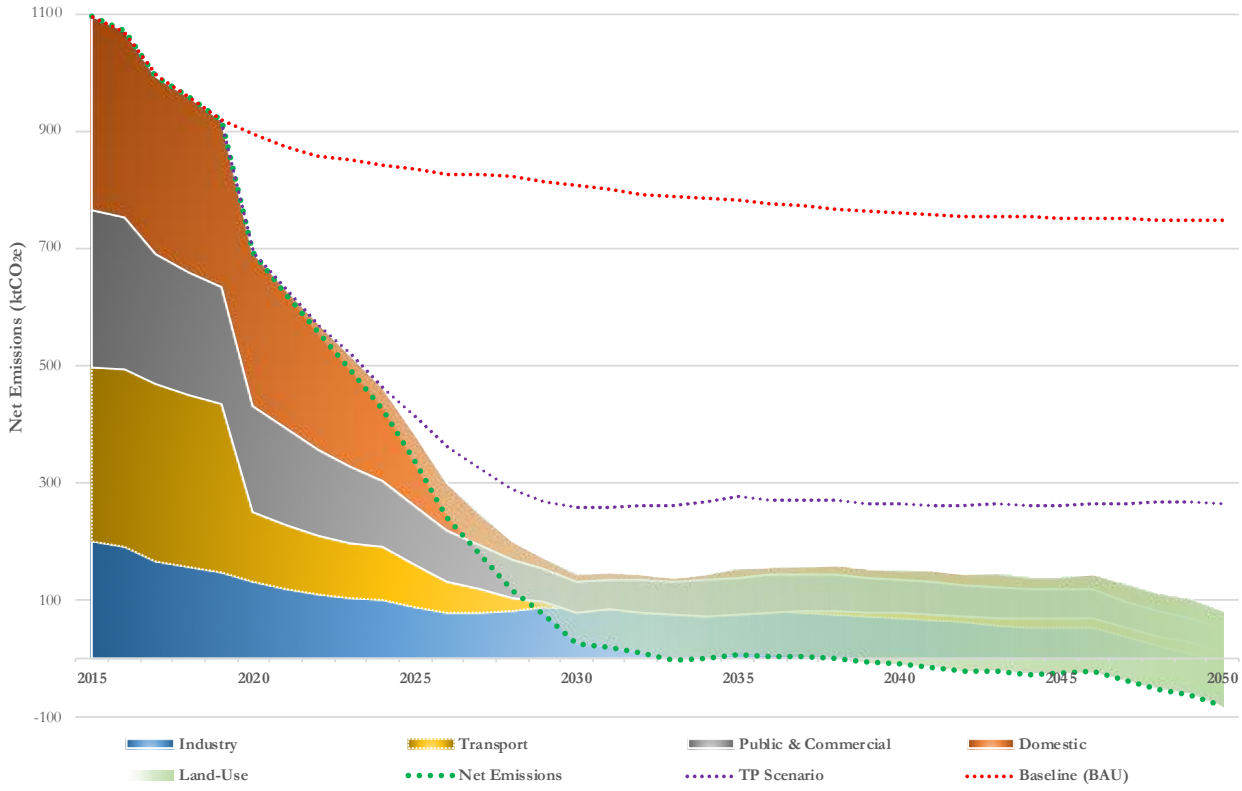


Figure.10: *Sectoral Emissions Shortfall Reduction with Stretch Measures*

9. Next Steps for York

Based on the analysis presented above, we recommend that if York wants to stay within its share of the global carbon budget, it needs to adopt a clear and ambitious climate action plan.

The case for the adoption of such a plan is supported by the evidence that much – but not all - of the action that is required can be based on the exploitation of win-win low carbon options that will simultaneously improve economic, social and health outcomes across the city.

A climate action plan for York should adopt science-based targets for emissions reduction, including both longer term targets and 5-yearly carbon reduction targets.

The action plan should focus initially on York's direct (scope 1 and 2) carbon footprint as these emissions are most directly under the city's influence, but in time it should also widen its scope to consider its broader (scope 3) carbon footprint.

