

# Net Zero Energy Strategy

Outlining Hackney Council's path  
to net zero by 2040



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# Executive summary

**Hackney Council recently declared a Climate Emergency, in which they ‘Pledge to do everything within the Council’s power to deliver... across the local authority’s full range of functions... a 45% reduction in emissions against 2010 levels by 2030 and net zero emissions by 2040...’**

This document provides a Net Zero Energy Strategy for the management of the Council assets that aligns with the Climate Emergency Declaration. It identifies the key carbon footprints resulting from the Council activities and influence, with a baseline model of the current footprint of that portfolio. Policy levers and intervention opportunities are then highlighted and modelled, with costing and monitoring options outlined. The suggested interventions aim to balance the feasibility of implementation with the severity of the climate crisis we face.

Several core strategic areas are identified:



**Monitoring and tracking** systems will be established to ensure that objectives are met and the strategy can remain flexible to the rapidly changing situation we are facing. This will include better data collection and intelligence.



**There is a policy and funding gap** between the intention to move to net zero carbon and current asset management strategies.



**Energy efficiency and renewable generation** are a central part of the strategy. All Tier 1 and 2 opportunities for solar PV will be bought forward for feasibility and installation. A fabric first and retrofit approach will be taken to upgrading buildings.



**Fuel switching should be trialled immediately.** All planned boiler replacements should consider the feasibility of hydrogen or electrification. After 2025 gas boilers should only be purchased in exceptional circumstance.



**Electrical infrastructure:** the electricity grid is becoming progressively cleaner as the provision of renewables increases. The technologies that are needed to support electrification include electric vehicle charging infrastructure, increased supply and distribution capacity, and new ways to share energy locally (smart grids) and shift times of energy demand (demand management). This will help manage energy and reduce peak demand.



**A Power Purchase Agreement should be agreed.** Net zero emissions from electricity consumption can only be achieved where there is investment in additional renewables infrastructure which is not included in grid carbon calculations. A properly negotiated PPA will help to strengthen UK renewable electricity infrastructure.



**Embodied carbon is important and difficult to reduce.** Embodied carbon from construction could make up the majority of remaining emissions in the Hackney Council portfolio. While best practice industry targets to reduce the embodied energy of construction should be met, this footprint will require some offsetting after 2040.

## Typical measures that are needed

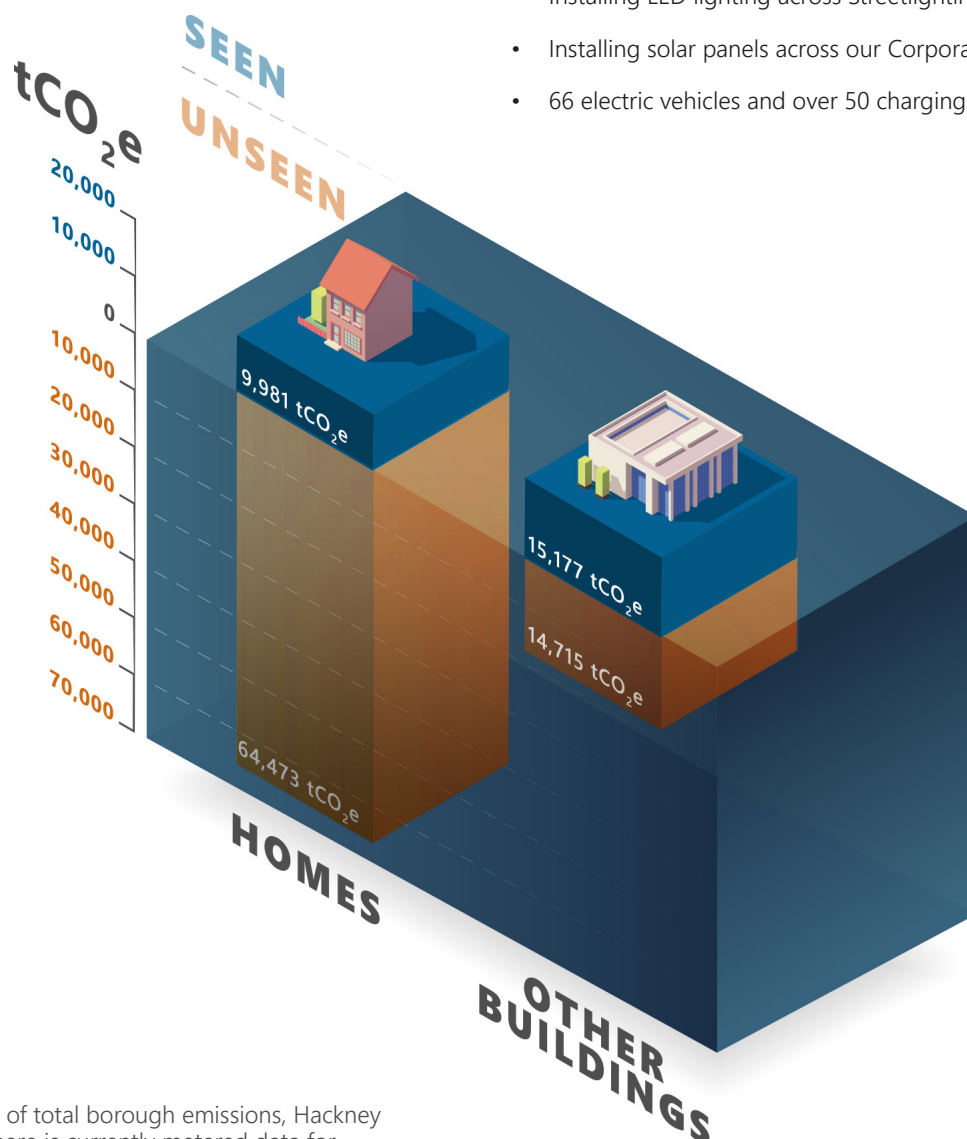
The key challenge in the Strategy is the diversity of the Hackney Council building stock. Buildings in the Council portfolio have varying ages, utilise different heat sources, and have different levels of fabric efficiency. They also have varying models of ownership and maintenance responsibility.

The measures modelled will be developed further to suit these various arrangements. The examples on the next page give a taste of how different energy reduction measures included in this strategy may be applied to different building stock, with approximate costs, and indicative carbon savings achieved. Note direct analyses of each building was not undertaken but these examples use indicative data derived from the carbon modelling.

Achievements so far:

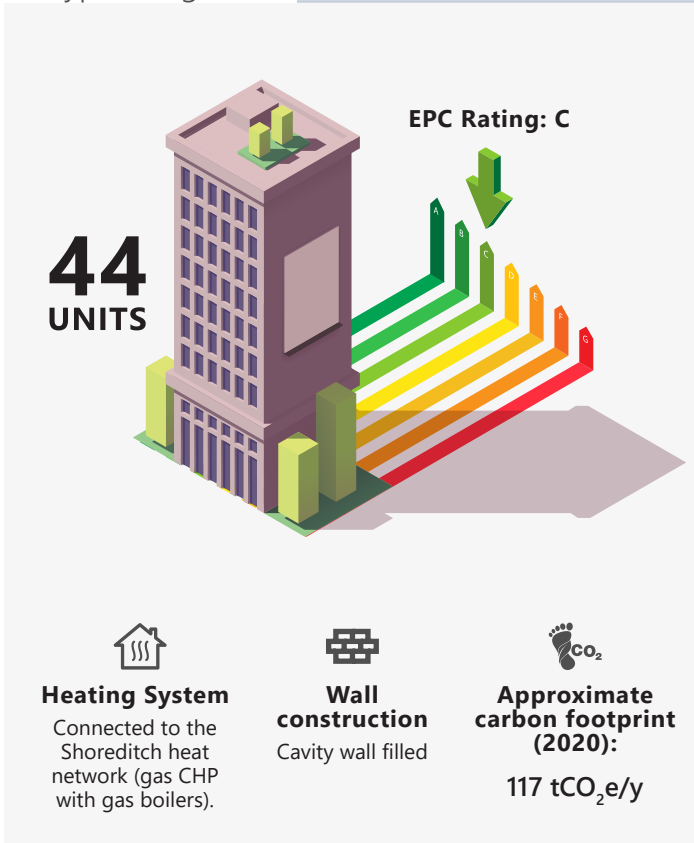
Implementing various improvements to the Council's Estate through LED light fittings and other energy efficiency savings.

- Purchase of renewable energy
- Installing LED lighting across Streetlighting
- Installing solar panels across our Corporate building
- 66 electric vehicles and over 50 charging points

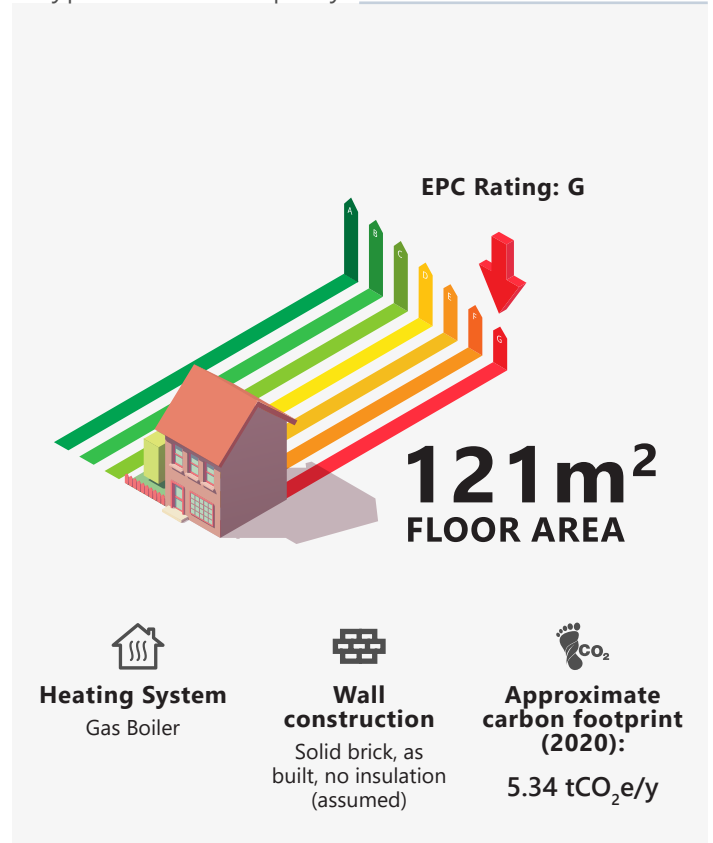


**Figure 1-1**  
Relative emissions of total borough emissions, Hackney assets and what there is currently metered data for.

Typical High Rise

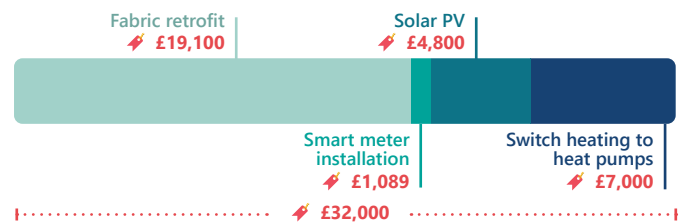
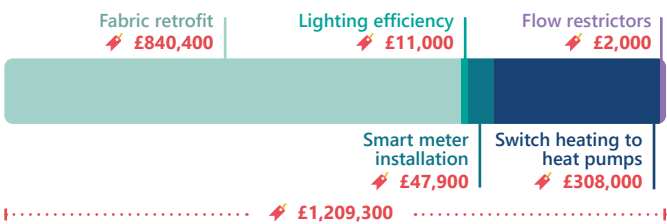


Typical Street Property



Route to Net Zero

Measures and Costs



Typical issues to resolve include:

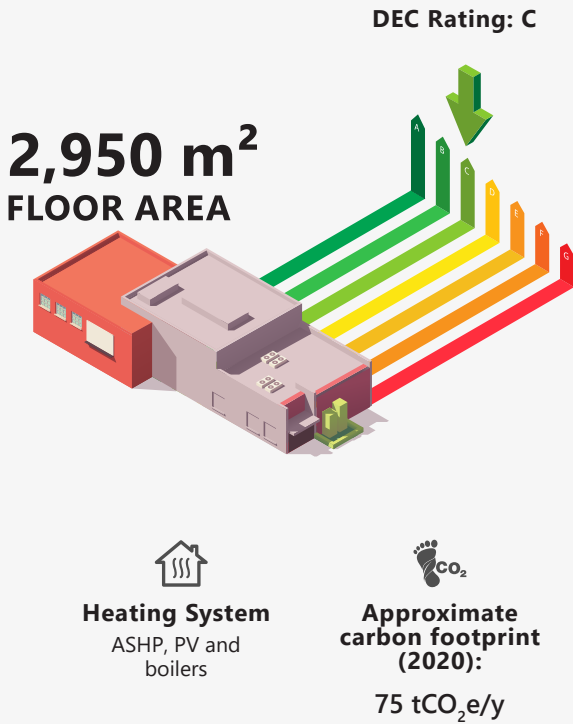
- ! Is there space and structural capacity to support heat pumps and heat rejection
- ! Works or upgrades required in privately owned flats
- ! Hackney is responsible for maintenance and upkeep of systems but only pays energy bills for communal systems
- ! Split of responsibility between Hackney and private leasehold owners is complex
- ! Challenges of wall insulation, such as fire safety, managing thermal bridges, and moisture control

Typical issues to resolve include:

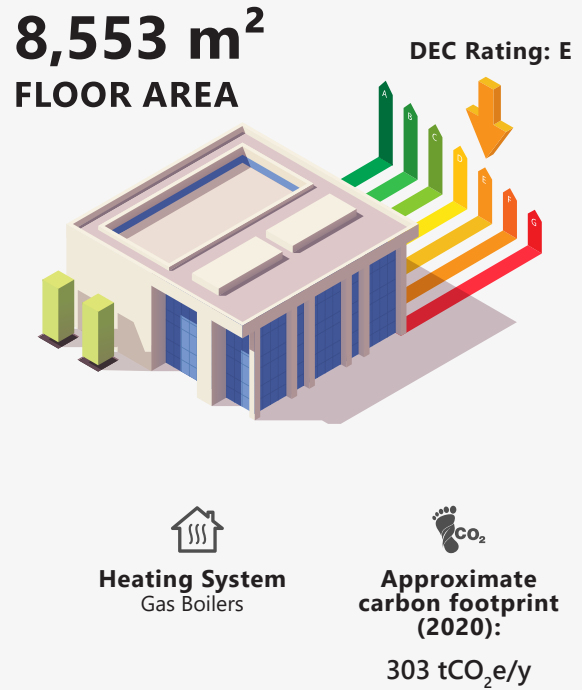
- ! Challenges of wall insulation, such as effect on period features, managing thermal bridges, and moisture control
- ! Adapting radiators and pipework to low temperature heating system
- ! Access to tenant spaces
- ! Hackney is responsible for maintenance and upkeep of systems but does not pay energy bills

Figure 1-2 Typical measures for Hackney Homes.

