Annexe C – 2030 York

CATAPULT Energy Systems

CITY OF YORK COUNCIL

LOCAL AREA ENERGY PLAN

Context & Historical Emissions

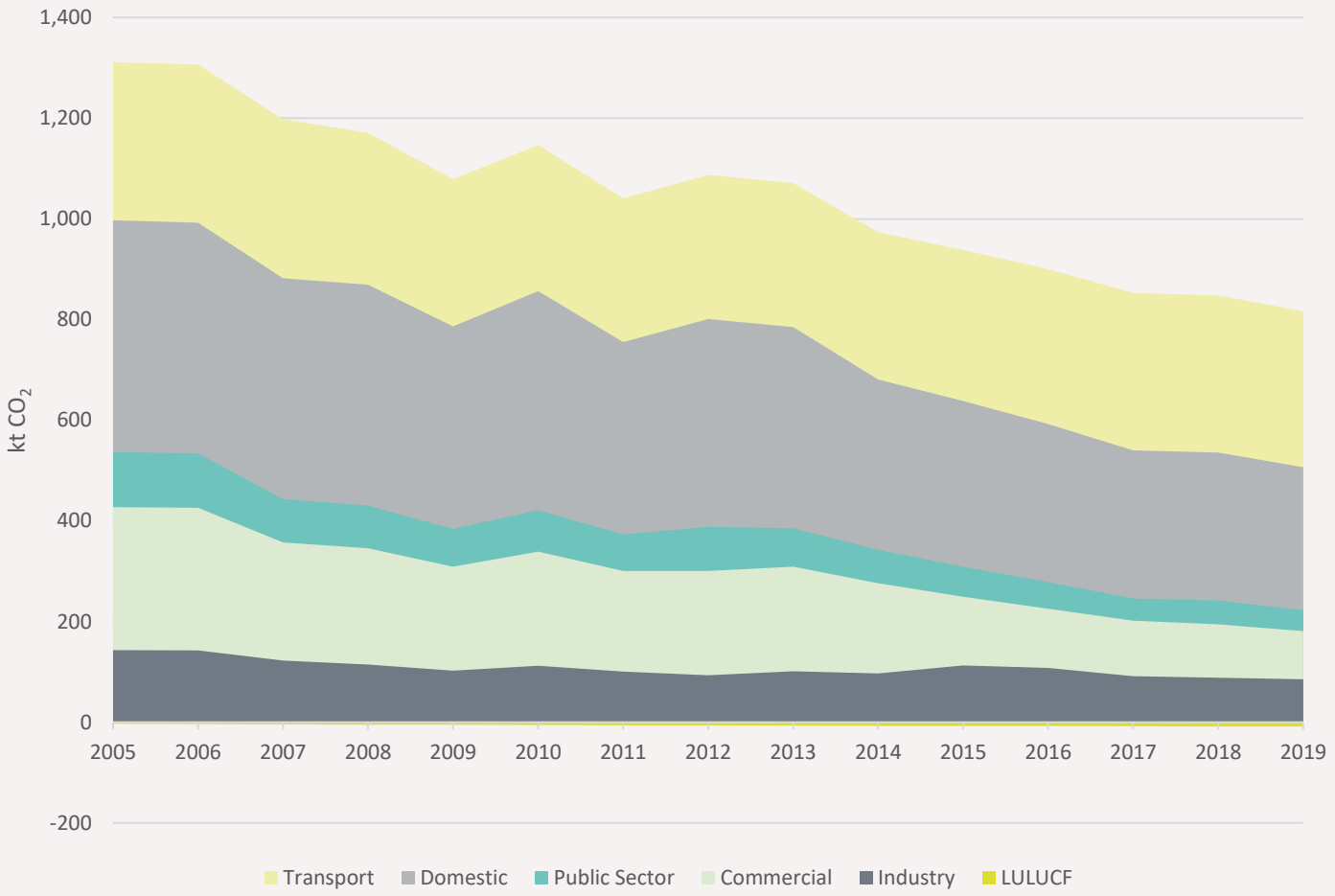
This Annexe is complementary to the local area energy plan (LAEP) that has been developed by Energy Systems Catapult on behalf of City of York Council. The main LAEP document has been aligned to the York & North Yorkshire LEP target of reaching net zero by 2034 and becoming England's first net negative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