The action plan should clearly set out the ways in which York will work towards achieving these targets, drawing on the deployment KPIs listed in this report. Action should also be taken to monitor and report progress on emissions reductions.

It is important to stress that delivering on these targets will require action across the city and the active support of the public, private and third sectors. Establishing an independent York Climate Commission could help to draw actors together and to build capacities to take and track action.

Such a Commission could act as a critical friend to the city, helping to promote stakeholder engagement and build buy-in and a sense of common ownership for the climate action plan, as well as in supporting, guiding and tracking progress towards its delivery.

Through such a Commission, cross-sectoral leadership groups could be formed for key sectors such as homes, public and commercial buildings, transport and industry, with clear plans for the delivery of priority actions in each sector. All large organisations and businesses in the city should be asked to match broader carbon reduction commitments and to report back on progress.

Appendix 1. League Table of the Most Carbon Effective Options for York

Measure*	Emissions Reduction Potential ($ktCO_2e$)
Insulating Domestic buildings	906
Upgraded Heating controls in Domestic buildings	846
Electrical upgrades in Domestic buildings	669
Installing heat pumps in Domestic buildings	653
Petrol Car to Bicycle	636
Petrol Car to Walk	636
Fabric improvements in Retail buildings	515
Petrol Car to Bus (electric)	485
Upgraded boilers in Domestic buildings	481
Electricity demand reduction in Domestic buildings	475
Diesel Car to Walk	464
Diesel Car to Bicycle	464
Installing solar PV in Domestic Buildings	444
Petrol Car to EV	439
Petrol Car to Bus (diesel)	395
Petrol Car to Plug-in hybrid	375
Petrol Car to Hybrid	375
Diesel Car to EV	370
Diesel Car to Bus (electric)	341
Fabric improvements in Public buildings	338
Diesel Car to Plug-in hybrid	276
Lighting improvements in Domestic buildings	276
Draught-proofing in Domestic buildings	257
Installing biomass boilers in Domestic buildings	252
Hybrid Car to EV	240
Glazing improvements in Domestic buildings	228
Diesel Car to Bus (diesel)	224
Heating improvements in Public buildings	213
Solar thermal devices in Domestic buildings	193
Condensing & Insulation Measures to Boilers & Steam Piping in Industry	185
Installing air source heat pumps in Office buildings	163
Solar thermal devices in Public buildings	148
Lighting improvements in Office buildings	133
Improving Efficiency of Boilers and Steam Piping in Industry	131
Solar thermal devices in Retail buildings	125
Wind microgeneration associated with Public buildings	103
Improved lighting controls and sensors in Public buildings	89
Upgrading heating controls in Office buildings	86
Improved lighting controls and sensors in Office buildings	86
Improved cooling in Office buildings	85
Improved lighting controls and sensors in Retail buildings	72

* Measures listed here have been grouped and summed across multiple applications for display purposes; 'ICE' and 'NMT' refer to Internal Combustion Engine and Non-Motorised Transport respectively; Transport measures refer to transitions between travel modes.

Diesel Car to Hybrid	66
Lighting improvements in Public buildings	66
Compressed Air Systems in Industry	54
Pump Upgrades, Repairs and Maintenance in Industry	49
Heating improvements in Retail buildings	42
Fan Correction, Repairs, & Upgrades in Industry	34
Furnace Efficiency and Heat Recovery Mechanisms in Industry	34
Installing solar PV in Public buildings	13
Fabric improvements in Office buildings	10
Improved cooling in Public buildings	10
Refrigeration Efficiency and Technical Upgrades in Industry	7
Improved cooling in Retail buildings	7
Installing solar PV in Office buildings	5
Heating improvements in Office buildings	5
Installing air source heat pumps in Retail buildings	4
Upgraded heating controls in Retail buildings	4
Installing air source heat pumps in Public buildings	4
Lighting improvements in Retail buildings	4
Wind microgeneration associated with Retail buildings	4
Upgraded heating controls in Public buildings	4
Solar thermal devices in Office buildings	4
Installing solar PV in Retail buildings	3
Wind microgeneration associated with Office buildings	3
TOTAL	**14,306**