Thomas Fairchild Community School  
Hoxton School

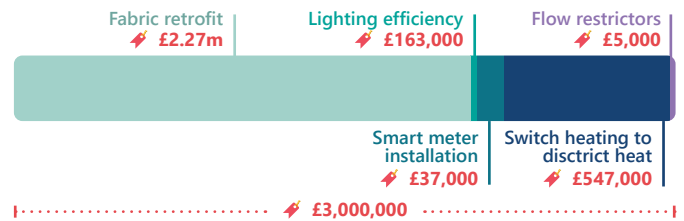


Hackney Town Hall  
Hackney Central Offices and public spaces



Route to Net Zero

Measure and Cost



Typical issues to resolve include:

- ! Is there space and structural capacity to support heat pumps and heat rejection
- ! Some schools and leisure centres are not currently part of Hackney energy purchasing scheme nor does Hackney have responsibility for maintenance. However, these buildings could revert back to Hackney responsibility before 2040
- ! Buildings older than Thomas Fairchild Community School are less likely to be suitable for switching from gas boilers to Net Zero Energy heat sources such as heat pumps without complementary fabric retrofit measures

Typical issues to resolve include:

- ! Connection to local heat network
- ! Long term carbon content of district heating network (heat networks currently operating with gas CHP and boilers will need to switch away from fossil fuels)

Figure 1-2 cont. Typical measures for Hackney Homes.

## Net Zero Energy Strategy

**The Hackney Council Energy Strategy covers homes, other buildings, the Hackney Council vehicle fleet and future new builds in the borough.**

Hackney currently purchases 125 GWh/y of gas and electricity. This covers the communal energy for 3,700 homes (communal boilers and electricity in communal areas) and all the energy for 379,000 m<sup>2</sup> of non-residential buildings. However, it is responsible for the maintenance and installation of a further 25,600 homes and 308,000m<sup>2</sup> of non-residential. It owns the freehold for a further 1,500 homes. This means that the capital expenditure for energy savings measures will be large compared to the cost savings. Further to this, there are challenges as buildings move between ownership regimes and approaches to energy procurement. The strategy must be robust enough to stand up to scrutiny but flexible enough to allow for these changes to occur. The building stock scope and key management requirements under the **Net Zero Energy Strategy** are summarised in Table 1—1.

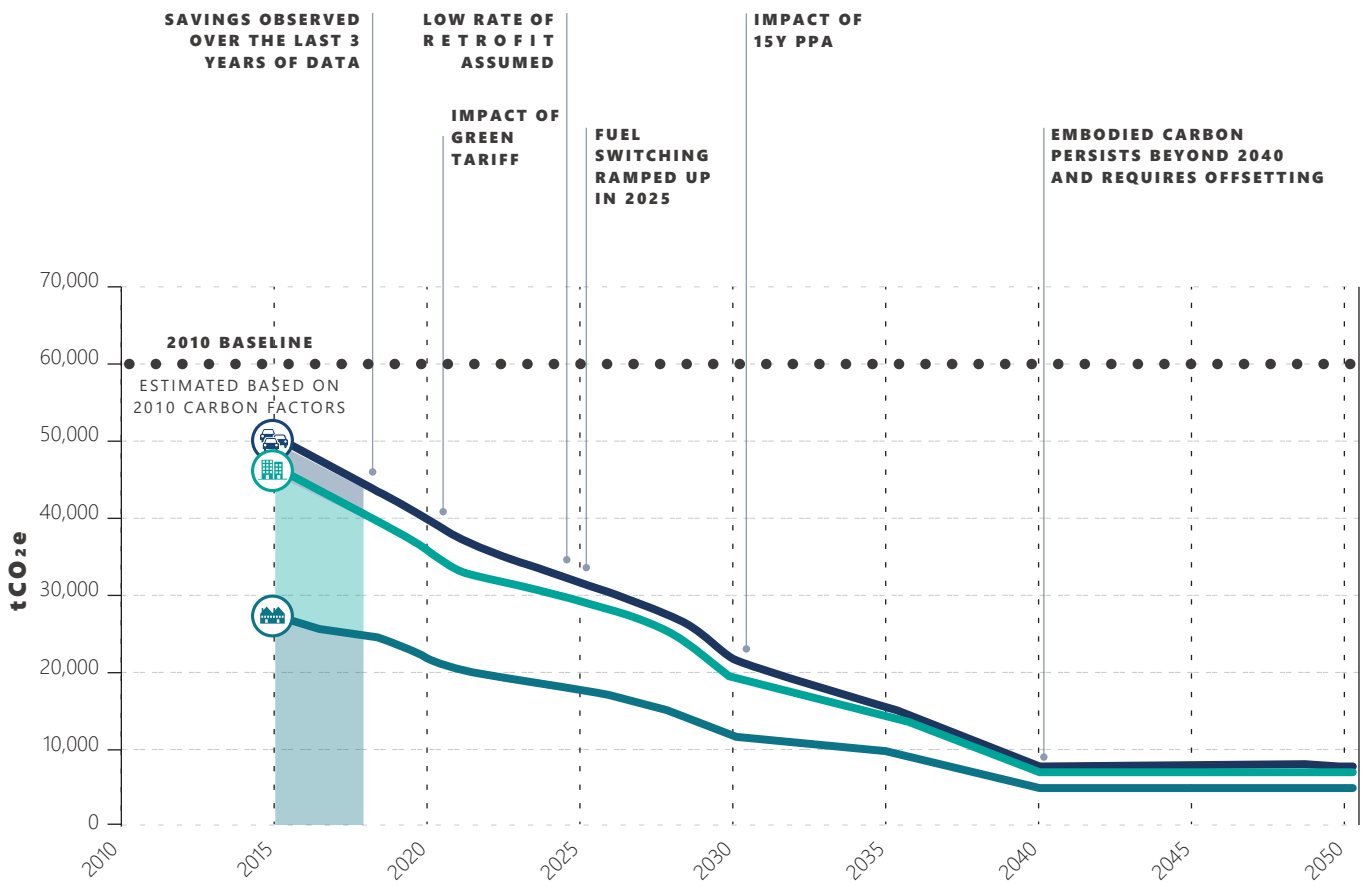
**Table 1-1**

Summary of Hackney Energy Strategy scope and key outcomes

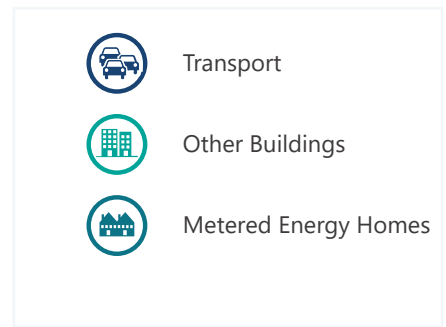
	Homes	All other buildings	Transport
Hackney are responsible for some energy purchasing	~3,700 homes	~379,000m <sup>2</sup>	480 vehicles
Hackney have some ownership and maintenance responsibility	~27,100 homes <i>of which: 25,600 homes leasehold/tenanted 1,500 homes freehold</i>	~687,000m <sup>2</sup> <i>43% office spaces 21% cultural 12% schools 7% public buildings</i>	480 vehicles <i>78 cars 378 LCVs 24 HGVs + business travel</i>
Target fabric retrofit by 2040 (across metered and unmetered)	9,078	206,000m <sup>2</sup>	NA
Target moved away from fossil fuel by 2040	All	All	All cars and majority of LGVs
Estimated capital cost of all measures (metered and unmetered)	£430m	£147m	£42m
Potential Revenue from heat as a service and RHI	£450,000	£70,000	NA
Annual fuel saving compared to Business As usual (metered)	£900,000	£800,000	NA
Emissions in 2020 (metered)	19,000 tCO <sub>2</sub> e	13,400 tCO <sub>2</sub> e	2,844 tCO <sub>2</sub> e
Emissions in 2040 (metered)	4,700 tCO <sub>2</sub> e	2,400 tCO <sub>2</sub> e	700 tCO <sub>2</sub> e
New development by 2040	4,000 new homes	100,000 m <sup>2</sup>	Net decrease in fleet size
Predicted embodied emissions in 2040	4,000 tCO <sub>2</sub> e	1,800 tCO <sub>2</sub> e	200 tCO <sub>2</sub> e

# Route to Net Zero Carbon 2040

Achieving Net Zero Carbon by 2040 is challenging and many of the required actions are not yet ready to be rolled out en masse, neither is all the funding in place. Figure 1-3 and Table 1-2 show the measures modelled and their impact.



**Figure 1-3**  
The Hackney net zero carbon pathway (based on energy data currently collected by Hackney).



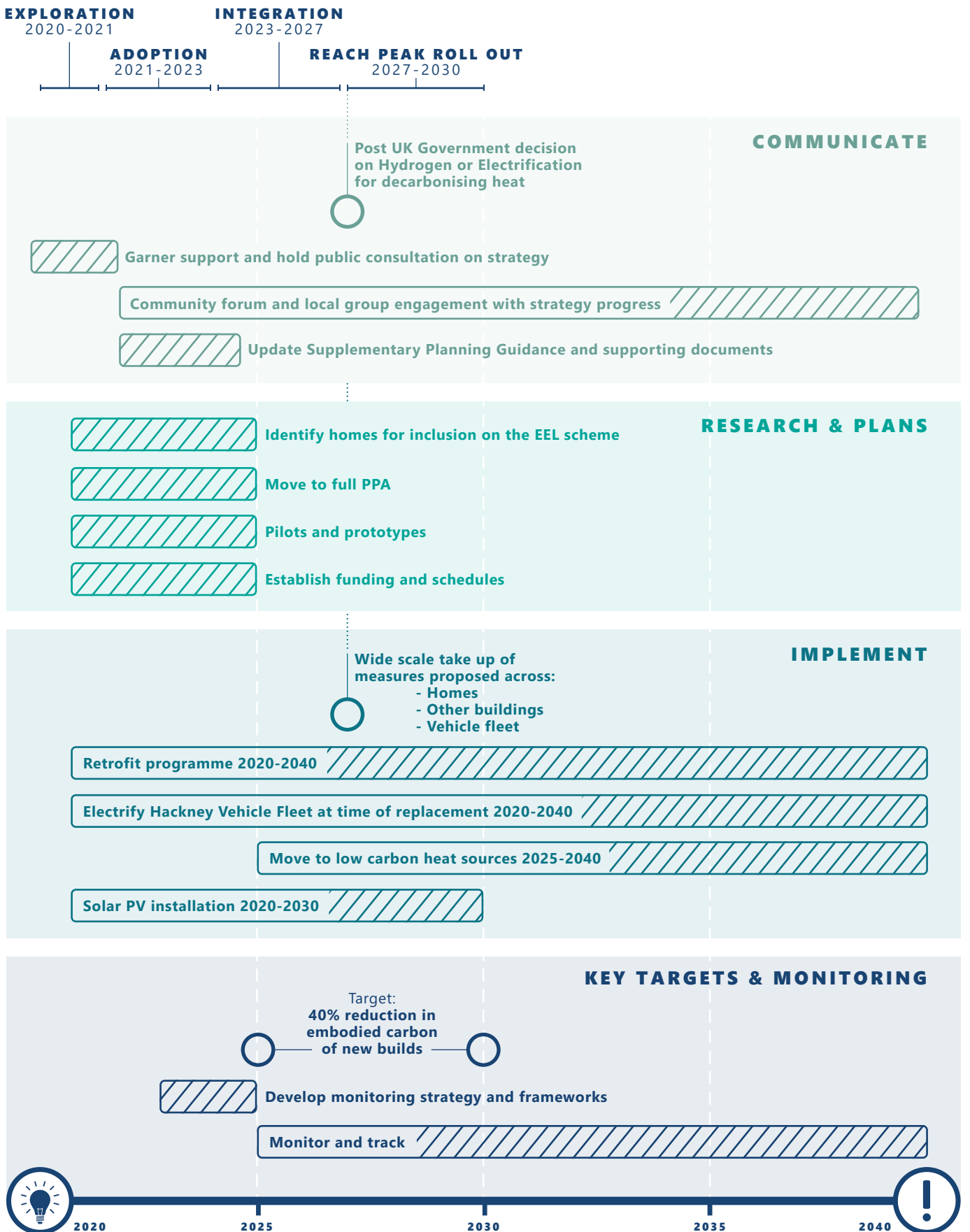


Applying these measures allows Hackney Council to achieve an 87% reduction in their carbon portfolio by 2040 compared to a 2010 baseline, before offsetting is considered. This includes the embodied emissions of new builds. The strategy also has potential co-benefits, it is important these are realised:

- Reduced fuel poverty – improved efficiency of the building stock, solar PV and demand management measures will reduce fuel costs for tenants and the council. It is important that reductions in energy demand offset increases in energy cost.
- Reduced local air pollution through the removal of fossil-fuel combustion, such as gas boilers and gas powered CHP.
- Increased national investment into renewable technology through a Power Purchase Agreement
- Reduction in hot water heating demand will also reduce water usage, a crucial aim of the London Plan.
- This strategy can unlock a green recovery directing investment into small local businesses

<b>Emissions before offsetting and after accounting for Clean Electricity purchasing</b>					
<b>tCO<sub>2</sub></b>					
	<b>2010 Baseline</b>	<b>2016</b>	<b>2019</b>	<b>2040</b>	
<b>Scope 1 (Vehicle fuel &amp; gas)</b>	<b>15,576</b>	<b>17,055</b>	<b>17,601</b>	<b>190</b>	
<b>Scope 2 (Electricity)</b>	<b>26,643</b>	<b>15,464</b>	<b>6,828</b>	<b>1,345</b>	
<b>Scope 3 (Embodied carbon)</b>	<b>16,506</b>	<b>16,733</b>	<b>16,733</b>	<b>5,983</b>	
<b>Scope 3 (Staff travel)</b>	<b>724</b>	<b>724</b>	<b>724</b>	<b>241</b>	
<b>Scope 3 (Unseen energy)</b>	<b>132,131</b>	<b>100,806</b>	<b>77,348</b>	<b>4,163</b>	<i>Systems upgrades included in cost estimates</i>

**Table 1-2**  
Summary of Hackney emissions and their scope. Pathway excludes the unseen energy.



**Figure 1-4**  
Key timeline for the Green Energy Strategy implementation

## Risks and Opportunities

Buro Happold have modelled the energy demand and carbon emissions of Hackney assets to 2050. We have shown that it is possible to achieve a 66% reduction in carbon by 2030 and to be net zero carbon by 2040. However, these are challenging targets.