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

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

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

CO_2 Emissions by Sector in York



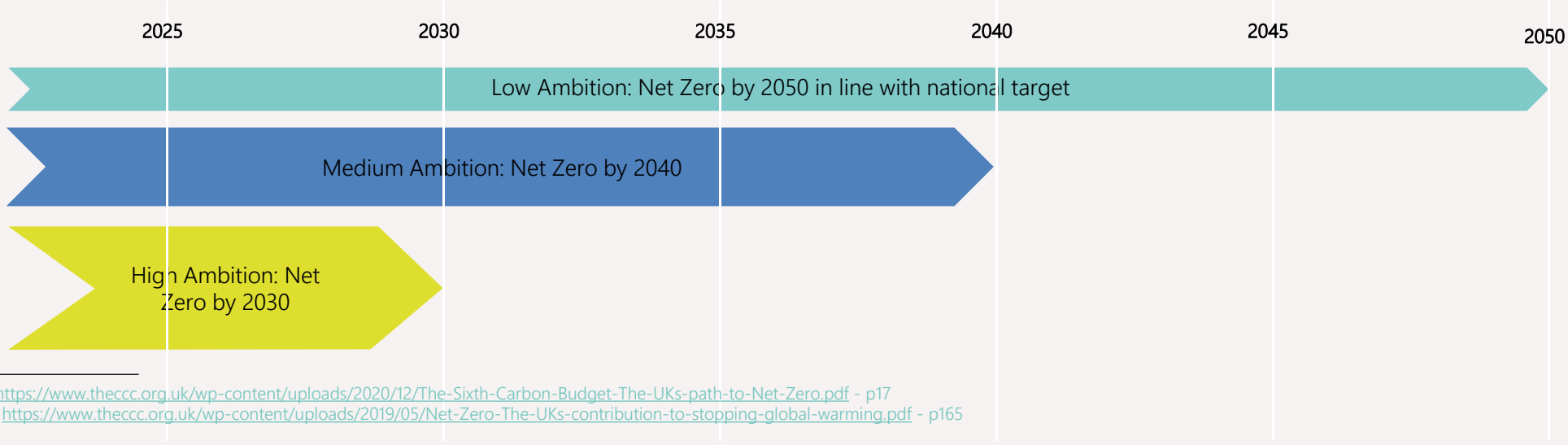
Note: this graph is based on data from BEIS which uses a different accounting method from the data used to estimate emissions in scope in the introduction. This results in lower LULUCF emissions shown in this graph.