Appendix 2. League Table of the Most Cost Effective Options for York

Measure*	Cost Effectiveness (£/tCO2e)
Fabric improvements in Retail buildings	-571
Diesel Car to Bus (diesel)	-458
Improved cooling in Retail buildings	-393
Petrol Car to Bus (diesel)	-373
Diesel Car to Walk	-345
Diesel Car to Bicycle	-345
Petrol Car to Bicycle	-323
Petrol Car to Walk	-323
Fabric improvements in Public buildings	-276
Petrol Car to Plug-in hybrid	-214
Electrical upgrades in Domestic buildings	-208
Lighting improvements in Public buildings	-200
Improved cooling in Office buildings	-198
Lighting improvements in Domestic buildings	-145
Heating improvements in Public buildings	-139
Electricity demand reduction in Domestic buildings	-137
Diesel Car to Plug-in hybrid	-136
Petrol Car to EV	-133
Lighting improvements in Retail buildings	-132
Petrol Car to Bus (electric)	-129
Petrol Car to Hybrid	-114
Improved cooling in Public buildings	-97
Heating improvements in Office buildings	-82
Insulating Domestic buildings	-76
Diesel Car to Bus (electric)	-63
Heating improvements in Retail buildings	-53
Lighting improvements in Office buildings	-53
Draught-proofing in Domestic buildings	-50
Diesel Car to EV	-41
Fabric improvements in Office buildings	-38
Installing heat pumps in Domestic buildings	-37
Upgraded Heating controls in Domestic buildings	-28
Glazing improvements in Domestic buildings	-27
Upgrading heating controls in Office buildings	-26
Installing biomass boilers in Domestic buildings	-24
Solar thermal devices in Domestic buildings	-18
Diesel Car to Hybrid	-12
Upgraded heating controls in Public buildings	-11
Upgraded boilers in Domestic buildings	-11
Upgraded heating controls in Retail buildings	-8
Installing air source heat pumps in Retail buildings	-1