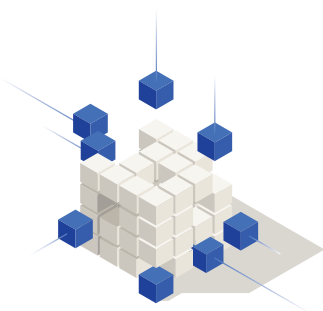
### A complex portfolio

The Hackney Energy Strategy covers a diverse building stock, with varying tenancy types, building types and usage patterns. As new buildings are developed and tenancy type changes, buildings are likely to move in and out of scope of this strategy. Hackney Council must take responsibility for the decarbonisation for buildings where they have operational influence and control.



### Fuel switching

To achieve net zero it is imperative that fossil fuels are phased out. However, how this is achieved will be highly influenced by the government Heat Policy Roadmap, which has not been released at the time of writing. This means that the suitability of different technologies may change. As such electrical and heat pump technology are suggested at present as proven and feasible options, but other technologies, such as Hydrogen, should be piloted to understand their suitability.



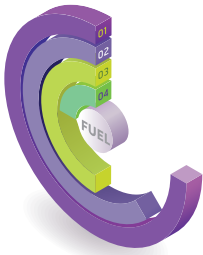
### Using data to deliver effectively

This strategy is underpinned by a number of assumptions about how energy is being used in the Hackney Council building stock. It is necessary to collect supporting data from the same buildings to build up a more nuanced picture of how emissions can be reduced and identify which buildings are highest priority.



### Green tariffs

By 2025 Hackney should move to long term power purchase agreements to encourage long term investment in renewables. This will enable the energy purchased to be reported as zero carbon. Currently Hackney purchases REGO backed Green Energy, this has been modelled using a reduced but not zero carbon emissions.



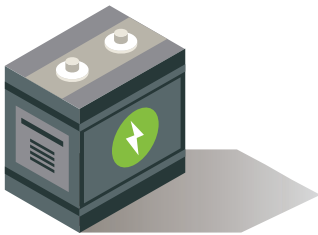
### Increasing fuel costs

The price of gas is expected to increase driving the search for affordable alternatives.



### Embodied carbon

The Hackney Green Energy Strategy includes embodied carbon from its vehicle fleet and future building. Scoping in embodied carbon is a bold step; it signals that Hackney is willing to tackle the significant emissions from consumption, and in particular development. It aligns with the increased emphasis put on Life Cycle Assessment (LCA) and the circular economy by the New Draft London Plan. However, by 2040 embodied emissions could be the only remaining significant emissions from Hackney Council operations. Offsetting these emissions could cost around £750,000 per year, and even to achieve these levels of embodied carbon will require design that will strongly reduce embodied energy of new builds on today's levels in line with industry net zero guidance.



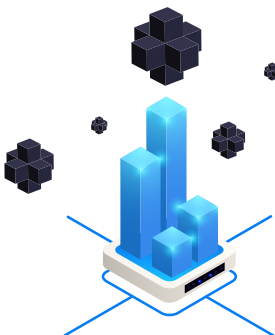
### Grid decarbonisation

The electricity grid is becoming progressively cleaner as the provision of renewables increases. Because renewables are intermittent, there is a greater need for local batteries, smart grids and smart meters to manage energy demand and reduce peak demand. The technologies that are needed to support electrification include electric vehicle charging infrastructure, increased supply and distribution capacity and new ways to share energy locally (smart grids) and shift times of energy demand (demand management).



### Equity and inclusivity

It is important that everyone has the correct resources to ensure they have the capacity to act. This could mean that training and other support is targeted at hard-to-reach groups and those who are adversely impacted by the proposed measures e.g. higher costs of electrified heating;



### Move beyond carbon as a metric

As systems become decarbonised there is potential for skewed priorities. For example, as electricity becomes 100% renewable, efficiency appears less important. This ignores co-benefits, such as reduced pollution, reduced fuel poverty and overall health of the population. Therefore, additional metrics should be developed to track progress towards goals. These should be arranged in three tiers:

- **Tier 1: carbon emissions (CO<sub>2</sub>e);**
- **Tier 2: co-benefits:** such as reduced congestion, reduced energy costs, air quality, prevalence of childhood obesity;
- **Tier 3: actions:** that are believed to lead to the desired outcomes and climate change mitigation. For example, number of bicycle racks installed or the number of buildings refurbished.

## Governance

The chosen oversight mechanisms are presented in Table 1—3. These are structured around the core areas of: evaluating strategy, tracking progress and oversight. The mechanisms listed have been selected through a review of a shortlist of typical oversight and monitoring measures which were assessed for their impact and relevance to this scheme, as summarised below. The chosen options were selected in preference to relying on Commissions, Carbon Budgets, BEIS data tracking or an Internal Support Team.

Area	Mechanism	Details
<b>Evaluating Strategy</b>	<b>Community forum</b>	Stakeholder and community engagement at an early stage is essential to drive innovation, to engage with those who will be affected by the scheme.
<b>Tracking Progress</b>	<b>Key Performance Indicator framework</b>	A thorough KPI framework that accommodates both the technical and qualitative metrics covered in the strategy will help the oversight and accountability teams drive the work. This will be a more effective option than carbon budgets or BEIS tracking as it will be better able to accommodate the complexity and diverse emissions categories that Hackney are responsible for.
	<b>Technical Progress</b>	Many of the recommended actions and focus areas in this strategy are linked to distinct structural changes and physical interventions. Measuring and tracking the physical interventions and measurable changes to the council portfolio will provide a data-driven approach to monitoring the Energy Strategy implementation.
<b>Oversight and Accountability</b>	<b>Steering Group</b>	A steering group, such as the Environmental Sustainability Board, should provide the internal expertise and authority to drive the project and retain focus on the necessity of acting on the Hackney Council Climate Emergency declaration.
	<b>Departmental Responsibilities</b>	It is essential that actions are fully integrated into existing departmental responsibilities to draw on staff expertise and to ensure that workstreams align with cross-cutting council work and priorities. Hackney should build on existing personnel so that every department has a sponsor and a champion to drive change.

**Table 1-3**  
Governance approaches to oversee the Hackney Net Zero Energy Strategy.

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## Glossary

Term	Definition
ASHP	Air Source Heat Pump
BLE	Bakerloo Line Extension
DSR	Demand Side Response
EE	Energy Efficiency
EPC	Energy Performance Certificate
EV	Electric Vehicle
Fabric retrofit	Wall insulation plus additional minor energy improvements
GLA	Greater London Authority
GSHP	Ground Source Heat Pump
HaaS	Heat As a Service
LSOA	Lower Layer Super Output Area
LZC	Low/Net zero carbon
P2P	Peer to Peer
PV	Photovoltaics
Retrofit	Installation of energy improvements on an existing asset
Unseen energy	Energy that is used by buildings owned and/or maintained by Hackney where Hackney do not pay directly for the energy and therefore do not know the amount of energy consumed.
V2G	Vehicle to Grid
VPP	Virtual Power Plant

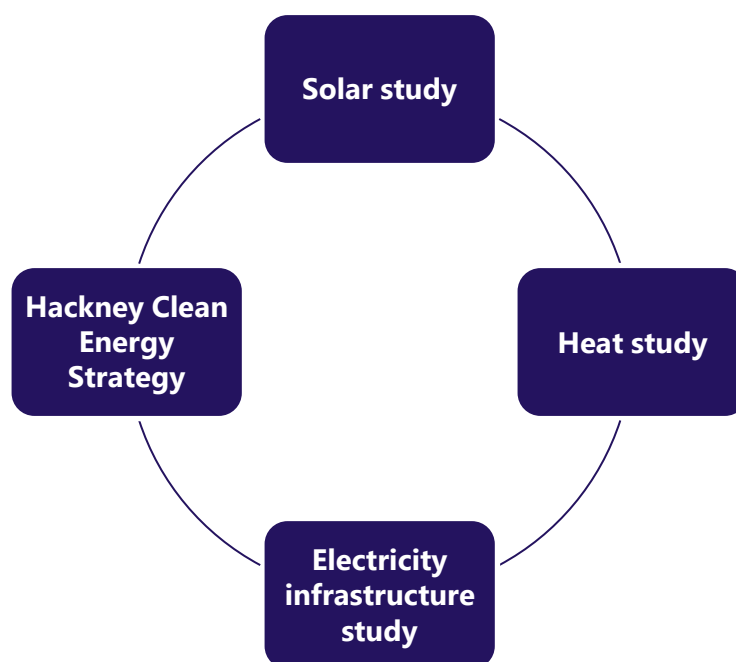


# 1 Introduction

This document outlines the core findings with regards to the development of the Hackney Council Net Zero Carbon Energy Strategy. This was one element of a four-part series of reviews by Hackney Council to better understand its abilities to positively influence its emissions and renewables capacity (Figure 1—1). The development of the Net Zero Energy Strategy took place in two parts.

Phase 1 identified which carbon emissions should be included in the net zero carbon target set by the London Borough of Hackney and outlined a preliminary model for pathways for reduction for the Council's own assets and developments. This is described in Section 2.

Phase 2 of the project carried out further analysis using this model to identify key policies to achieve net zero carbon. This model is based on records of energy currently purchased by the Council, though results are intended to apply to the full Council building stock. A costing assessment for the full building stock was also completed, with recommendations made for monitoring and oversight mechanisms. These findings form the contents of this document.



**Figure 1—1: Hackney Council energy and net zero reviews in 2020**

## 2 Scope

In phase one, a scoping exercise for the Net Zero Carbon Energy Strategy was carried out. This assessed a longlist scope of emissions categories that could be included in the study. The following sections detail the key findings of the scoping exercise. This strategy is focussed on where the Council can have the biggest impact in terms of size of emissions, capacity to influence those emissions and ability to measure and verify emissions reductions.

### 2.1 Background and governmental guidance

The Council climate emergency declaration included the resolution to *'do everything within our power to deliver against the targets set by the IPCC's October 2018 1.50C report, across our functions (including a 45% reduction in emissions against 2010 levels by 2030 and net zero emissions by 2040), and seek opportunities to make a greater contribution.'*

Government reporting guidelines request that Local Authorities measure and report GHG emissions from their own estate and operations.<sup>1</sup> This includes all sources of environmental impact over which the organisation has operational control, or 'full authority to introduce and implement its operating policies'. There is otherwise no fixed framework under which Hackney Council must declare its emissions, so the Phase 1 scoping exercise was carried out in the interest of better defining the organisational boundary.

### 2.2 Scope

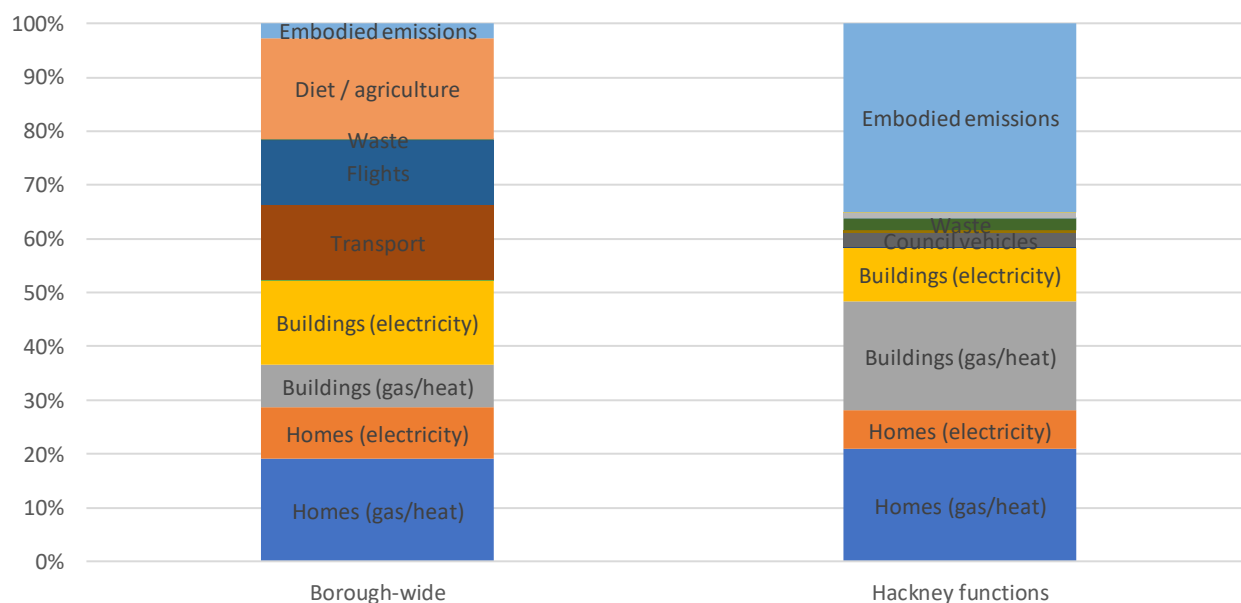
The scoping review was carried out by reviewing relevant emissions areas and reporting frameworks to highlight key areas of focus. These were then analysed for inclusion against a broad range of criteria, including relative emissions magnitude, power to influence, alignment to reporting frameworks.

