CLIMATE CHANGE AND ENVIRONMENT SCRUTINY COMMITTEE	AGENDA ITEM NO. 6
6 JULY 2022	PUBLIC REPORT

Report of:	Adrian Chapman, Executive Director Place and Economy	
Cabinet Member(s) responsible:	Cllr Marco Cereste, Cabinet Member for Climate Change, Planning, Housing and Transport	
Contact Officer(s):	Hannah Swinburne, Principal Climate Change Officer	Tel. 01733 453479

LOCAL AREA ENERGY PLAN

RECOMMENDATIONS	
FROM: Adrian Chapman, Executive Director of Place and Economy	**Deadline date:** N/A

It is recommended that the Climate Change and Environment Scrutiny Committee:

1. Note the findings of the Local Area Energy Plan.
2. Support the approach to incorporate findings and recommendations of the Local Area Energy Plan into the development of the City-Wide Climate Change Action Plan.
3. Support the approach to establish a Peterborough wide decarbonisation stakeholder group, hosted by Peterborough City Council, to continue to lead the delivery of the LAEP and progress towards the development of viable business cases to unlock investment.

1. ORIGIN OF REPORT

1.1 The report was requested by the Climate Change and Environment Scrutiny Committee.

2. PURPOSE AND REASON FOR REPORT

2.1 The report presents the findings of the Local Area Energy Plan and seeks support of the Committee to use this information to guide the development of the city-wide climate change action plan.

2.2 This report is for Climate Change and Environment Scrutiny Committee to consider under its Terms of Reference No. Part 3, Section 4 - Overview and Scrutiny Functions, paragraph No. 2.1 Functions determined by the Council:

1.Environmental Capital;
3. Waste Strategy & Management;
4. Climate Change;
5. Reducing Carbon Emissions and achieving Net Zero Carbon Emissions;
6. Biodiversity;
10. Energy Generation and Consumption.

2.3 The Council declared a climate emergency and have made tackling climate change a corporate priority. The Local Area Energy Plan provides insight to inform plans to decarbonise Peterborough.

3. TIMESCALES

Is this a Major Policy Item/Statutory Plan?	**NO**	If yes, date for Cabinet meeting	**N/A**

4. BACKGROUND AND KEY ISSUES

4.1 **The Local Area Energy Planning approach.** Peterborough City Council declared a climate emergency in 2019 and committed to supporting the city to become net zero carbon. The Council has also committed to developing a city-wide climate action plan. This will cover actions to decarbonise buildings, transport, energy production, industry, purchases, waste and land use. In order to produce an ambitious action plan which is grounded in solid foundations, the action plan will need to be built on some key information, including a strong knowledge of our current infrastructure and behavioural choices and a reliable projection of future scenarios.

Energy Systems Catapult (ESC) have developed the local area energy planning (LAEP) approach to deliver a comprehensive, data-driven and cost-effective plan for decarbonisation. Importantly, the approach requires working closely with stakeholders to build upon progress being made and ambitions for the city.

The LAEP evaluates the current and future energy demands of the city, considering electricity demand, heating demand, retrofitting buildings for energy efficiency and electric vehicle charging demand to produce a plan to get to net zero carbon. To note, the LAEP does not cover all areas which will feature within the city-wide climate change action plan, such as land use and transport emissions from commercial vehicles such as vans, lorries, buses etc. This LAEP therefore considers almost 70% of emissions, see figure 1.

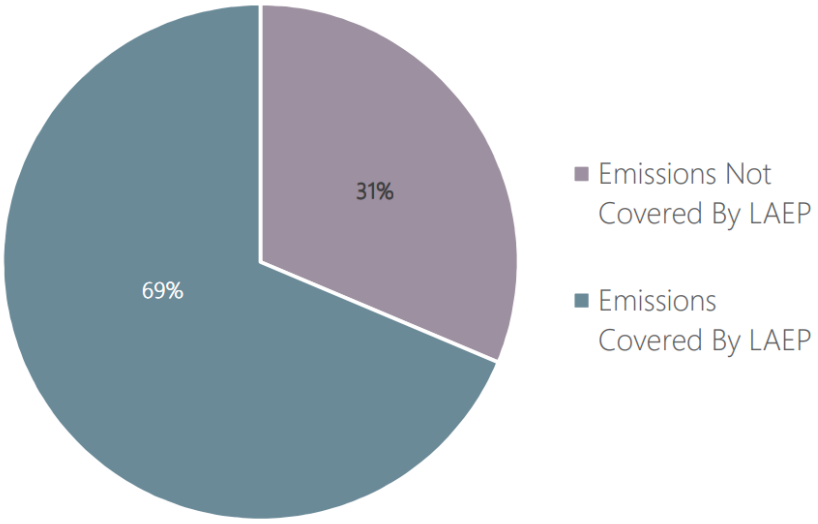

Figure 1: Approximate proportion of Peterborough CO2 emissions (2019) covered by the LAEP