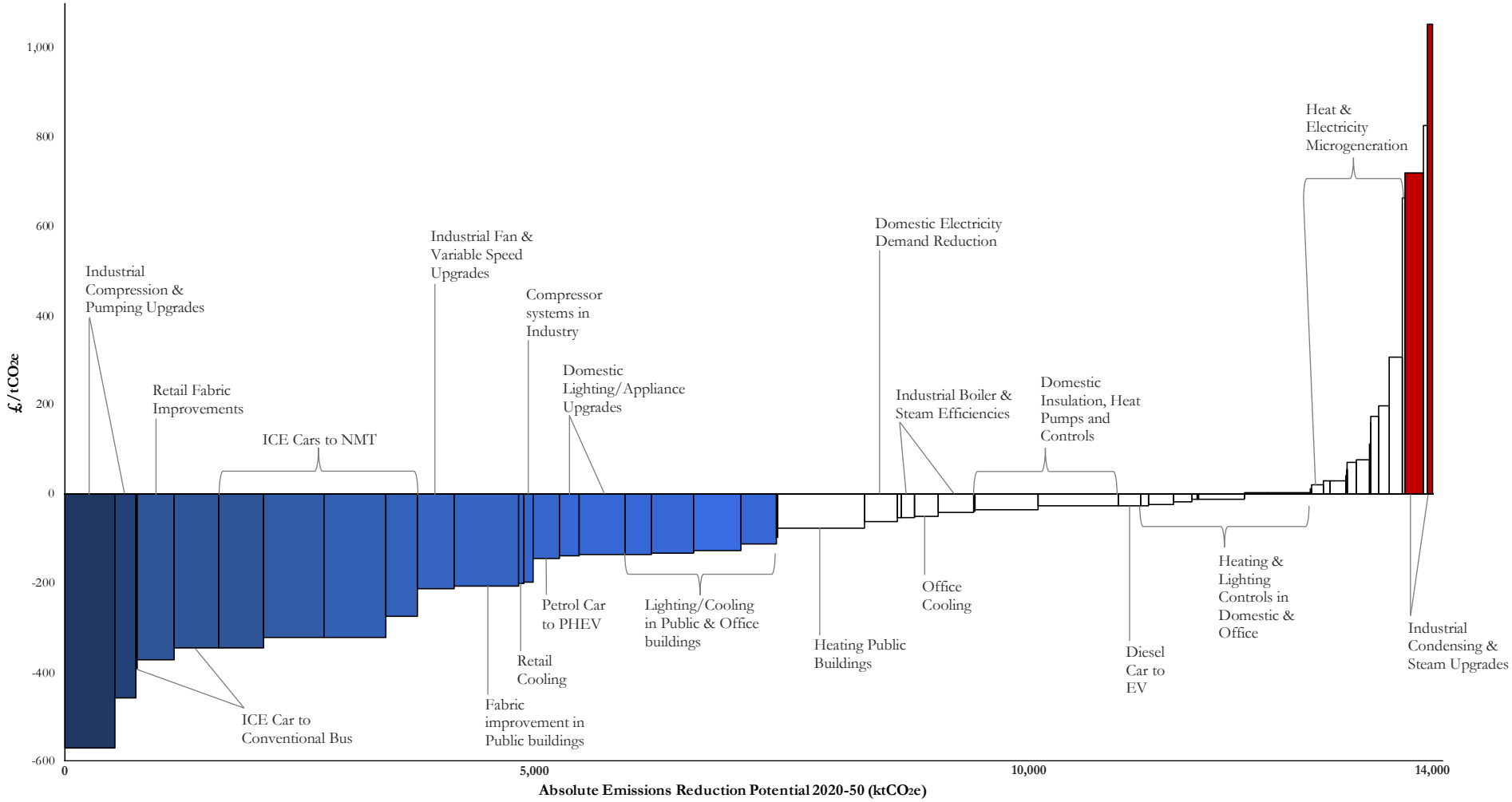
* Measures listed here have been grouped and summed across multiple applications for display purposes; the cost per tonne of emissions reduction displayed here are mean values across applications.

Hybrid Car to EV	3
Installing solar PV in Domestic Buildings	3
Installing air source heat pumps in Public buildings	10
Solar thermal devices in Retail buildings	19
Improved lighting controls and sensors in Retail buildings	29
Installing air source heat pumps in Office buildings	30
Installing solar PV in Public buildings	40
Installing solar PV in Office buildings	53
Installing solar PV in Retail buildings	55
Improved lighting controls and sensors in Office buildings	71
Solar thermal devices in Public buildings	76
Solar thermal devices in Office buildings	112
Wind microgeneration associated with Office buildings	158
Improved lighting controls and sensors in Public buildings	174
Wind microgeneration associated with Public buildings	196
Wind microgeneration associated with Retail buildings	307
Improving Efficiency of Boilers and Steam Piping in Industry	307
Fan Correction, Repairs, & Upgrades in Industry	663
Condensing & Insulation Measures to Boilers & Steam Piping in Industry	719
Pump Upgrades, Repairs and Maintenance in Industry	825
Compressed Air Systems in Industry	1,055
Furnace Efficiency and Heat Recovery Mechanisms in Industry	3,213
Refrigeration Efficiency and Technical Upgrades in Industry	15,656