Pathways

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

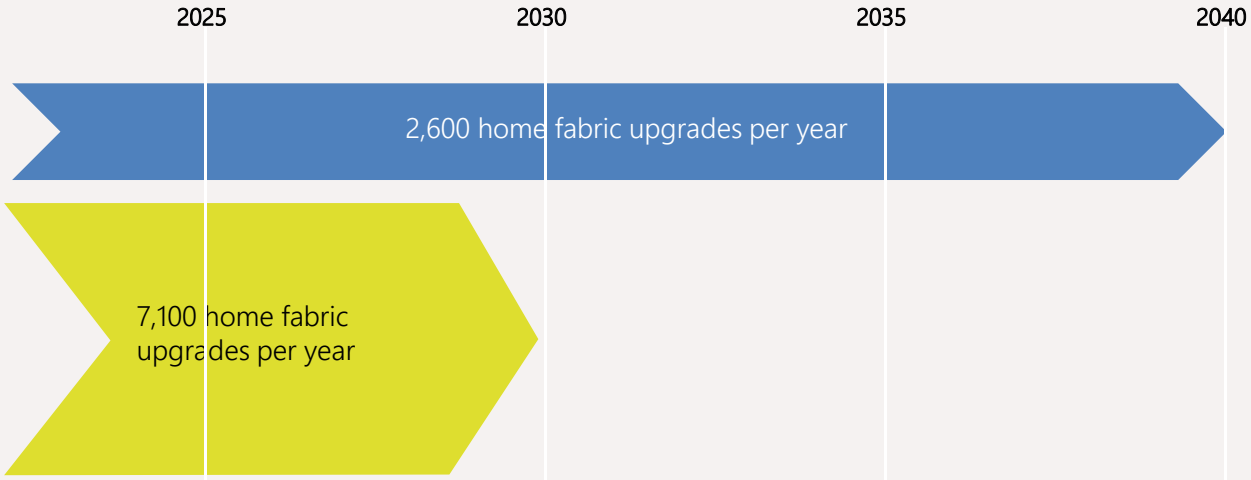
For national context, the Climate Change Committee's "Balanced Pathway" to net zero by 2050 is reflective of what they consider to be "the UK's highest possible ambition", compatible with the 1.5°C Paris climate target*. This pathway recommends that the UK reduce emissions by 78% by 2035 against a 1990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