A LAEP aims to define the extent of the transformation required to transition an area's energy system to net zero in a given timeframe. This is achieved by an exploration of potential pathways that considers a range of technologies and scenarios, and when combined with stakeholder engagement leads to the identification of the most cost-effective preferred pathway and a sequenced plan of proposed actions to achieving an area's net zero goal. The scope of the LAEP covers the current energy consumption as well as the carbon savings.

To meet a net zero target of 2040, this plan would require capital investments of £8.8 billion. This would save 4.3 million tonnes of CO_2 cumulatively to 2050 against a "business as usual" pathway. This expenditure is expected to be realised from multiple sources including private investment, residential home upgrades and government grants. The vast expenditure required to tackle carbon emissions necessitates that the city takes an evidence-based approach to selecting the most cost-effective pathway to net zero carbon. This will allow decarbonisation and the

associated co-benefits to be realised, for the minimal expenditure.

4.2 **Research findings.** Several pathways to net zero were modelled; actions that are common across all scenarios are considered low regret and can be undertaken as soon as possible. Actions that are not common to all scenarios will require decision points and early enabling actions to remove barriers.

Peterborough has been divided into ten zones. These are based on areas served by primary electricity substations, rather than any political or geographical boundary. These zones are: Barnack and Wittering; Castor and Marholm; City Central; City East; City North; City South East; City South West; East Rural; Glinton and Newborough; and North East Rural, see figure 2. Proposed decarbonisation solutions differ across the ten areas. See figure 2.

Figure 2: The ten zones of the Peterborough LAEP.

4.2.1 The research has produced the following conclusions.

Buildings. Peterborough currently has around 87,000 dwellings and plans to add another 15,000 dwellings between 2022 and 2036. In order to reach net zero, energy efficiency upgrades will need to be carried out on up to 66,000 dwellings, as well as on public, commercial and industrial buildings, by retrofitting insulation, upgrading glazing and various other measures.

Retrofitting was found to be “low regret” almost universally under all scenarios. The exceptions are in the City Central and City East Zones. In these more urban areas, there is a higher proportion of flats where individual flat retrofit is unlikely to make a large impact due to the limited number of applicable measures. Rural areas, however, were found to have a proportionately higher number of dwellings requiring a “deep” retrofit, i.e., more expensive and intrusive measures such as solid wall insulation, floor insulation, and triple glazing. Buildings in these areas currently have lower energy efficiency and higher fuel poverty, meaning that the improvements would have a positive social impact in addition to the carbon/energy impact.

New build dwellings are expected to be designed and constructed to a standard where they are not going to require insulation upgrades before the chosen net zero target; however, there is an opportunity to bring forward the use of low-carbon heating systems for new builds from the current 2025 date, to avoid more expensive retrofit at a later time. This will likely depend on developers selecting low carbon heating rather than achieving this through planning policy.

In total, domestic retrofits are expected to cost over £800m to reach net zero (an average of

around £12,750 per dwelling, although the cost for a specific dwelling will vary significantly depending on its individual requirements.

4.2.2 **Heating.** The decarbonisation of heat is one of the greatest challenges in the transition to net zero, the predominant heating system in Peterborough being fossil gas (88% of homes) or oil (4%). Around 80,000 of these will need to be replaced by heat pumps (mostly air source) and over 16,000 homes connected to a heat network.

The rural off-gas areas are low-regret areas for the installation of heat pumps; specifically, the zones of Barnack & Wittering, Glinton & Newborough, Caster & Marholm, and East Rural are key deployment areas for heat pumps.

Air source heat pumps are typically the most cost-effective heat pump type due to their lower capital costs compared to ground source heat pumps. However, in City South East, a cluster of ground source heat pumps could be considered due to the properties being detached and having a significant amount of land available to use as the heat source. For large properties, the higher heat demand can justify the higher upfront cost of ground source, since it achieves higher efficiencies and lower running costs. Where clusters like this exist, small communal systems could also be considered.