Appendix 3. Detailed Sectoral Emissions Reduction Potential by Scenario

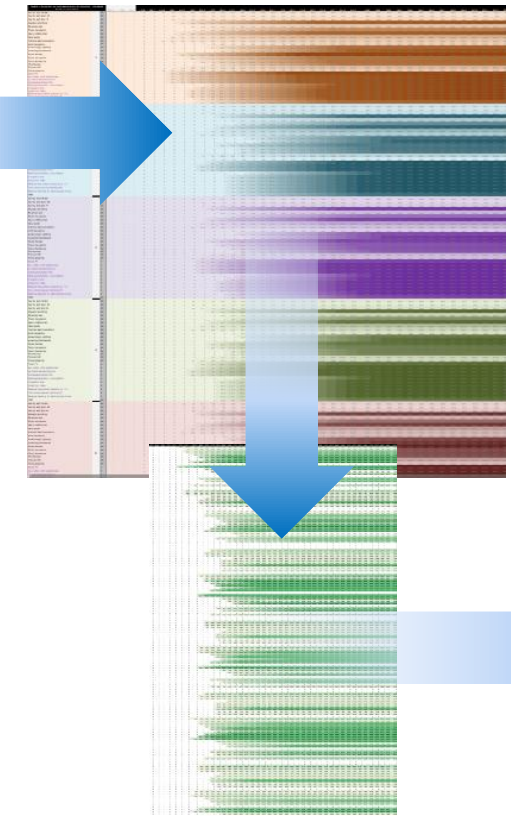
			2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Domestic Housing	Reduction on BAU Emissions ($ktCO_2e$)	CE	5%	10%	17%	23%	31%	40%	47%	54%	57%	58%	55%	58%	56%	53%	54%	51%	50%	49%	51%	52%	50%	52%	52%	50%	49%	52%	51%	51%	48%	47%	47%
		CN	5%	12%	19%	25%	35%	44%	54%	60%	64%	66%	65%	64%	64%	61%	61%	59%	59%	59%	59%	59%	59%	59%	59%	59%	58%	59%	57%	57%	56%	55%	56%
		TP	7%	14%	23%	32%	43%	53%	65%	72%	78%	80%	79%	79%	77%	76%	75%	72%	73%	72%	72%	73%	72%	72%	72%	71%	71%	71%	70%	69%	68%	68%	69%
	Reduction on 2020 Emissions ($ktCO_2e$)	CE	5%	10%	17%	23%	30%	40%	47%	54%	57%	58%	55%	58%	56%	53%	55%	51%	51%	50%	52%	53%	52%	53%	54%	52%	51%	55%	55%	55%	51%	51%	51%
		CN	5%	11%	18%	25%	34%	43%	53%	60%	64%	66%	66%	64%	64%	61%	62%	60%	60%	60%	60%	60%	60%	61%	61%	61%	60%	62%	61%	61%	61%	59%	61%
		TP	7%	14%	22%	31%	43%	53%	64%	72%	79%	81%	80%	79%	77%	76%	75%	73%	74%	74%	73%	74%	74%	74%	74%	74%	74%	75%	74%	73%	73%	73%	75%
Public & Commercial buildings	Reduction on BAU Emissions ($ktCO_2e$)	CE	4%	8%	13%	19%	25%	29%	34%	39%	43%	45%	46%	46%	45%	44%	41%	41%	41%	42%	42%	43%	44%	44%	45%	45%	46%	46%	46%	48%	48%	48%	49%
		CN	5%	10%	16%	23%	30%	35%	40%	47%	51%	54%	56%	55%	53%	53%	50%	49%	49%	50%	51%	52%	52%	53%	54%	54%	55%	55%	56%	57%	57%	57%	59%
		TP	5%	11%	18%	25%	34%	39%	45%	52%	57%	61%	63%	62%	60%	59%	56%	55%	54%	56%	57%	58%	58%	59%	60%	60%	62%	61%	62%	64%	64%	64%	66%
	Reduction on 2020 Emissions ($ktCO_2e$)	CE	4%	8%	12%	17%	22%	26%	29%	34%	37%	38%	38%	38%	35%	34%	32%	32%	31%	31%	31%	31%	31%	31%	32%	31%	32%	31%	31%	32%	31%	31%	31%
		CN	5%	9%	15%	21%	27%	31%	35%	41%	44%	46%	47%	45%	42%	42%	39%	38%	37%	38%	37%	38%	37%	37%	38%	37%	38%	37%	37%	38%	37%	37%	38%
		TP	5%	10%	17%	23%	30%	35%	39%	45%	49%	51%	52%	50%	47%	47%	43%	42%	41%	42%	42%	42%	42%	42%	42%	42%	42%	42%	42%	42%	42%	41%	42%
Transport	Reduction on BAU Emissions ($ktCO_2e$)	CE	54%	54%	55%	55%	56%	56%	57%	57%	58%	58%	59%	59%	58%	58%	57%	57%	56%	56%	55%	54%	54%	53%	52%	52%	51%	50%	49%	48%	47%	47%	46%
		CN	58%	60%	63%	65%	67%	69%	72%	74%	77%	80%	83%	83%	83%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	83%	83%	82%	82%	81%	81%	80%	80%
		TP	58%	60%	63%	65%	67%	69%	72%	74%	77%	80%	83%	83%	83%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	83%	83%	82%	82%	81%	81%	80%	80%
	Reduction on 2020 Emissions ($ktCO_2e$)	CE	54%	54%	53%	53%	53%	52%	52%	52%	52%	52%	52%	52%	51%	50%	50%	49%	48%	47%	46%	46%	45%	44%	43%	43%	42%	41%	40%	40%	39%	38%	37%
		CN	58%	59%	60%	62%	63%	65%	67%	68%	69%	72%	74%	73%	73%	73%	73%	72%	72%	72%	71%	71%	70%	70%	69%	69%	68%	68%	67%	67%	66%	66%	65%
		TP	58%	59%	60%	62%	63%	65%	67%	68%	69%	72%	74%	73%	73%	73%	73%	72%	72%	72%	71%	71%	70%	70%	69%	69%	68%	68%	67%	67%	66%	66%	65%
Industry	Reduction on BAU Emissions ($ktCO_2e$)	CE	2%	3%	4%	4%	4%	4%	4%	4%	4%	3%	3%	3%	3%	3%	3%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		CN	6%	10%	14%	17%	16%	16%	16%	15%	15%	14%	14%	14%	13%	13%	12%	12%	11%	10%	9%	9%	8%	8%	7%	7%	7%	7%	8%	8%	8%	8%	8%
		TP	8%	12%	17%	20%	20%	19%	19%	19%	18%	18%	18%	17%	17%	17%	16%	15%	14%	13%	13%	12%	12%	11%	11%	11%	11%	11%	11%	11%	11%	11%	12%
	Reduction on 2020 Emissions ($ktCO_2e$)	CE	2%	2%	3%	4%	4%	4%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		CN	6%	9%	13%	15%	14%	14%	14%	13%	13%	12%	12%	11%	11%	10%	10%	9%	8%	7%	7%	6%	6%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
		TP	8%	11%	15%	19%	18%	17%	17%	16%	16%	15%	15%	14%	13%	13%	12%	12%	11%	10%	9%	9%	8%	8%	7%	7%	7%	7%	7%	7%	7%	7%	7%