A baseline scenario was modelled for the Council, this includes a model of Hackney Council Asset consumption, borough-wide emissions data for 2018, and a preliminary assessment of the embodied energy of buildings and Council vehicles. Figure 2—1 shows the Hackney Council emissions baseline. This indicates that emissions from building operation and construction make up the biggest contribution to the carbon footprint. A number of emissions that have their environmental impact tracked elsewhere and their carbon emissions are small, were excluded. Environmental impacts such as biodiversity, waste, transport and water are important for reasons beyond their carbon emissions and are covered under other strategic documents which form part of the overarching Climate Change Strategy. The Council data set shows some parallels with the borough-wide emissions, with gas and electricity use making up the majority of emissions. Transport makes up a larger proportion of borough wide emissions than for the Council inventory, since the latter only covers staff commuting and the Council vehicle fleet (assumed ~200

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<sup>1</sup> HM Government, 2019. Environmental Reporting Guidelines. Available online.

vehicles). The inclusion of embodied carbon is an important step of holding the Council to account for the emissions associated with development. For reference, the energy consumption of the Hackney buildings has been estimated where the Council is not currently responsible for billing (unseen energy) but is responsible for property maintenance and/or improvements and this is accounted for in Scope 3 emissions (Table 2—2)<sup>2</sup>. The final scope selected (Table 2-1) was then tested using a SWOT analysis and checked for alignment with GLA Net zero carbon pathways and ISO50001.



**Figure 2—1: Comparison of data for borough wide and Hackney functions.**

**Table 2-1: Scope of the Hackney Low Carbon Strategy, with omitted emissions struck off.**

Core categories with established data	Emerging categories	Low emissions and tracked elsewhere
Homes where Council buys energy	Embodied energy buildings	Staff commute
Other buildings where Council buys energy	Council vehicles	Waste
Renewable energy	Flights	Water
	Diet / agriculture	
	Products and services	
	Land use	

<sup>2</sup> Unseen energy is the energy that is used by buildings owned and/or maintained by Hackney where Hackney do not pay directly for the energy and therefore do not know the amount of energy consumed.

**Table 2—2: Summary of Hackney emissions and scopes.**

	Emissions before offsetting and after accounting for Clean Electricity purchasing			
	tCO <sub>2</sub>			
	2010 Baseline	2016	2019	2040
<b>Scope 1 (Vehicle fuel &amp; gas)</b>	15,576	17,055	17,601	190
<b>Scope 2 (Electricity)</b>	26,643	15,464	6,828	1,345
<b>Scope 3 (Embodied carbon)</b>	16,506	16,733	16,733	5,983
<b>Scope 3 (Staff travel)</b>	724	724	724	241
<b>Scope 3 (Unseen energy)</b>	132,131	100,806	77,348	4,163

### 2.3 Issues of ownership, responsibility and visibility of emissions

The question of ownership and responsibility is complex: heating infrastructure is provided by the Council (Scope 3), for example, while tenants are responsible for actual heat consumption (Scope 1 or 2). The final emissions categories selected were all emissions for which Hackney Council are directly responsible for use, management or installation, as per Section 2.1, the included Scope 3 emissions cover those areas where we have some influence. This breakdown is shown in Table 2-1. Key issue is to what degree can the Council know what the emissions are and to what degree can the Council control and reduce those emissions, how some of these factors relate to the Hackney Council buildings is summarised in Table 2—4. This driven by a number of underlying factors:

- Who owns freehold and leasehold?
- Who is responsible for specifying and maintaining building fabric and energy systems?
- Who occupies the building?
- Who pays for the energy?

It should be stressed that the Council plays a key role in supporting other groups with many of the emissions excluded from this strategy. An example is private tenants or tenants with private heating systems within Council buildings. The Council is responsible for retrofit of the building fabric for these tenants, and therefore still has some influence on their emissions. The broader influence of the Council in implementing this strategy is also explored in Appendix C.

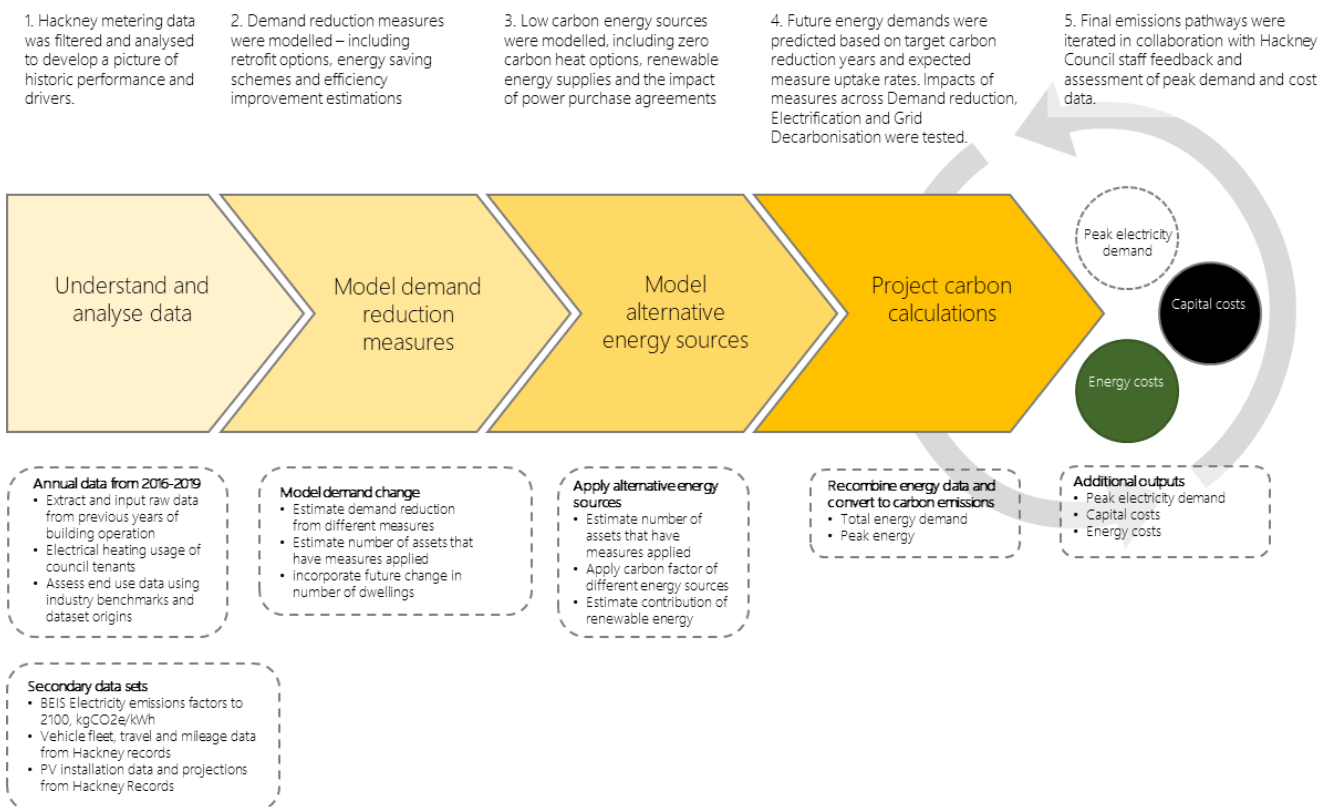
**Table 2—4: Complex ownership situations summarised.**

<b>Common issue</b>	<b>Description</b>	<b>Approach to scoping</b>
<b>Freehold ownership (gas &amp; electricity properties)</b>	The owner occupier pays for energy and is responsible for maintenance and operation of the energy systems. Hackney is responsible for the building fabric	The energy data for these buildings is not seen by Hackney therefore these buildings are excluded from the modelled energy consumption and identified in Scope 3  However, the uptake rates and capital expenditure include these properties because Hackney has responsibility for maintenance.
<b>Tenanted buildings (gas &amp; electricity properties)</b>	The tenant pays for energy but Hackney is responsible for maintenance and operation of the energy systems	
<b>Freehold ownership (communal boilers)</b>	The owner occupier pays for energy. Responsibility for maintenance and operation of the energy systems can be the owner or Hackney. Hackney is responsible for the building fabric	Communal heating is included in the energy model because it is wholly the responsibility of Hackney and Hackney pay for the cost of heat production.
<b>Tenanted buildings (communal boilers)</b>	The tenant pays for energy but Hackney is responsible for maintenance and operation of the energy systems.	
<b>Leisure centres</b>	Buildings owned by Hackney but operated & maintained by a contracted company. At some point these building could revert back to Hackney in terms of maintenance responsibility or become part of the energy purchasing scheme.	These buildings are excluded from the modelled energy consumption.  However, the uptake rates and capital expenditure include these properties because Hackney has responsibility for maintenance.
<b>Schools</b>	Hackney is responsible for the property, maintenance and energy systems of some Schools. Some schools are not part of the Hackney energy purchasing scheme and the Council has limited visibility of their consumption data.	Where Schools are not included in energy modelling, they have been included in predicted capital expenditure.

### 3 Modelling methodology

To identify key policies and options for Hackney Council to achieve zero emissions from its portfolio, a net zero carbon pathway model was built. This is based on the energy and building data available, therefore, the model focuses on the metered buildings. Where cost estimates have been made these are based on all the assets that Hackney own or have responsibility for. The model extends to 2050 and models a variety of policies and management options that could be implemented to alter its carbon footprint.

The net zero carbon model was based on the data currently collected by The Council e.g. those areas for which Hackney are responsible for some energy purchasing. This means the energy model shows a sample of the full Council portfolio. The use of this sample demonstrates the policy levers and strategies required to bring the full portfolio to net zero. The cost and peak demand models look at the full cost and demand implication of the entire Council building stock.



**Figure 3—1: Energy modelling methodology.**

Figure 3—1 provides a summary of the energy modelling process used to interrogate the end use and demand profile of The Council energy scope. Input data collected by The Council was assessed to establish current patterns of energy use. A baseline was then built which adjusted these demand patterns according to future projections of carbon

intensity of power networks and the addition of new homes and other buildings. Options for energy reduction measures were then tested to develop emissions trajectories.

The energy reduction measures modelled are shown in Table 3-1. These include demand reduction measures – such as retrofit and improved device efficiency – and major policy changes – such as changes to electricity purchasing, participation in the Mayor of London Extended Energy Leap programme and changes to heating systems.

**Table 3-1: Energy reduction measures modelled in the Net zero carbon pathways.**

Area	Measures	Application of measure to homes	Application of measure to other buildings	Application of measure to Council transport
Demand reduction	Fabric retrofit	30% of properties	30% of properties	
	Smart meter installation	100% of properties	100% of properties	
	Behaviour change	25% of properties	25% of properties	
	Lighting efficiency improvements	75% of properties	80% of properties	
	Appliance efficiency improvements		50% of properties	
	Building systems and cooling improvements		20% of properties	
	Hot water flow restrictors	75% of properties	75% of properties	
	Extended Energy Leap conversion	2% of properties		
Energy supply	Net zero carbon heat	All gas boilers across all assets switched to electrical sources or heat pumps		
	Green tariff	Negotiate PPA covering at least 50% of electricity data		
	Local renewable generation – PV	4 MWp installed across homes [2,000 x 2 kWp units]	2 MWp across other buildings [200 x 10 kWp units]	
Embodied carbon	Embodied carbon targets	LETI benchmarks required in all new builds across asset portfolio		20% reduction in fleet size
Transport	Vehicle fleet electrification and reduction			All new vehicles transferred to electric equivalents where possible

## 4 Summary modelling results

Net zero carbon is achievable but there is a policy gap that must be addressed to meet the level of retrofit and technology uptake required. Figure 4—1 shows the emissions pathway for Council assets to 2050, annotated with some of the key levers included in the pathways model; these are discussed in the following sections. Key results include a sharp reduction in emissions at 2019 due to implementation of green tariffs and some contribution from demand reduction roll-outs. At 2025 there is then a rapid decrease in emissions as low carbon heat plans are rolled out en masse and a green electricity purchase agreement is arranged.

Taken together, a 66% reduction in emissions by 2030 is achieved, and the portfolio is fossil fuel free by 2040, moving all heating away from natural gas. A 100% reduction in emissions by 2040 is challenging due to embodied carbon and remaining grid carbon mix, leaving residual emissions at 2040 of ~7,800 tonnes CO<sub>2</sub>.