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



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

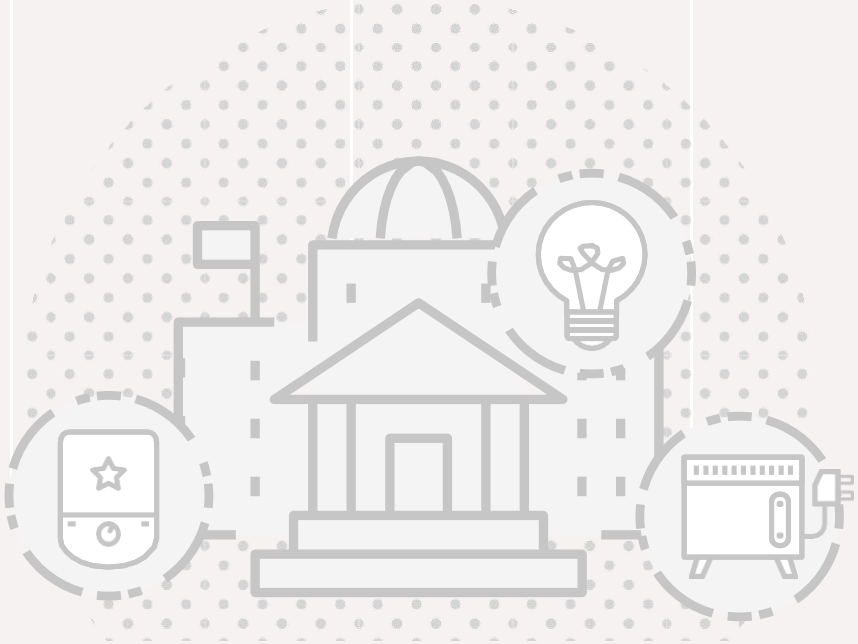
Building Fabric Upgrades



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

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

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



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

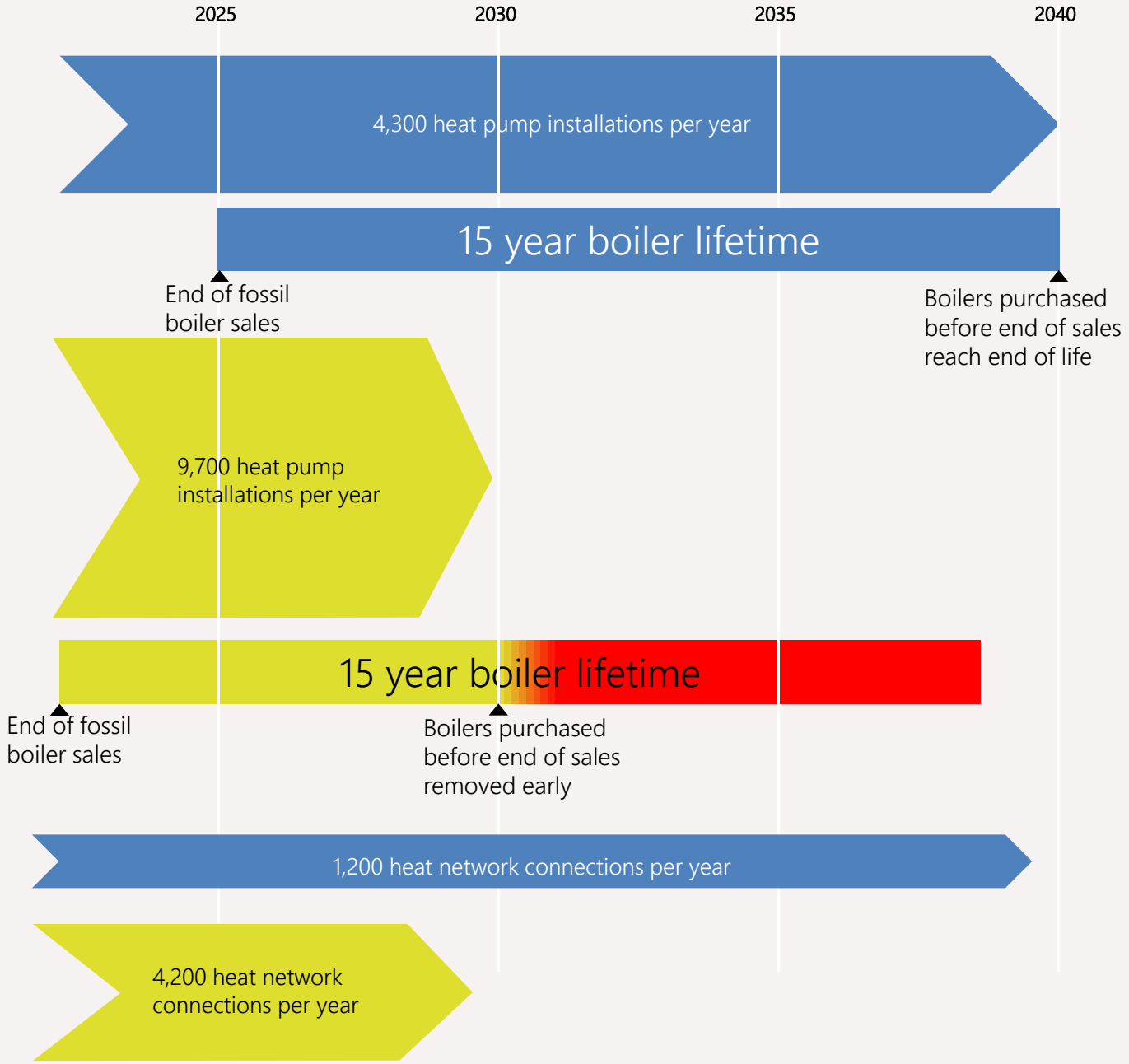
Heating System Replacements

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