The PIRI (Peterborough Integrated Renewables Infrastructure) project includes a proposed district heat network which focuses on the Fengate and city centre area. The delivery of PIRI will be subject to further commerciality work and securing investment. Modelling within the LAEP showed the heat network to be viable. In scenarios with more ambitious net zero target dates, the heat network becomes increasingly important and cost-effective as a solution for domestic dwellings in urban areas.

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

After the mid-2030s, hydrogen is expected to become a viable option to decarbonise the remaining non-domestic buildings. At this stage, it may also be worth considering extending the hydrogen offering to nearby dwellings.

4.2.3 **Transport.** HM Government have legislated to ban the sale of new fossil fuelled cars from 2030. By this date, it is expected that almost 40% of private vehicles in Peterborough will be EV or plug-in hybrid, and by 2040, there will be around 80,000 plug-in vehicles registered in Peterborough. Figure 3 shows the projected uptake of electric vehicles across the city. Electric vehicle uptake of this scale will require over 50,000 domestic EV charging points (at a capital cost of around £32m) and consume 78GWh of electricity per year. A low emissions zone could help accelerate the transition to electric vehicles.

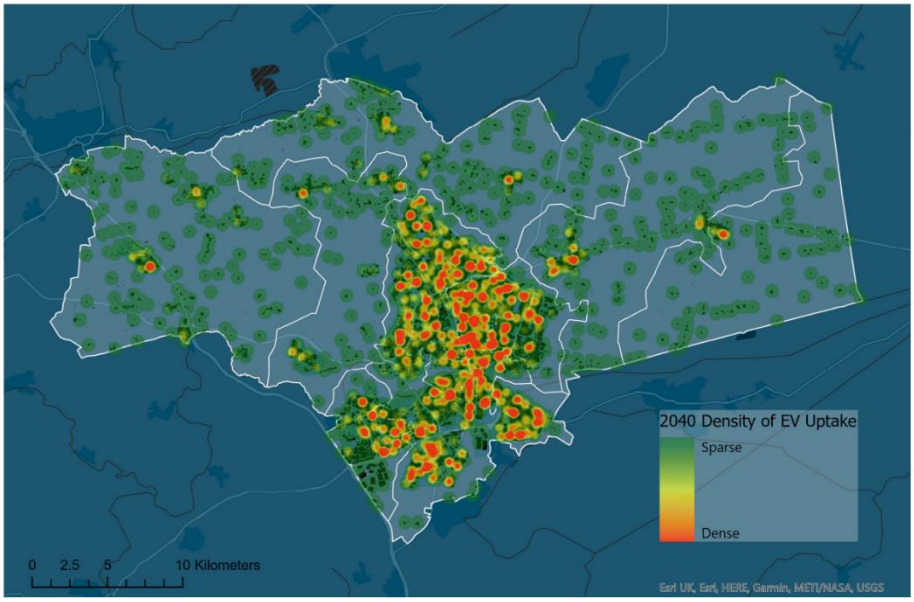

Figure 3: Projected density of electric vehicle uptake by 2040

Charging infrastructure will need to be installed to keep up with demand and provide consumer confidence to encourage the transition to electric vehicles. A mixture of publicly accessible and private residential chargers will be required. Residents with off street parking are assumed to charge their vehicles at home, whereas those without are expected to require public charging hubs, including at the kerbside and in car parks. Areas of high-density housing without off-street parking exist towards the city centre, as shown in figure 4. There are a number of fast (7-25 kW) and rapid (25-99 kW) chargers already installed in these areas. However, given the projected increase in electric vehicle demand, a subsequent increase in charging infrastructure is required in these areas.