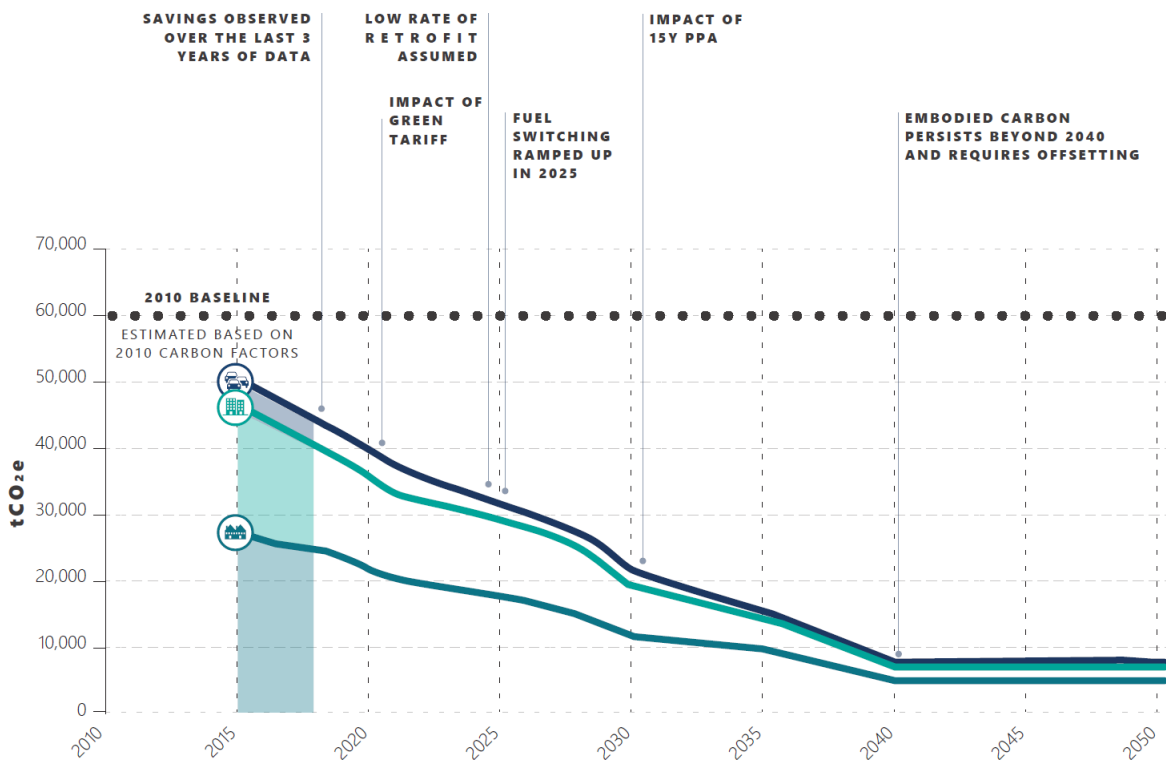
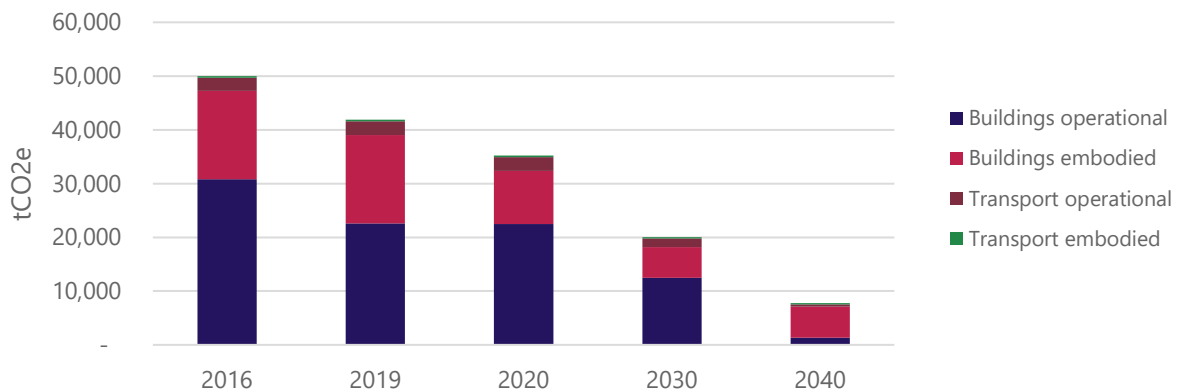


Figure 4—1: Total embodied and operational emissions for Hackney assets.





**Figure 4—2: Annual CO<sub>2</sub> emissions (embodied emissions are the largest source of emissions by 2040).**

Large emission reductions are recorded for building operations and transport. There is a smaller overall reduction in embodied carbon emissions. All areas require major shifts in infrastructure or approach.

To achieve the operational reduction in emissions numerous actions are required, covering both energy demand, heat source switching and decarbonisation, as summarised in Figure 4—3. Carbon savings are typically a result of the effect of multiple measures and cannot be traced to a single action (e.g., a heat pump, in a newly insulated house, powered by renewable electricity). Therefore, carbon savings associated with each measure are approximate. Neither do they account for the numerous co-benefits of some measures.

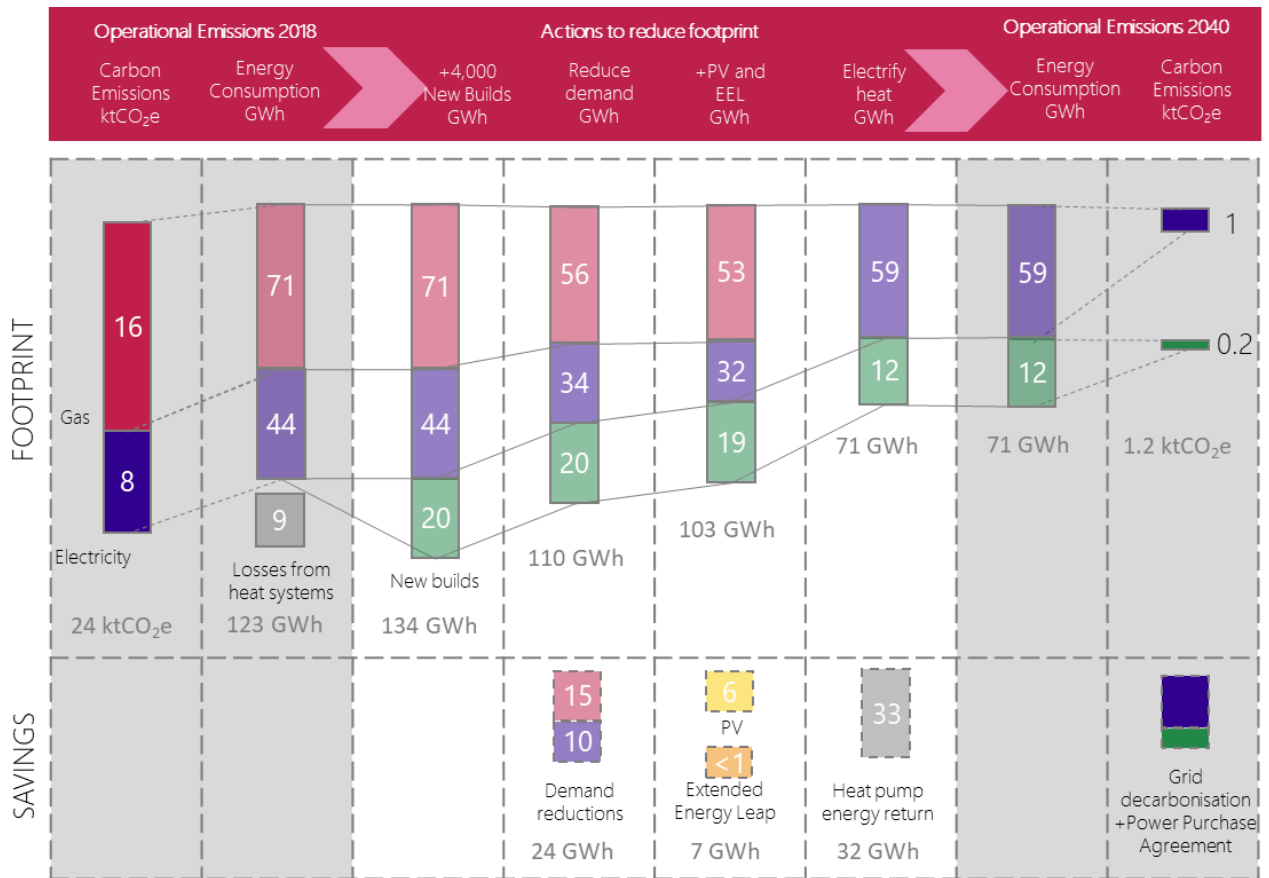


Figure 4—3: Pathway to net zero for building’s operational emissions.

## 5 Actions required to achieve Net Zero Carbon by 2040

Achieving net zero carbon requires systemic change. The Council will need to better understand how energy is used, carry out fabric retrofit to thousands of homes and buildings, stop using fossil fuel for heating, cooking and transportation, and finally, change the way homes and other buildings are built. This section explores the proposed changes required to achieve emissions reductions. Each section outlines key areas of action, with discussion of key changes and their relative influence on the final pathway. To illustrate implementation strategies and options, discussion of key policy levers and funding mechanisms are referenced, and, where relevant, considerations and priorities for typical building typologies in the Hackney portfolio are presented. The actions presented here reveal a large gap between business as usual and what is required to achieve net zero carbon by 2040.

### 5.1 Understanding where and how energy is used

There are proven business benefits to putting in place metering and monitoring of energy consumption. Monitoring power and energy usage in a building can often identify hidden issues that affect both operational and environmental quality, can pinpoint the reason for higher than desired energy costs, and can reveal the causes of more frequent equipment repair and replacement. The following section summarises a metering strategy for Hackney.

Smart meters are the new generation of gas and electricity meters replacing older 'traditional' meters, including prepayment meters. At present, Hackney Council has a mix of basic and smart meters for the building incoming supplies of both commercial and residential buildings. Recommendations for developing this monitoring strategy include:

1. Develop and maintain a clear metering and sub metering strategy alongside increased data gathering about the condition of all buildings.
2. Develop a methodology for commissioning and verification of metering installations to ensure accuracy whilst also updating the entire metering strategy.
3. Develop the use cases for metering data, billing, energy reporting, energy analysis & diagnostic of poor performance etc. and from this develop a plan of what metering data is needed, the accuracy of the data required, and frequency of data transmission to fulfil the use cases. This should be aligned with the monitoring programme for the Net Zero Carbon Energy Strategy.
4. Consider creating a metering standard specification for all new building developments which will integrate the metering needs as part of the design process and avoid costly retrofit solutions which do not make the most of new infrastructure.
5. Identify the stakeholders, organisational structure and interfaces which will work with and respond to the data and insights provided by the energy monitoring and management software or energy bureau service provider.

6. Develop a performance brief for the energy monitoring and analysis platform which may include contracting the services of an energy bureau and seek proposals and costs for its implementation, and again should be aligned with the Low Carbon Strategy KPIs and monitoring requirements (Appendix D).
7. Consider a strategic plan which may look at typical buildings already in existence as an example of how to implement a metering strategy as a retrofit, or a pilot study of one or more buildings, utilising building diagnostic tools to optimise energy, comfort and facilities management.

### 5.2 Demand reduction in homes and other buildings

Between 2016 and 2019, the energy demand in the Council portfolio increased by 4% in homes and fell by 5% across other buildings. Against an unconstrained pathway, with no demand measures or fuel switching but continued addition of new builds to the portfolio, a demand reduction of over 20% is achieved through the mixture of interventions listed in Table 3-1, such as retrofit, behaviour change and reduction in hot water usage.

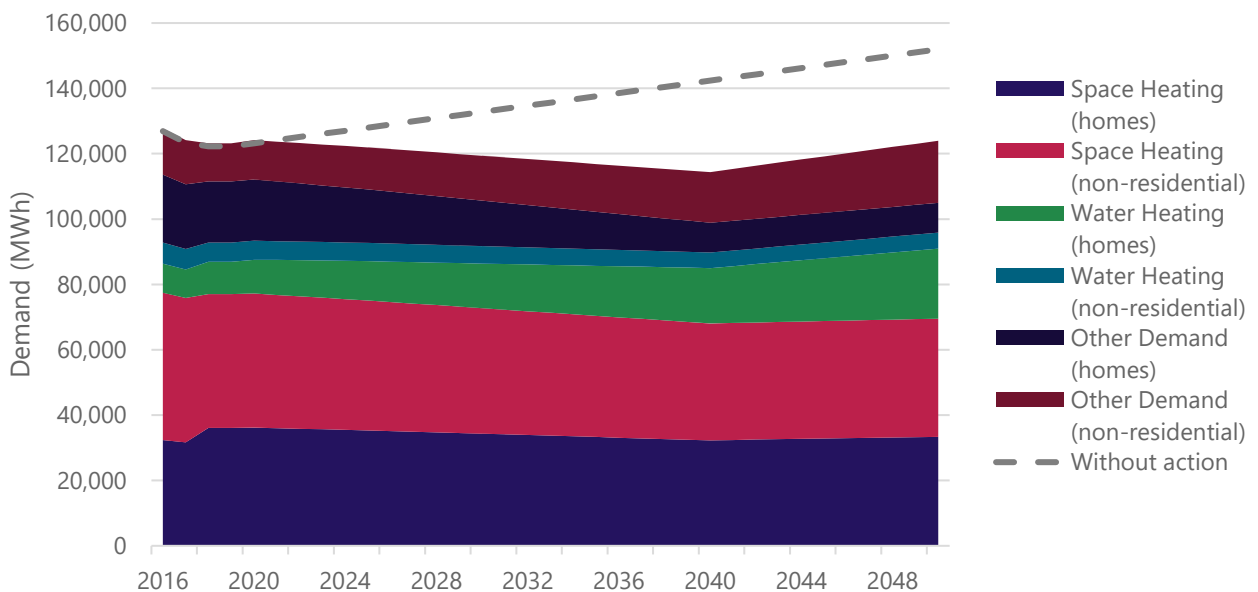


Figure 5—1: Energy demand for buildings.

### 5.2.1 Demand reduction implementation

Table 5-1 indicates how key demand reduction initiatives can be targeted to illustrate priorities for implementation under this area of emissions reductions. In many cases fabric retrofits will be needed before fuel switching to improve the efficiency of new technologies and safeguard against the risk of higher fuel costs. Key policies and public initiatives to support such areas are also provided.

**Table 5-1: Demand reduction measures by building typology, with key policies and funding sources.**

Building typology	Key demand reduction priorities	Policy, guidance and funding sources
Single house	Many measures would be useful for this typology: fabric retrofits, metering and flow restrictors would all be appropriate here. Houses could also be considered for inclusion in the Extended Energy Leap Scheme.	GLA programmes: the Extended Energy Leap and Retrofit Accelerator programmes provide targeted expertise and retrofit funding for London homes. Green Homes Grant – Local Authority Delivery scheme. Eligible for low income households at EPC E or worse (~10% of Hackney homes according to EPC ratings). ECO funding is another source of support for retrofitting old, inefficient housing. Retrofit Accelerator – deep retrofit for homes supported by the European Regional Development Fund.
Block of flats	Fabric retrofits, communal lighting upgrades and roll-outs of metering and flow restrictors would be an easy win action. Behavioural campaigns could also be high-impact in high density spaces.	
School	In schools, fabric retrofits, metering and lighting/appliance efficiency would be pursued, with behaviour change initiatives amongst students started.	The GLA Retrofit Accelerator also has a Schools Subscription, <sup>3</sup> recommended for clusters of at least 8 schools within a London borough. RAFT <sup>4</sup> also provides retrofit advice for schools. The government has also recently announced substantial amounts of funding for school and public building rebuild programmes, focussed on improving energy efficiency. <sup>5, 6</sup>
Office	Fabric retrofits, metering and appliance/ventilation/lighting upgrades should be initiated. Initiatives for space heating should be prioritised since water usage tends to be lower in office spaces.	As above, funding has been announced to support retrofit of public buildings, also covering low carbon heating upgrades. <sup>7</sup> Low Carbon retrofit toolkits from bodies like CIBSE, CIOB and the Better Buildings Partnership also provide retrofit guidance and toolkits for commercial and office spaces. The Retrofit Accelerator Scheme Workspaces also provide targeted expertise and retrofit delivery and funding mechanisms for non-domestic buildings.