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

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

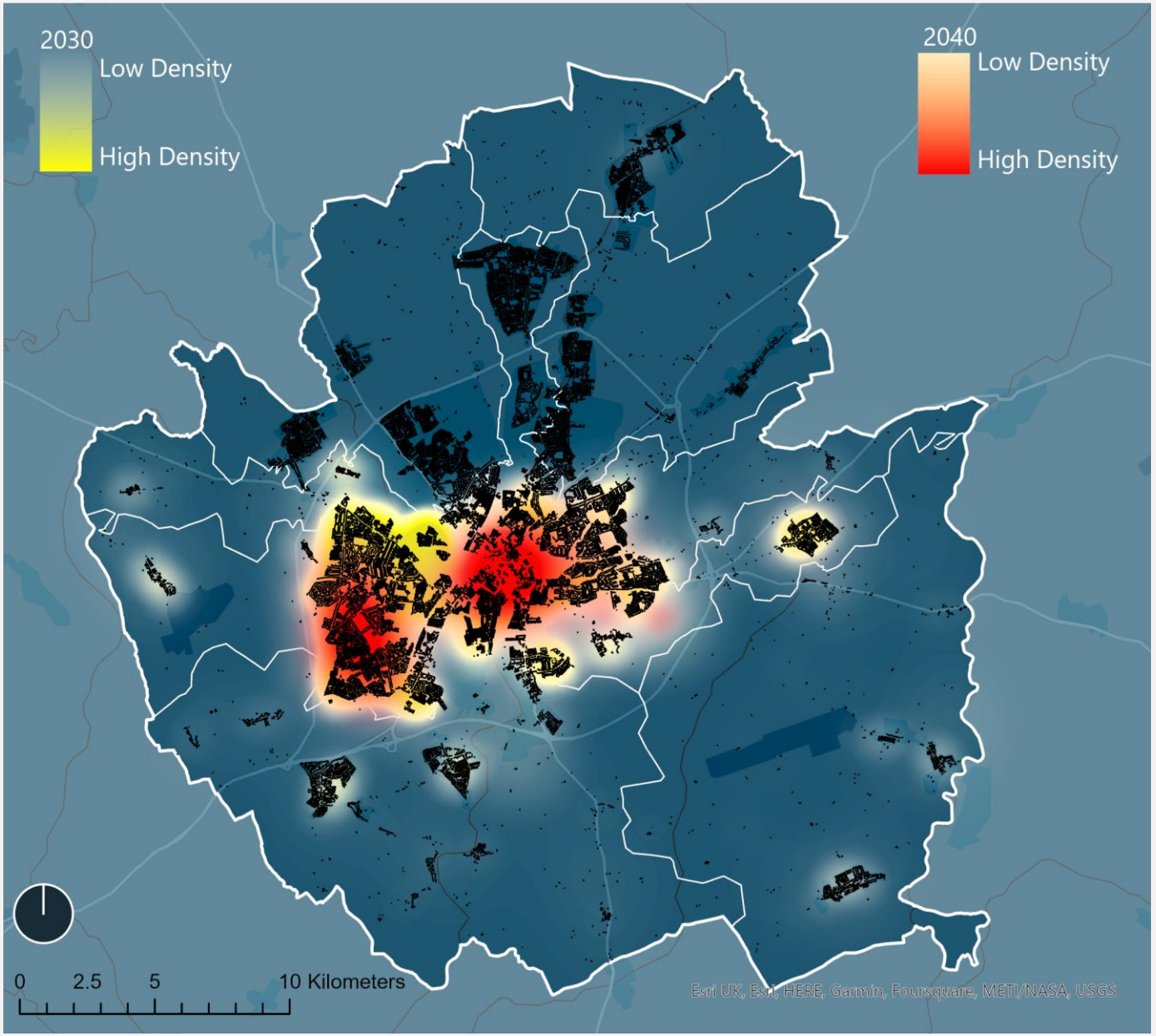
Ideally, the sale of new fossil fuel boilers can be ended in advance of the net zero target date, to minimise the need to remove working boilers before their end of life. Assuming an average boiler lifetime of 15 years, the sale of new fossil fuel boilers would need to end as soon as 2025 to minimise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