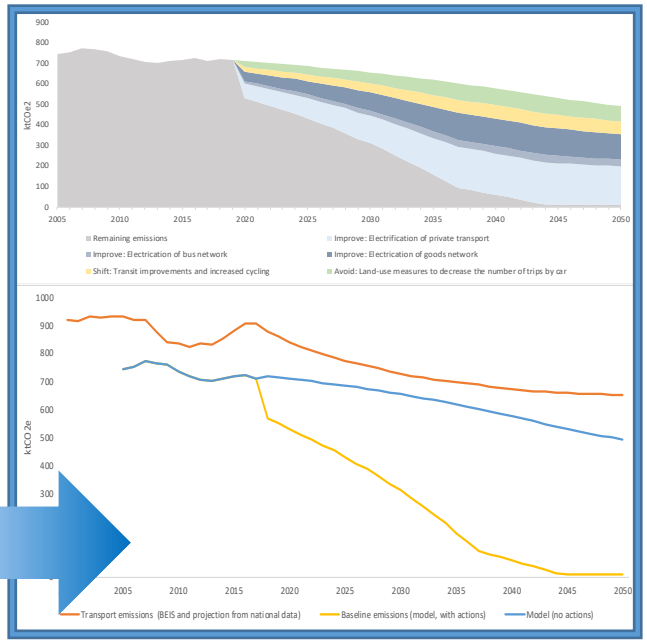
Appendix 4. Marginal Abatement Chart for York