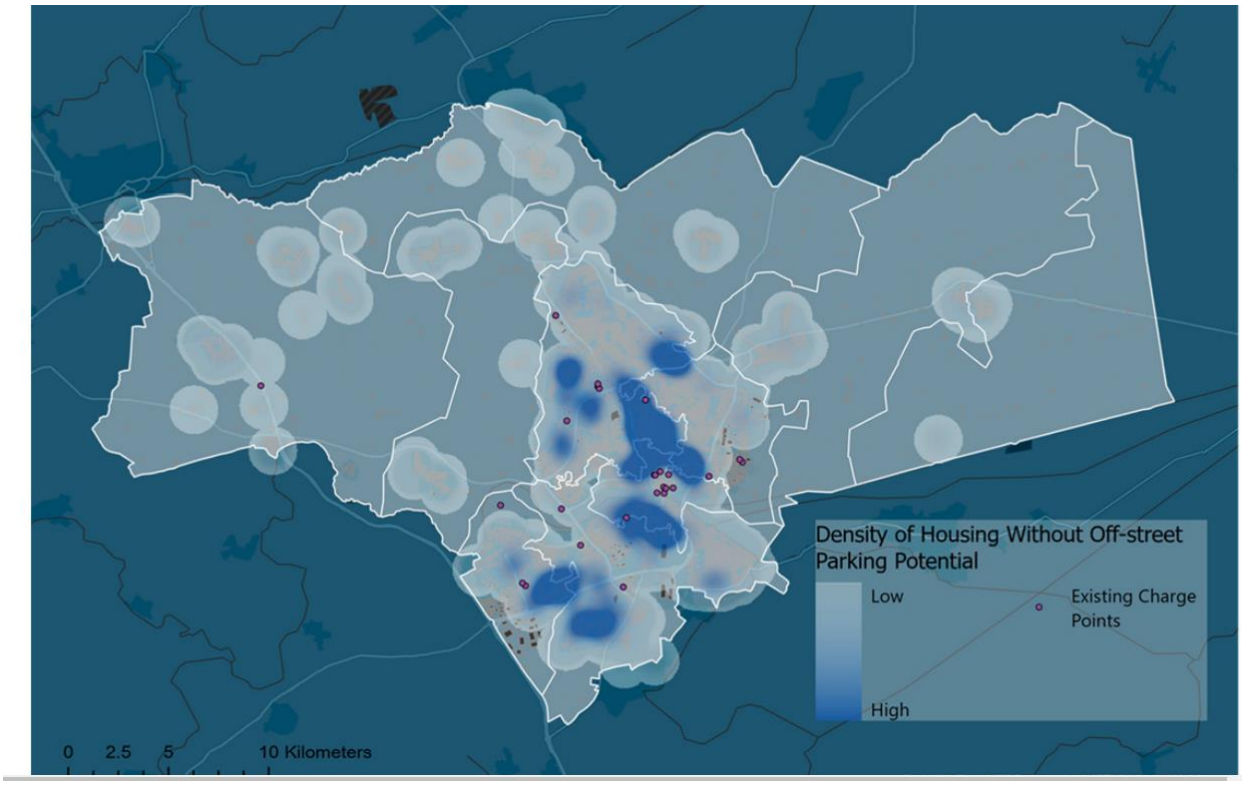

Figure 4: Density map showing houses without off-street parking

A survey carried out as part of this work found that a majority of residents of Peterborough are considering EVs as their next vehicle, but this was dominated by those with off-street parking available to them.

4.2.4 **Local generation.** Electrification of heat and transport is core to decarbonisation, and this will

increase Peterborough's annual demand for electricity from 880 GWh to 1,290 GWh by 2040. If this electricity demand is supplied by the national grid, then Peterborough's rate of decarbonisation will be limited by the rate that the grid decarbonises. The grid is expected to reach zero carbon by 2035 at the earliest.

Local renewable generation can bring economic benefits, reduce emissions earlier, and contribute to the decarbonisation of the national electricity system. Rooftop and ground-mounted solar have been studied to demonstrate the scale of local renewable capacity which would decarbonise Peterborough, however generation should be diversified alongside the deployment of storage to give a better security of supply.

A high-level assessment was conducted to give a high-level indication of the maximum contribution of ground-mounted solar to the future energy system. From this land area, it was found that deploying 1.35GWp (peak) of ground-mounted solar could be cost-optimal (subject to full feasibility analyses and site visits), which would generate approximately 1,975 GWh of energy per year. Again, in practice, this should be varied generation by a mixture of low carbon sources, including consideration of onshore wind.

Domestic rooftop solar could also provide a large contribution. It is estimated that deploying around 157 MWp of rooftop solar capacity could be cost-optimal (subject to full feasibility and site visits). This would require a capital investment in the region of £166m, however there would be significant social benefits to residents, especially those in fuel poverty. By adding in-home battery storage, more of the generated electricity could be consumed by the household, reducing the reliance on the network during peak times and reducing the amount of electricity purchased. The economic case for batteries can be marginal in today's market but is likely to change with the emergence of novel incentives such as time-of-use tariffs and falling battery costs.