<sup>3</sup> GLA, no date. Retrofitting Schools. Available online.

<sup>4</sup> RAFT, no date. About. Available online.

<sup>5</sup> Department for Education, 2020. PM announces transformative school rebuilding programme. Available online.

<sup>6</sup> Will Ing, 2020. Chancellor to unveil £3 billion retrofit funding. Available online.

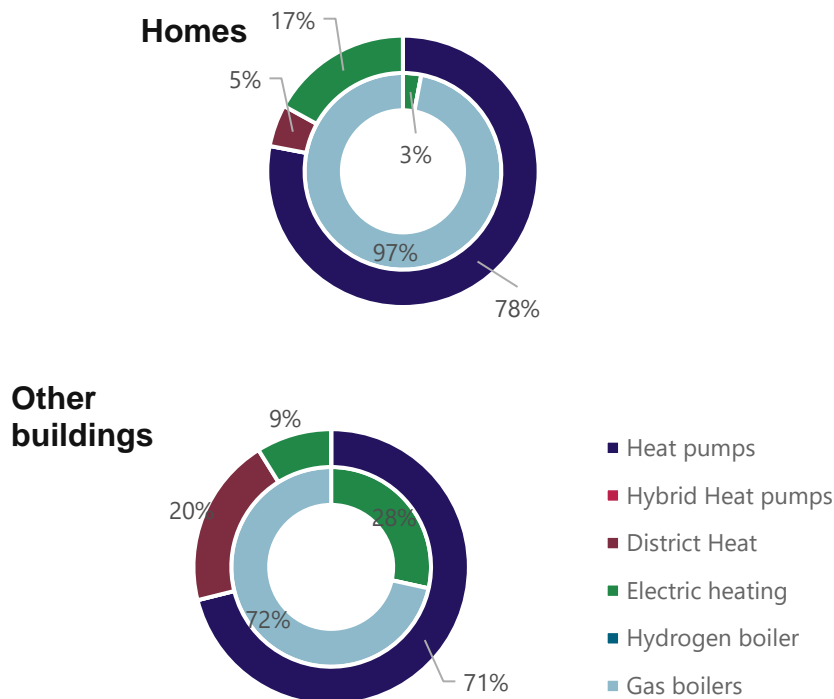
<sup>7</sup> Construction News, 2020. £1bn public sector retrofit scheme cautiously welcomed. Available online.

### 5.3 Decarbonisation of Energy supply

To achieve net zero carbon, it is essential to switch away from fossil fuel. This is challenging both for heating and electricity. Three key areas are mapped in the pathways: heat source switching, purchasing of renewable power and local electrical infrastructure. These are explored in the following sections, with case study strategies for implementation and possible funding and guidance options presented in Table 5-3.

#### 5.3.1 Low carbon heat

By 2040 fossil fuel will no longer be used for heating in standard operating conditions (Figure 5—2). Outside power purchasing, transferring to low carbon heat with complementary fabric retrofits, is the biggest action the Council can do to reduce its carbon footprint, and will enable its tenants to do so in parallel. Some fossil fuel boilers may be retained for back up and extremes of peak demand. Retaining some fossil fuel boilers that are rarely used will offer better resilience and reduced costs.



**Figure 5—2: Heating sources in 2025 (central ring) and 2040 (outer ring).**

Actions to inform the targeted roll-out of heat switching are listed in Table 5-3. As boilers are replaced the feasibility of low carbon heat would be investigated. Small scale pilot studies, identifying Hackney buildings which are best suited to switching to low carbon fuel, will also be evaluated. For the first few years, this would be done on a small selection of buildings to reduce the risk and build up a body of lessons learnt. These pilots would include heat pumps and hydrogen ready boilers.

### 5.3.1.1 Technological Uncertainty

Heat pumps, district heat networks and electric heaters are identified as the key heating system improvements for use in Hackney, when combined with appropriate fabric retrofits. These are heat sources advised by major bodies like the UK Climate Change Committee<sup>8</sup> and are proven technology, on the market and compatible with existing systems, as shown in Table 5-2.

However, there is large technological and economic uncertainty in UK heating futures, so it may be appropriate to revise the figures used in this strategy in future as the situation evolves. The selection of different heat sources (and supporting infrastructure) can also have a significant impact on associated benefits and challenges. For example, as shown in Table 5-2, the use of heat pumps have positive impacts on local air quality, while high costs associated with their installation and maintenance can increase fuel poverty where the installation of the technology is not adequately appraised.

In particular, while there is wide public interest in the use of hydrogen as an alternative fuel, the supply chain for hydrogen is under developed and the hydrogen available is not low carbon at this time. As such, future roll-outs will evaluate viable alternative strategies to pursue, provided the end goal of decarbonisation is achieved, and the principles of clean, healthy, affordable decarbonisation as set out in this strategy are followed. The Council will continue to monitor technological advances of Hydrogen technology and will look to adopt when/if the market and technological conditions become suitable.

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<sup>8</sup> CCC, 2016. Next Steps for UK Heat Policy. Available online.

**Table 5-2: Benefits and risks of different heat sources.**

	Carbon intensity	Technological maturity	Costs	Air pollution impact	Impact on reducing fuel poverty	GLA Energy Hierarchy <sup>9</sup>
District Heat	Low	Medium	High	Low	Medium, may increase	1
Electric	Low	High	Low	Low	Low, may increase	2 – assuming decarbonisation of the grid
Heat Pumps	Low	High	High	Low	Medium, may increase as installation costs reduce	2
CHP	Medium	Medium	High	High	Medium	3
Gas boilers	High	High	Low	High	None	4
Hybrid	Medium	High	High	Medium	As above	Not included
Hydrogen Boilers	Unknown	Unproven	Unknown	Low	Unknown	Not included

### 5.3.2 Local renewable energy generation

The model assumes that by 2030, the Council would achieve the installation of 2,000 home scale PV installations (2 kWp or approximately 20m<sup>2</sup>) and 200 larger scale PV installations (10 kWp, or approximately 100m<sup>2</sup>). This, and existing PV sites, will generate about 6,000 MWh in 2040, this is about 5% of building energy demand in 2040. This is equivalent to all Tier 1 opportunities and a quarter of Tier 2 opportunities identified in the solar study. Any additional capacity installed would also benefit this strategy. This is important for reduction of electricity demand and total energy supply as well as overall carbon emissions.

<sup>9</sup> GLA, 2019. The London Plan: Intend to Publish. Available online.



### 5.3.3 Purchasing renewable power

Net zero emissions can be achieved by eliminating fossil fuels and purchasing renewable electricity. However, the use of purchased renewable energy (especially green tariffs) can be controversial. Because of this the long term strategy for Hackney is to move to high quality green tariffs and Power Purchase Agreements.

Long term power contracts such as Power Purchase Agreements are preferable to standard energy tariffs since they provide a predictable source of income to renewable generators, and directly drive investment in green renewable infrastructure. Power purchase agreements should ensure the energy provider does not double count power supplied in its reporting, and that the revenue is used to fund and build new generators for the new supply required.

The Council will pursue a power purchase agreement approach from 2025 onwards in order to reduce emissions associated with its electricity consumption. However, it will be necessary to monitor greenhouse gas reporting requirements for renewable energy purchase going forwards to ensure compliance. As a minimum, in 2025 Hackney transfers to an agreement which supplies 50% of electrical demand at net zero carbon supply.

### 5.3.4 Electrical infrastructure

Electricity is currently the most feasible option for low carbon heat, and it is likely that many more buildings will gain heat pumps in the coming decades.<sup>8</sup> Switching from natural gas to electric heating will increase peak heat demand and put strain on the electrical infrastructure. Figure 5—3 shows estimates for peak demand for non-residential is approximately 108 MW for all buildings, and at 51 MW for homes. Peak demand from homes increases by approximately 90% and peak demand in other buildings by about 20%. This will need to be managed at the:

- Building-level: through demand side management and improved electrical infrastructure;
- Neighbourhood: identifying which neighbourhoods need reinforcement of supply;
- Borough-wide: upgrading large scale electrical infrastructure



**Figure 5—3: Predicted peak demand across Hackney functions.**

#### 6.3.4.1 Demand side response (DSR)

Demand side response (DSR) is another strategy to employ and it works by reducing and shifting demand for electricity at peak times. Existing BMS systems will be programmed to shed load when the system reaches a pre-set maximum. This could activate temporary turn down of HVAC and lighting. Our buildings with larger power demands (typically greater than 1MW) will benefit from installing a controller that receives signals from the National Grid and we would look to integrate this with smart meter strategy (Section 5.1).

#### 6.3.4.2 Infrastructure digitalisation

Increasing electrification of our heat and transport can create a strain on the power grid. The Council recognises its potential to drive transition and a coordinated approach to enable informed decision making both across its own and Boroughwide activities. A coordinated digitised approach will help accelerate the roll out of low carbon projects by reducing the need for expensive, time consuming grid reinforcements. For this purpose, the Council is committed to an infrastructure strategy plan to fully define and realise the benefit of digitalisation in Hackney. Once these benefits are quantified and a portfolio of

projects identified, the Council will work with the external stakeholders including UKPN, Greater South East Energy Hub and The London Economic Action Partnership (LEAP) to develop the opportunity. The Council are best placed to do this because they can act as a bridge between central and local government to help attract third party investment. The infrastructure strategy plan will include the following elements:

- UKPN grid constraints analysis to understand where flexible energy trading may have maximum value
- Supply potential: Asset review across Housing Stock and non- domestic buildings, evaluate how digital infrastructure could increase the supply potential (e.g. demand side response, HaaS, p2p trading), private sector engagement and soft market testing
- Identification of pilot projects which could see immediate benefits together with forward plan of what low carbon infrastructure needs to be installed to meet climate targets together with portfolio of projects to take to third party investors

### 5.3.5 Energy supply implementation

The previous sections highlight that decarbonisation of energy supply should involve a major shift to system electrification, driven by the implementation of heat pumps and a Power Purchase Agreement, supplemented by expansion of renewables and supporting electrical infrastructure. Table 5-3 describes possible implementation strategies for some of these areas, with details on related guidance and policy.

**Table 5-3: Energy supply measures by building typology, with key policies and funding sources.**

Building typology	Key energy supply priorities	Policy, guidance and funding sources
Single house	Explore capacity of roof space for renewables installation or proximity to district heat network for connection. Heating should be upgraded if managed by The Council.	Mayor of London's Energy Efficiency Fund (MEEF) – low carbon project accelerator in London, also providing part funding for regeneration projects. The Renewable Heat Incentive provides financial incentive to increase low carbon heat solutions for homes across the UK.
Block of flats	Explore capacity of roof space for renewables installation. Communal heating systems should be upgraded to heat pumps or district heat as a priority, as should any individual boilers where managed by The Council.	
School	Explore capacity of roof space for renewables installation. Heating systems should be upgraded as a priority, using connections to district heat networks or heat pump installation where appropriate.	The GLA Decentralised Energy Enabling Project (DEEP) supports London boroughs to develop decentralised energy projects, Low carbon heat funding for non-residential buildings is also provided by the Renewable Heat Incentive scheme, which closes in 2021.
Offices and Non Domestic Buildings	Explore capacity of roof space for renewables installation or proximity to district heat network for connection. Heating system should be upgraded if managed by The Council.	

## 5.4 Transport

The Council have a fleet of private vehicles, and ad hoc journeys are taken by staff for Council business. Vehicles used by Hackney supply chain has not been included. All data for these emissions have been established as per Table 5-4, with reductions achievable by reducing and electrifying the number of LCV and small vehicles used by 20%.

Certain challenges have been identified:

- HGVs – such as waste collection – may not be electrified, though recycled oil and biofuels are available and should be used wherever possible
- There is a lack of depot space for vehicle charging.
- Use of charging points is not guaranteed therefore there is a perceived risk that vehicles will go uncharged. This could be mitigated through scheduled charging periods or other management practices.
- The cost and availability of on-street parking prohibits employees taking vehicles home to charge.

**Table 5-4: Summary of assumptions for transport modelling.**

Item	Estimate for 2020	Estimate for 2040
Number of vehicles 2020	1,000	800
Type of vehicle	Car	Car
Fuel type 2020	Diesel	Electric
Typical mileage	400km/week	400km/week
Business travel	The largest portion of business travel emissions comes from use of taxis and vehicles (95%). Where possible these must be transferred to public transport, cycling or electric vehicle modes, supported by decarbonisation of the national grid.	

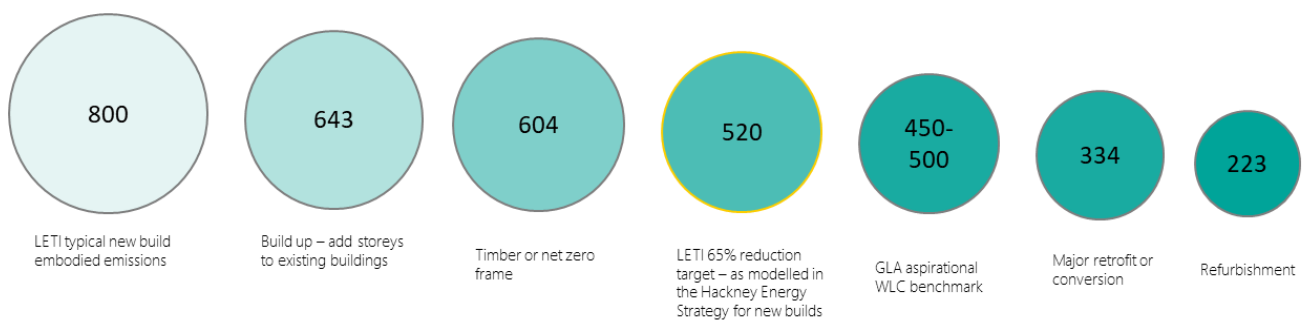
### 5.5 Embodied carbon

Hackney is responsible for the construction of its estate, though not all the energy those buildings use. Since the carbon footprint of construction is high, this makes embodied carbon a major issue for the Council (Figure 4—2).