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

District Heat Networks

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



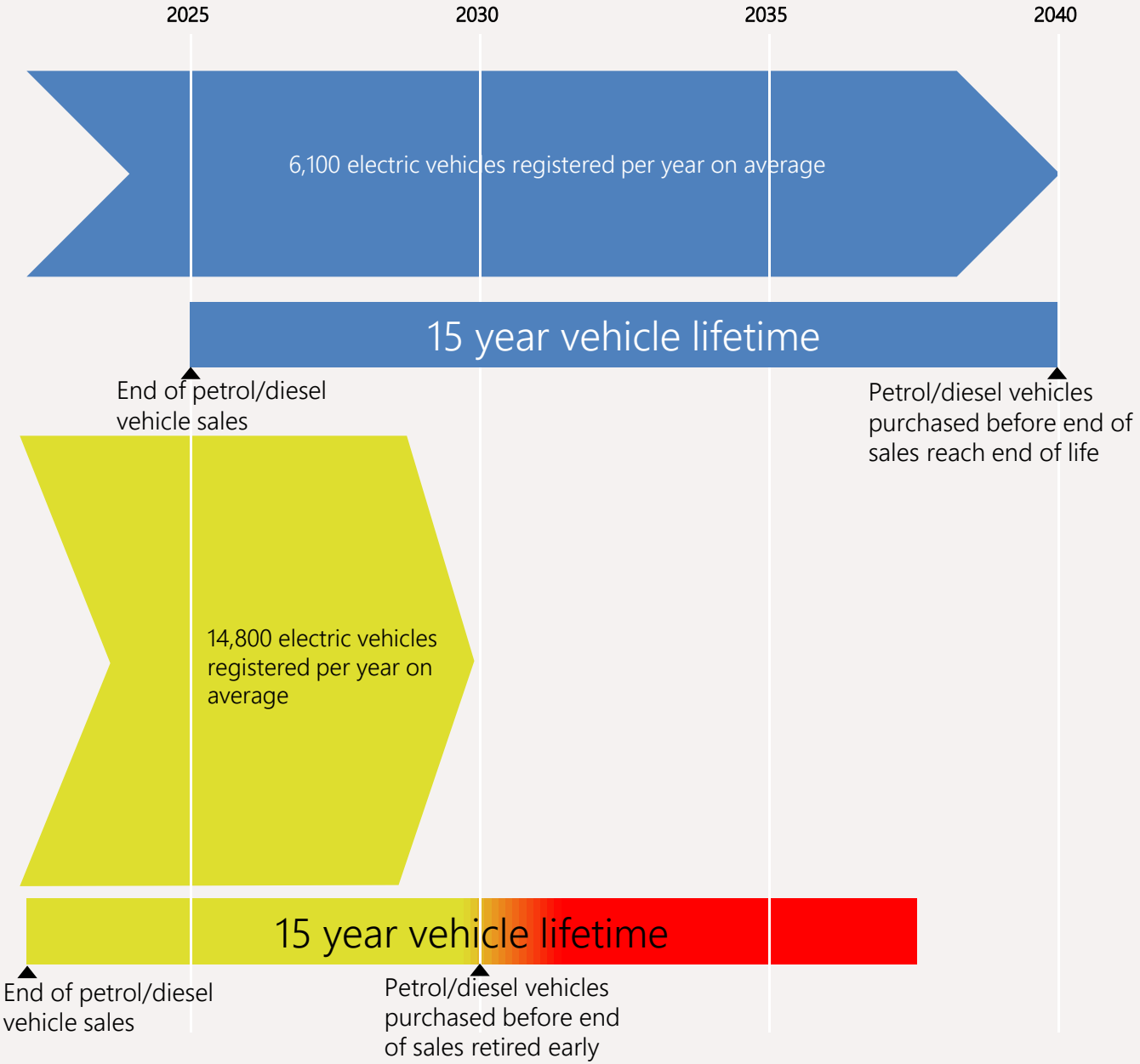
Cars and Vans

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

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

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

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



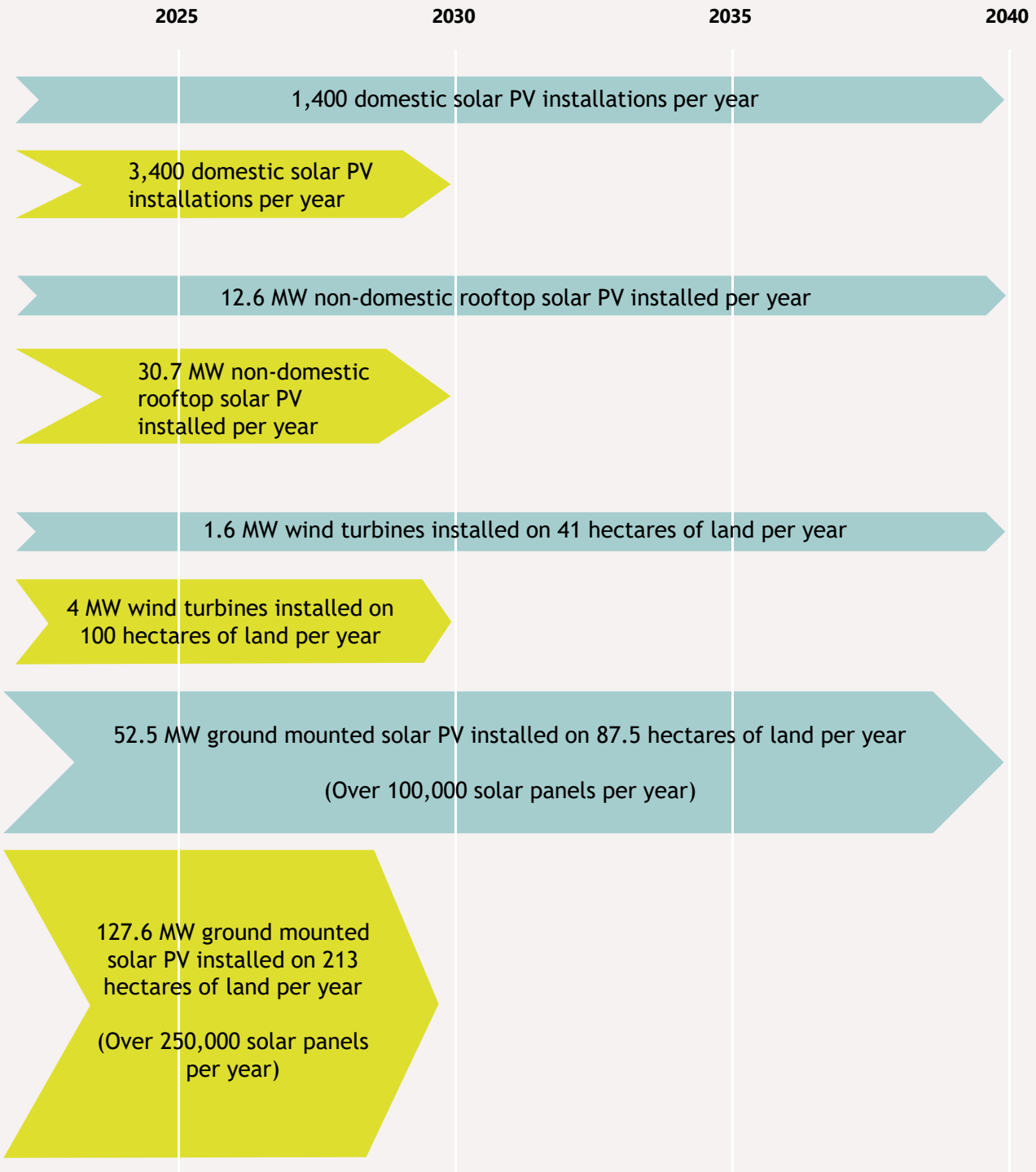
* https://www.gov.uk/government/news/quick-off-the-spark-electric-vehicle-sales-continue-to-soar-in-green-revolution
** https://www.thisismoney.co.uk/money/cars/article-8600251/Hybrid-BMWs-automatically-switch-electric-mode-low-emission-zones.html

Local Generation

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

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

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



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

Networks

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

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