Appendix 5. Methodology Explored

Sector	Measure	Application Data
Commercial	*Office T5 Lighting (conversions & new luminaries)*	kWh/m² - £2018 CAPEX/OPEX/EoL -
	Retail PIR Movement & Daylight Sensors	kWh/m² - £2018 CAPEX/OPEX/EoL -
	…	
Transport	*Private EV Penetration*	kWh/m² - £2018 CAPEX/OPEX/EoL -
	Public EV Buses	kWh/m² - £2018 CAPEX/OPEX/EoL -
	…	
Domestic	*Detached House Cavity Wall Insulation*	kWh/m² - £2018 CAPEX/OPEX/EoL -
	High-Rise Flat Draught Proofing Measures	kWh/m² - £2018 CAPEX/OPEX/EoL -
	…	
Industrial	*Boilers/Steam Systems Upgrades*	kWh/m² - £2018 CAPEX/OPEX/EoL -
	Furnaces/Process Heaters Improvements	kWh/m² - £2018 CAPEX/OPEX/EoL -
	…	





The figure above displays, at a high level, the methodology applied in this analysis. First, thorough evaluation of many hundreds of application-specific interventions was undertaken to develop data on what each measure will institute in energy savings (across several energy vectors), and the costs involved in its application and lifecycle. Next, lifecycle energy and cost savings are applied to reliable projections for market prices, costs, energy vector by type, emissions factor by source, and a variety of other economic and environmental variables over time. The ongoing productivity and savings of each intervention can then be then 'scaled-up' to the local conditions for deployment potential and place-specific penetration available in York's context – the number of houses (by type) recommended a certain measure year-on-year, area of commercial building judged suitable, possible percentage mode-shift in transport journeys, etc. This process enables the carbon savings attributable to each intervention (specific to York) to be aggregated into the sectoral, and ultimately city-wide outputs.

ANNEX 1


CITY OF
YORK
COUNCIL


UKRI
Economic
and Social
Research Council


PCAN
PLACE-BASED
CLIMATE ACTION
NETWORK


UNIVERSITY OF LEEDS


Centre for
Climate Change
Economics and Policy


wrc

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ANNEX 2

DRAFT v6

York Climate Commission

1 Vision

Act as an independent, technical body representing and reflecting the public, private and civic sectors from across the City of York; providing strategic oversight and accountability for progressing the City's climate change agenda.

2 Background & context

The City of York Council (CYC) recognises that no single organisation has the power, authority, resources or ability to achieve the city-level change needed to deliver our ambition of becoming a carbon neutral city by 2030.

Bringing together key partners across the city is essential in creating shared ownership and accountability but also benefiting from the collective experience and expertise that exists within York.

CYC has proposed the establishment of a York Climate Commission (the Commission) to acknowledge the collective responsibility of our climate change ambition and provide leadership in delivering on this ambition.

3 Scope

The scope of the Commission is to:

- Promote leadership in the city on climate change, encouraging stakeholders to take effective action now, while maintaining a long term perspective;
- Provide authoritative independent advice on the most effective steps required to meet the city's carbon reduction target so as to inform policies and actions of local stakeholders and decision makers;
- Monitor and report on progress towards meeting the city's carbon targets and recommend actions to keep on track;
- Advise on the assessment of climate-related risks and adaptation opportunities in the city and on progress towards climate resilience;
- Bring together major organisations and key groups in York to collaborate on projects that result in measurable contributions towards meeting the city's climate reduction target;
- Make the economic case for project development, implementation and investment in low carbon and climate resilient projects in the city;
- Promote best practice in public engagement on climate change and its impacts in order to support robust decision-making;
- Act as a forum where organisations can exchange ideas, research findings, information and best practice on carbon reduction and climate resilience.

The Commission is not intended to be a lobbying or campaigning organisation and instead has a clear focus on providing independent advice and bringing together organisations to collaborate on specific projects and work-streams. It may, however, act as an advocate for further devolved powers which would enable the city to achieve more.