These emissions have been somewhat reduced in the net zero pathways by assuming industry best practice guidance for building design and projected decarbonisation of car manufacture – LETI benchmarks of 40% reductions from 2020, and 65% reductions by 2030. These can be achieved by sourcing 30-50% of materials from re-used sources, using sustainably sourced timber or low carbon options as preferred construction materials and designing such that 50-80% of materials can be re-used at end of life.

In addition, embodied energy of buildings could be substantially reduced by refurbishment of buildings in place of new construction. Construction makes up a large proportion of a building’s whole life carbon cost, so to use principles of renewal rather than new build would significantly reduce the emissions associated with embodied carbon.

Figure 5—4 indicates different embodied emissions reductions strategies that might be appropriate for use to exceed Hackney embodied energy strategy targets. These consider Building Life Cycles Stages A1-A5.



**Figure 5—4: Low carbon construction techniques (kgCO<sub>2e</sub> /m<sup>2</sup>).**

## 5.6 Residual emissions and offsetting

Residual emissions occur because of electricity for electric vehicles, building electricity demand where a green tariff does not allow 100% renewable electricity as at present, and embodied carbon of construction and new vehicles. Table 5-5 illustrates that there are residual emissions remaining on the pathway which will need to be managed under an offset scheme or similar. The wide variability in pricing mechanisms serves to illustrate the high variability of potential future offset costs as the industry changes rapidly.

There are a number of options for dealing with these residual emissions:

- Identify potential sites for large solar panel arrays or wind turbines in the borough (e.g. in the Hackney Marshes);
- Test the feasibility of anaerobic digestion of food waste (recovering energy as green gas or electricity);
- Green investment of Council funds (only investments, e.g. renewable generation or green home loans, inside the borough would be picked up in borough-wide emissions accounts);
- Increased levels of retrofit and microgeneration;
- Contribute to offsetting scheme outside of Borough boundary (e.g. reforestation or renewable generation)

**Table 5-5: Annual residual emissions and cost estimates.**

Residual emissions in the Hackney Energy Strategy at 2040 (tCO <sub>2e</sub> )	7,758
Cost of offsetting – BEIS carbon value projections (low range <sup>10</sup> £13.8 /tCO <sub>2e</sub> )	£107,000
Cost of offsetting – BEIS carbon value projections (high range £42.7 /tCO <sub>2e</sub> )	£330,000
Cost of offsetting – GLA carbon value projections (£95 / tCO <sub>2e</sub> . <sup>11</sup> )	£737,000

<sup>10</sup> BEIS, 2018. Carbon Valuation. Available online.

<sup>11</sup> GLA, 2019. Carbon Offset Funds Report 2019. Available online.

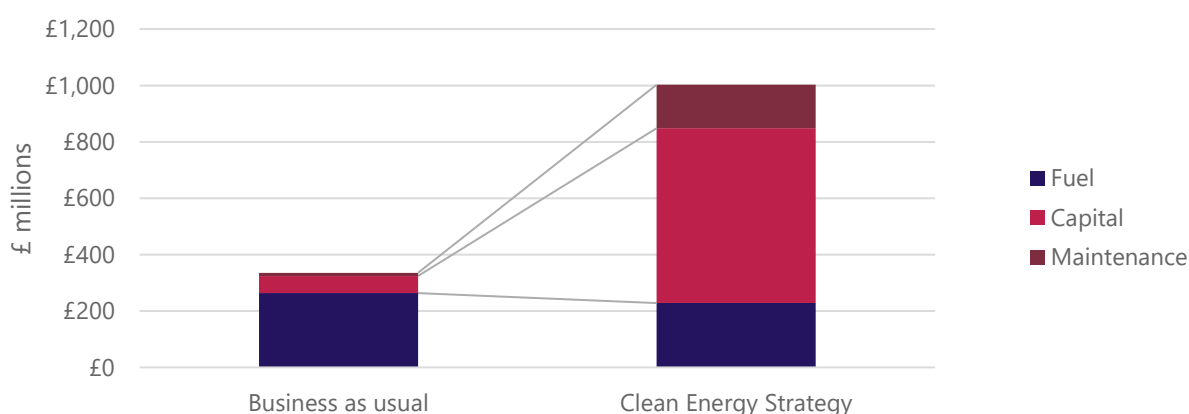
## 6 Costs and delivery

Achieving net zero carbon requires a large investment in our homes, buildings and transport systems. Done well the benefits reaped will include jobs, lower bills, greater comfort, cleaner streets and improved health.

### 6.1 Costs

The analysis indicates that approximately £600,000,000 capital expenditure would be required to deliver the strategy, excluding capital costs for new builds, business travel costs and upgrades for electrical and heat network infrastructure. Key costs come from demand reduction measures and heat switching, these affect a large number of properties and have high capital costs. Benchmark costs were used, these are formative because the mass application of many of these technologies are under development. The cost is an outline estimate that will be refined with additional details of the building stock and when technologies are more mature and better pricing data is available. It is indicative of how much this Low Carbon Strategy can contribute to the Green Economic Recovery.

Figure 6—1 shows the cost of the Energy Strategy, compared to the Business As Usual scenario. These were calculated using range estimates from appropriate case studies and industry benchmarks. The Business As Usual scenario also assumes that all existing heat sources, vehicles and PV are replaced once during the period 2020-2040. In both cases annual maintenance is at 2.5% of capital costs, while the costs of new build construction or development is excluded, as is the cost of fuel for spaces where The Council is not responsible for purchasing.



**Figure 6—1: Costs for Low Carbon Strategy compared to Business as Usual.**

The figure shows that capital costs are large relative to fuel costs, since most of the fuel costs in residential buildings are borne by tenants and residents. However, fuel savings will be achieved for the Council whilst significant fuel savings for residents can also be expected. However, it should be noted that many of the initiatives captured in this figure are already underway – including the PV expansion scheme and business as usual boiler replacement. This analysis also excludes cost savings and non-quantitative benefits that



would arise from the Strategy, such as reduction in fuel poverty, reduced offsetting payments and other co-benefits and avoided costs.

Uptake rates are modelled over twenty years until 2040. Hackney will target achieving 5% of the 2040 target every year until 2040. Although there may be some shortfall in year 1 to 3, it is imperative to set an ambitious stretch target to achieve the overall 20 year ambition. Should 25% of the overall 2040 target be achieved in the first five years it will be considered exceptional performance and will be celebrated accordingly.

### 6.1.1 Cost analysis for homes

Table 6-1 illustrates the breakdown of capex associated with each measure for homes.

**Table 6-1: Carbon reduction cost breakdowns – homes.**

Measure	Total uptake by 2040		Capital cost per measure	Total capital cost	
	Metered buildings	Unmetered buildings		Metered buildings	Unmetered buildings
District Heating	179	1,334	£750	£134,316	£1,000,414
Heat pumps	2,794	20,809	£7,000	£19,556,420	£145,660,232
Electric heating	609	4,535	£750	£456,675	£3,401,407
Solar PV	2,000	0	£4,800	£9,600,000	£0
Smart meter installation	3,582	26,678	£1,089	£3,900,539	£29,052,013
Retro-fit (fabric)	1,075	8,003	£19,100	£20,523,496	£152,863,210
Behaviour change	895	6,669	£-	£0	£0
Lighting efficiency	2,686	20,008	£250	£671,580	£5,002,068
Flow restrictors	2,686	20,008	£45	£120,884	£900,372
Energy leap	73	544	£45,000	£3,289,373	£24,499,927

### 6.1.2 Cost analysis for all other buildings

Table 6-2 illustrates the breakdown of the capex associated with each measure for non-domestic buildings.

**Table 6-2: Carbon reduction cost breakdowns – all other buildings.**

Measure	Total uptake by 2040 (m <sup>2</sup> )		Capital cost per m <sup>2</sup> (or array, for Solar)	Total capital cost	
	Metered buildings	Unmetered buildings		Metered buildings	Unmetered buildings
District Heating	75,734	61,679	£64.00	£4,846,952	£3,947,467
Heat pumps	268,854	218,961	£72.00	£19,357,516	£15,765,196
Electric heating	33,459	27,250	£10.42	£348,530	£283,851
Solar PV	200	0	£14,345	£2,869,000	
Smart meter installation	378,668	308,396	£4	£1,649,478	£1,343,372
Retro-fit (fabric)	113,600	92,519	£265	£30,135,673	£24,543,170
Behaviour change	94,667	77,099	£0	£0	£0
Lighting efficiency	302,935	246,717	£19	£5,755,756	£4,687,617
Appliance efficiency	189,334	154,198	£52	£9,861,150	£8,031,142
Ventilation and cooling efficiency	75,734	61,679	£103	£7,800,564	£6,352,955
Flow restrictors	284,001	231,297	£1	£177,501	£144,561

### 6.1.3 Implementation

The monitoring and oversight structure should sit in a broader implementation programme established upon adopting this strategy. A monitoring and governance overview is covered in the Appendix.

This Strategy has identified a 4 stage Delivery path across the Exploration, Adoption, Integration and Peak Roll Out Phases and Figure 6—2 sets out a preliminary timeline for implementation. This approach breaks down the measures modelled in the net zero pathways into key actions and stages, highlighting the importance of community and stakeholder engagement, working to demonstrate a leadership role, as well as monitoring and planning. These strategies would be consulted alongside Table 5-1 and Table 5-3, which illustrate typical strategies by building typology.

Action already underway is highlighted in Section 7.2 and Appendix A. The Council is coordinating its approach to achieve the uptake rates necessary to deliver its ambitious targets and recognises that delivering the ambition will require specific actions around

developing projects, lobbying government, finance, governance and monitoring. Against these we have recognised immediate steps which include:

- Ensuring we consume less energy in carrying out our operation
- A review of Housing and Corporate Assets to:
  - Categorise and prioritise for heat decarbonisation e.g., assets due for refurb/plant replacement/area of high fuel poverty/worst performing EPC
  - Devise strategic plan for building energy reduction and heat/hot water decarbonisation by individual building or typology
  - Pilot low carbon heat pump-based systems, with thermal storage (i.e.no gas boilers or direct electric heating systems)
  - Review low carbon heat opportunities e.g., connection to district heat network(s)
- Development of a retrofit programme to support low carbon technology which include:
  - Fabric improvements and heating system modifications to support lower temperatures as the technologies required to decarbonise e.g., some heat pumps typically require lower temperatures than the current residential and non-residential buildings are designed to operate
  - Demand reduction projects to enable ease of implementing lower carbon heating technologies with minimal change to existing heating systems
- Project pipeline development, market testing (where necessary) to facilitate pilot, rollout of measures which can be used to both apply for grant funding and attract investments from third party funders
- Garner stakeholder support and develop procedures for funding projects through a range of innovative financing models
- Take a proactive role in influencing stakeholders and engaging at a higher level to collaborate with other local authorities to lobby the Mayor of London and UK Government to adopt ambitious legislation and policies which are supported with funding streams and increased powers to enable an increased rate of delivery at the local level.

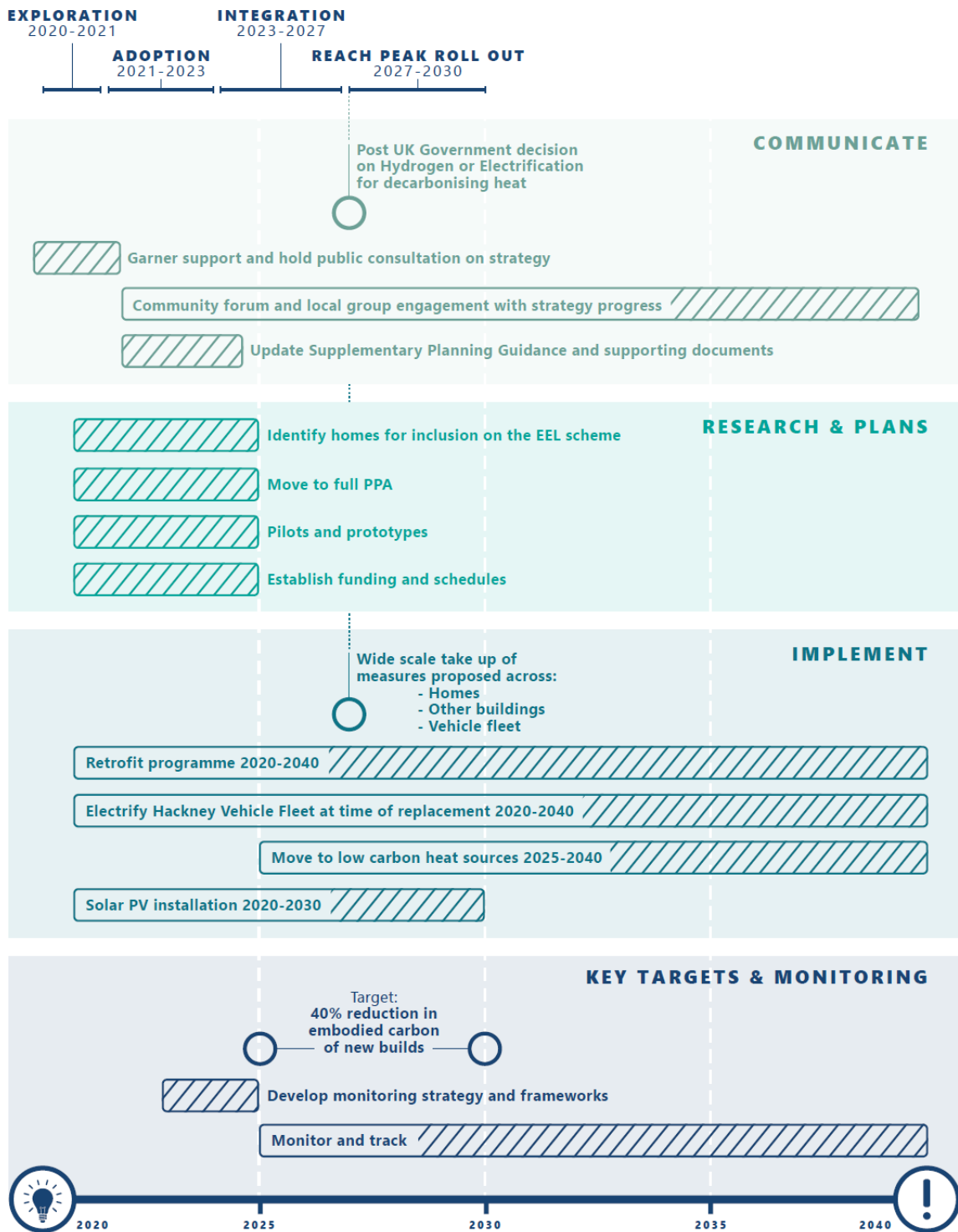


Figure 6—2: Key timeline for the Low Carbon Strategy implementation.

## 6.2 Progress towards Emissions Reduction

Since 2016, the Council has reduced its Scope 2 emissions by up to 50%, whilst the grid decarbonisation is a contributing factor, the Council has taken actions including

- Implementing various improvements to the Council's Estate through LED light fittings and other energy efficiency savings.
- Purchase of renewable energy
- Installing LED lighting across Streetlighting
- Installing solar panels across our Corporate building.

We are continuing to work through a programme to install up to 1MW of solar capacity across our portfolio by end of 2021. We have conducted a Boroughwide solar study to identify how to achieve a Manifesto Commitment to cover 50% of our assets with solar panels and through this study we have identified an opportunity to install up to 15MW of solar capacity. In 2020, the Council completed a District Heat Masterplan to identify potential for district heat to contribute to low carbon energy supply in the Borough. We are currently developing our approach to procuring a Power Purchase Agreement.

All of Hackney's new buildings follow the latest London Plan guidance on energy and the Council has set ambitious design parameters. Across our existing Housing stock, we have committed to demand reduction through fabric efficient systems e.g. insulations, controls and improve our stock to EPC C or higher by 2030 with existing EPC data showing a 27% reduction in emissions across Housing stock against 2010 levels. We have installed a number of energy efficiency and renewable energy measures into our stock through the Energy Company Obligations and continue to support both private and social housing residents with emissions reduction through our Green Homes Programme and SHINE.

The Council Fleet has a definite direction for emissions reduction through the use of high blend renewable biofuels and development of our electric vehicle fleet. As a result, Fleet has made a substantial contribution to Hackney's carbon reduction targets and capitalised on positive publicity from our achievements signing up to the 'Go Ultra Low' programme and the 'Clean Van Commitment' committing us to electrify all our light commercial vehicles by 2028 (subject to vehicle availability, suitability and funding). Our work with 'alternative fuels' has identified Hackney Council as a leading public sector organisation in this space.

This has been achieved through the use of:

- High blend renewable biofuels on approximately 70% of our fleet - we're on target to save circa 2000 tonnes of CO<sub>2</sub> annually with scope for a further 1000 tonnes if all non-electric vehicles use the fuel,
- Expansion of our electric vehicle fleet currently standing at 66 vehicles,
- Installation of a private network of 47 charging points for fleet users spread over 13 sites, and
- Installation of 5 home-based charging points for drivers that take vans home

## 7 Conclusions

The energy demand and carbon emissions of Hackney assets have been modelled to 2050 where it is available. This work has shown that it is possible to achieve a 66% reduction in carbon emissions by 2030 and to be net zero carbon by 2040. However, these are challenging targets and there are a number of key focus areas:

- **Capital expenditure of over half a billion is required** to deliver this strategy. Some, but not all, of this will be recovered in reduced energy costs. The cost estimate made here is high level and departments would build up a more accurate picture of what the costs will be. Where possible this expenditure will be retained in Hackney by prioritising contracts to local companies and making sure local companies are trained and accredited. This will be a key part of the Green Economic Recovery;
- **There is a policy and funding gap** between the intention to move to net zero carbon and current asset management strategies that will need to be addressed.
- **Businesses seeing opportunity and understanding risks:** Climate change mitigation is going to create lots of work to do in the Borough and further afield. The businesses and residents of Hackney should be ready to benefit from this. The Council will engage with stakeholders on the expected changes and where necessary encourage training so that they can benefit from new revenue streams. Energy saving schemes run by the Council for our own assets would be available for buy-in for private properties and businesses where possible.
- **Equity and inclusivity:** it is important that everyone has the correct resources to ensure they have the capacity to act. This means that training and other support will be targeted at hard-to-reach groups and those who are adversely impacted by the proposed measures e.g. ameliorate potential higher costs of electrified heating where complementary building fabric retrofit has not been carried out;

To meet its target, Hackney Council will specifically:

- **Improve data gathering:** this work has been underpinned by a number of assumptions about how energy is being used. The next step will be to collect additional data to build up a more nuanced picture of how emissions can be reduced and identify which buildings are the highest priority. At the very least for each energy data point it should be understood the floor area that is being supplied and what the energy is used for; the data gathering will also help the Council build robust forward plans and pipeline of projects to meet the set target. A tenant engagement plan should be put in place to understand energy use where Hackney do not pay energy bills. Future leases should require tenants to share energy data;
- **Scale up energy efficiency and renewable generation** will be scaled up immediately. All Tier 1 and 2 opportunities for solar PV will be bought forward for feasibility and installation. Tier 3 and 4 opportunities will also be considered where opportunities arise;

- **Move away from fossil fuel:** switching from gas is easier in some buildings than others, it will require extensive upgrades to building fabric, building systems and electrical capacity. Pilot projects, in suitable buildings, would start immediately. We will start exploring decarbonisation plans for large heat providers; replacing some gas boilers with heat pumps where they are due for replacement. Other low carbon heat sources would be developed, including heat networks, direct electric heating and hydrogen (as the technology matures).
- **Improve Electrical infrastructure:** electrification of vehicles and heating will put pressure on supply. Technologies and Strategies to support electrification, including digitalisation of infrastructure, increased supply and distribution capacity, new ways to share energy locally (smart grids) and shift times of energy demand (demand management) will be implemented. This will help manage energy and reduce peak demand enabling a speedier roll out of low carbon heating technology and electric vehicles.
- **Procure Green tariffs:** by 2025 Hackney would move to long term power purchase agreements to encourage long term investment in renewables. This will enable the energy purchased to be reported as zero carbon. Currently Hackney purchases REGO backed Green Energy, this has been modelled using a reduced but not zero carbon emissions;
- **Measure embodied carbon:** by 2040 embodied emissions could be the most significant emissions from Council operations, offsetting these emissions will cost around £750,000 per year. Scoping in embodied carbon is a bold step, it signals that Hackney is willing to tackle the significant emissions from consumption and in particular development. It aligns with the increased emphasis put on Whole Life Carbon and the circular economy by the New Draft London Plan. To succeed on these matters designs that strongly reduce embodied energy of new builds from today's levels in line with industry net zero guidance will be required;
- **Move beyond carbon as a metric and commit to reporting on metrics:** as systems become decarbonised there is potential for skewed priorities. For example, as electricity becomes 100% renewable efficiency appears less important. This ignores co-benefits, such as reduced pollution, reduced fuel poverty and overall health of the population. Therefore, new metrics would be developed to track progress towards goals, e.g., kWh/m<sup>2</sup> as a key metric for evaluating building performance. In general three tiers of metrics could be considered :
  - **Tier 1: carbon emissions (CO<sub>2e</sub>);**
  - **Tier 2: co-benefits:** such as energy intensity (kWh/m<sup>2</sup>), reduced congestion, reduced energy costs, air quality, prevalence of childhood obesity;
  - **Tier 3: actions:** that are believed to lead to the desired outcomes and climate change mitigation.

## Appendix A Plan for immediate actions

Document appended.



## Appendix B Scoping report

Document appended

## Appendix C Monitoring

Monitoring and oversight mechanisms appropriate for this strategy were reviewed and selected. A longlist of typical oversight and monitoring mechanisms were assessed for their impact and relevance to this strategy. The measures were then grouped by three categories: Evaluating Strategy, Tracking Progress, Oversight & Accountability. The assessment results were used for a Red Amber Green analysis (Figure C—1).

Key areas	Evaluating Strategy		Tracking Progress				Oversight & Accountability		
	Commission	Community Forum	Technical Progress	Carbon Budget	BEIS data	KPIs	Steering Group	Internal Support team	Departmental responsibilities
Is it fit for purpose?									
Straightforward to implement?									
Could it exist in isolation in its category? (Additional measures needed?)									
Is mechanism in place/common in Hackney activities?									
Would mechanism bring innovation or new knowledge?									



Key areas	Evaluating Strategy		Tracking Progress				Oversight & Accountability		
	Commission	Community Forum	Technical Progress	Carbon Budget	BEIS data	KPIs	Steering Group	Internal Support team	Departmental responsibilities
Is it fit for purpose?	Requires additional monitoring, intensive			Complex and fail to capture qualitative or cross-cutting goals	Do not match key emissions categories in the Hackney Green Energy Strategy			Benefit captured in steering group or departmental methods	
Straightforward to implement?									
Could it exist in isolation in its category? (Additional measures needed?)									
Is mechanism in place/common in Hackney activities?									
Would mechanism bring innovation or new knowledge?									

● Yes   
 ● Possibly   
 ● No

**Figure C—1: Evaluation of potential monitoring mechanisms.**

The results were then used to highlight appropriate mechanisms (Figure C—1).

**Table C—1: Monitoring and oversight mechanisms.**

Area	Mechanism	Justification
Evaluating Strategy	Community forum	Stakeholder and community engagement at an early stage is essential to drive innovation, to engage with those who will be affected by the scheme.
Tracking Progress	Key Performance Indicator framework	A thorough KPI framework that accommodates both the technical and qualitative metrics covered in the strategy will help the oversight and accountability teams drive the work. This will be a more effective option than carbon budgets or BEIS tracking as it will be better able to accommodate the complexity and diverse emissions categories included.
	Technical Progress	Many of the recommended actions and focus areas in this strategy are linked to distinct structural changes and physical interventions. Measuring and tracking the physical interventions and measurable changes to the Council portfolio will provide a data-driven approach to monitoring the Energy Strategy implementation.
Oversight and Accountability	Steering Group	A steering group will provide the internal expertise and authority to drive the project and retain focus on the necessity of acting on the Hackney Council Climate Emergency declaration.
	Departmental Responsibilities	It is essential that actions are fully integrated into existing departmental responsibilities to draw on staff expertise and to ensure that workstreams align with cross-cutting Council work and priorities.

## Appendix D Governance options analysis

		<b>Benefits</b>	<b>Constraints</b>
<b>Evaluating Strategy</b>	Commission	<ul style="list-style-type: none"> <li>• Critical, analytic</li> <li>• Draws in external expertise, adds credibility</li> </ul>	<ul style="list-style-type: none"> <li>• No overarching oversight</li> <li>• Lack of feedback at review start can be inefficient</li> </ul>
	Community Forums	<ul style="list-style-type: none"> <li>• Innovative, direct insight, diverse expertise</li> <li>• Draws in input from those affected by measures</li> </ul>	<ul style="list-style-type: none"> <li>• May be swayed by political popularity of issues</li> <li>• Consistent oversight constrained by changing members of forums</li> </ul>
<b>Oversight &amp; Accountability</b>	Steering group	<ul style="list-style-type: none"> <li>• Diverse views and collaboration from early stages</li> <li>• Invites a range of expertise</li> </ul>	<ul style="list-style-type: none"> <li>• Can be complex to administrate</li> <li>• Can be divorced from the process of implementing recommendations or be seen to devalue involvement of frontline staff</li> <li>• Cannot exist in isolation – other monitoring will also be required</li> </ul>
	Internal support team	<ul style="list-style-type: none"> <li>• High level of familiarity with Council functions and interests</li> <li>• High level of expertise and experience</li> <li>• Ability to align monitoring with existing channels</li> </ul>	<ul style="list-style-type: none"> <li>• Resource limitations and staff turnover could result in gaps in oversight and monitoring</li> <li>• May show bias towards work delivered</li> <li>• May be a lack of diversity in experience compared to e.g. a commission,</li> </ul>
	Departmental responsibilities	<ul style="list-style-type: none"> <li>• As above</li> <li>• Can closely align with existing procedures and workstreams</li> </ul>	<ul style="list-style-type: none"> <li>• As above</li> <li>• Separating plans into departments may lose cross-cutting elements and lose detail</li> </ul>
<b>Tracking Progress</b>	BEIS data sets	<ul style="list-style-type: none"> <li>• Clear reporting structure</li> <li>• Already required under legislation and Council policy</li> <li>• Well-understood, non-controversial</li> <li>• Allows for easy comparison with other areas,</li> </ul>	<ul style="list-style-type: none"> <li>• BEIS datasets cover local-authority scope 1 and 2 emissions, and are not broken down by Council portfolio</li> <li>• Embodied energy not included under BEIS reporting,</li> <li>• No provision for qualitative metrics and oversight</li> </ul>

	KPIs	<ul style="list-style-type: none"> <li>• Clear and structured, easy to communicate,</li> <li>• Widely used and understood, making it a defensible and uncontroversial system of oversight,</li> <li>• Allows for qualitative reporting and judgments</li> </ul>	<ul style="list-style-type: none"> <li>• Leaves little room to innovate and change plans</li> <li>• Requires a detailed data collection and technical progress review to demonstrate alignment to indicators</li> <li>• Requires objectives to be defined at project start</li> </ul>
	Technical progress	<ul style="list-style-type: none"> <li>• Consistent monitoring throughout project; detailed quantitative oversight</li> <li>• Should align tightly with initial target setting, meaning success and results of plan are clear</li> <li>• Results easy to communicate</li> </ul>	<ul style="list-style-type: none"> <li>• Encourages a focus on a limited number of numerical goals – should be combined with qualitative approaches to oversight</li> <li>• Requires constant access to good quality data</li> <li>• Doesn't capture the impacts of the technology on users</li> </ul>
	Carbon budgets	<ul style="list-style-type: none"> <li>• Science-based target approach is robust in terms of delivering net zero</li> <li>• Allows dynamic or flexible plans since monitoring is based on outcome</li> <li>• Clear to communicate, good public understanding of the term</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of attention to detail may be an issue when trying to highlight successful areas and areas to target,</li> <li>• Doesn't capture other important metrics and objectives (e.g. Biodiversity and wellbeing, user experiences),</li> <li>• Accessing accurate and consistent carbon data may be challenging</li> </ul>

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