4 Deliverables

The Commission aims to achieve the following deliverables:

- The collation of existing carbon reduction targets and measures for organisations across the city using an agreed methodology;
- Agreed strategic and shared priorities and opportunities for carbon reduction and climate resilience across the city;
- To support York based organisations' understanding of the importance of energy and low carbon initiatives to the success of their business and helping overcome barriers to successful implementation.
- Collaborate with other organisations to identify effective carbon reduction and climate resilience measures, research and develop projects, and attract funding for project development and/or delivery;
- An annual report monitoring project delivery and evaluating progress across the city.

5 Membership

Membership of the Commission is open to individuals representing key organisations from the public, private and civic sectors across the city who can contribute to the development and delivery of a low carbon and/or climate resilient economy/society in York. The balance of membership of the Commission reflects the need for cross-city representation and for it to address both climate mitigation and resilience.

Prior to appointment, members must have ensured that their participation in the Commission has been authorised at a senior level within their organisation.

Any operational costs will be shared equally across members.

Members of the Commission are recruited periodically via an open process. Members are appointed on the basis:

- That they are representative of a significant organisation or sector;
- That they will engage with their organisation and sector to promote the work of the Commission;
- That although some members will represent large organisations which can make a specific commitment, others may be able to represent their sector (e.g. housing / small businesses) but cannot make commitments on behalf of their sector;
- That they can deliver useful, accurate and timely data to the Commission;
- That they can demonstrate expertise, knowledge, leadership and skills to contribute usefully to the expert work of the Commission;
- That they can commit the required amount of time to the Commission;
- That they have access to good networks and connections that will add value to the Commission;
- That they are available to attend the Commission meetings. Alternate representatives would not usually be allowed to attend. If a member is absent for three meetings in succession, membership will be reviewed and may be revoked

6 Ways of Working

The Commission will be Chaired by the Executive member for Environment and Climate Change for an initial 12 months from formation. At which point, the Chair will be appointed

from amongst the other Commission members, with the Executive member for Environment and Climate Change taking up the role of Co-chair.
The Commission will act as a strategic body and as such will meet on a quarterly basis. It is intended that administrative support will be provided jointly.

The Commission will meet quarterly. Meetings will be held privately; however, to ensure accountability and scrutiny of the work of the Commission and to report the progress that is being made by all sectors and partners towards the city's carbon reduction target, the Commission will discuss progress on a 6 monthly basis to CYC Climate Change Policy Scrutiny Committee.

Decisions within the Commission are made with a preference for a consensus-based approach to decision-making; however, when necessary a vote can be taken to secure the decision.

These Terms of Reference shall be adopted (with any proposed amendments) at the Commission's first meeting, then be reviewed on an annual basis to ensure their continued relevance.

7 Structure

York Climate Commission:

Comprising a Chair, Co-Chair and representatives from key organisations or sectors, including at least one person from each Working Group. The Climate Commission group meets four times per year:

- To oversee the programme of deliverables;
- To take an overview of initiatives, projects and activities to ensure coordination, reduce duplication and foster synergy between projects;
- To act as a problem-solving forum;
- To agree, communicate and publish advice on meeting carbon reduction targets;
- To agree, communicate and publish advice on risk / opportunity assessment of climate change.

Working Groups:

Working Groups will be established by York Climate Commission members (who join Working Groups) and include technical or subject specialists. Working Groups will concentrate on key areas of climate action; the Working Groups are under development and will be formalised within the first 3 months of the Commission. Working Groups will meet four times per year and focus on:

- Information gathering by monitoring the performance of actual and proposed projects in the city, capturing carbon reduction data in an agreed format and preparing reports;
- Providing a more complete picture of the contribution of the city to carbon emissions;
- Overseeing effective mechanisms to bring projects from different stakeholders together where appropriate in order to achieve economies of scale or greater strategic synergy between projects;

ANNEX 2

- Project portfolio delivery, funding and finance by taking a city-wide view of the carbon reduction and resilience projects and how they could be financed, including securing funding for the work of the Commission.

York Climate Commission, December 2020