4.2.5 **Electricity Network & Flexibility.** To meet the new demand from electric heating and transport, there will be a need to upgrade the electrical network, since some areas could see capacity increases to as much as 4x current levels. The current capacity on the high-voltage network should be suitable to accommodate electrification without the need for capacity upgrade in most zones, with only City North likely requiring an upgrade of the high-voltage feeders.

However, there is a significant constraint on the low-voltage network with capacity upgrades being required for both substations and feeders across the whole of Peterborough (especially in rural zones).

The core approach used assumes that additional demand is met through increased capacity however further work would be required with District Network Operators to identify the most cost-effective means of providing the capacity. This may be via flexibility services which could be considered and deployed to reduce the investment required and make the network suitable for the future. Smart appliances which can shift the times they use electricity without any loss in performance can provide this flexibility. By shifting demand such that EVs were charged overnight and large thermal stores were used in dwellings, ESC's modelling showed the overall peak electrical demand for Peterborough could be reduced by around 20%.

Without flexibility, the total capital investment required would be between £300m and £400m.

4.2.6 **Gas Network & Hydrogen.** Although much of the current fossil gas demand for heating is expected to become electrified within Peterborough, the gas network still has an important part to play in the future energy system. Some areas of the non-domestic sector require high temperature heat for specialised industrial processes that cannot be electrified and therefore will remain on fossil fuel gas before considering the transition to hydrogen in the mid-2030s. This provides an opportunity for nearby properties to also connect to a hydrogen network.

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

4.3 **Socio-economic costs and benefits.** Net zero offers the opportunity to achieve localised and

immediate benefits. For example, warmer retrofitted dwellings mean less damp and mould and therefore a reduction in asthma and other respiratory diseases. Reduced energy usage would also assist those in fuel poverty. Economic benefits through net increases in jobs to design, install, upgrade, and maintain the low carbon measures would likely also be seen.

More generally, the transition away from fossil fuel burning would likely increase the health of residents through improved air quality.

4.4 **Project identification.** The LAEP identifies both early actions and long-term scale-up activities needed to decarbonise in a cost-effective way, along with key enabling actions and decision points to stay on track and navigate future uncertainty.

Several pathways to net zero were modelled; actions that are common across all scenarios are considered low regrets and can be undertaken as soon as possible. Actions that are not common will require decision points and early enabling actions to remove barriers.

4.4.1 Pipeline of projects

Low regrets activities

- Basic efficiency upgrades for almost every home with remaining upgrade opportunities
- Heat pumps installed in off-gas grid homes, where neither district heat networks, or hydrogen are likely to reach
- Heat pumps installed in on-gas grid homes which are far from any likely heat networks or industrial users of hydrogen
- District heat network expanding from the proposed PIRI scheme to serve public, commercial and private buildings in core city centre locations
- EV chargers for homes with off-street parking
- Solar PV on rooftops and low value areas of land

Activities which require a decision to be made

- Deeper building efficiency upgrades which will tend to have long payback periods, but can have additional benefits such as fuel poverty alleviation and employment creation
- Further expansion of heat networks to serve many more homes beyond the core city centre areas – if this can be implemented in the near future it could provide additional carbon savings and put Peterborough on a path to net zero in a shorter timeframe but would be an exceptionally ambitious scale of project.
- Hydrogen to heat homes close to areas of industrial use instead of heat pumps; once more evidence is available around the viability, cost, emissions and policy around hydrogen for building heating in Peterborough, a decision can be made about homes in these areas.
- Further deployment of ground-mounted solar PV to reduce emissions from consumption of grid electricity. In theory, very large areas of land could be used to produce most of Peterborough's energy requirements on an annual basis, though the occupation of this extent of land could be challenging and will need to be balanced against alternative land uses. A balance can be found between larger heat network coverage or larger renewable deployment, although the scale of both in any combination is likely to be challenging.
- Delivery of electric vehicle charging infrastructure through by EV hubs, kerbside charging or other options.

Enabling actions

- Target an information and engagement campaign at rural homeowners around energy efficiency and heat pumps
- Collaborate with social landlords to identify properties for retrofit
- Work with experts to advances plans for the district heat network
- Seek advice, funding and planning permissions for energy efficiency roll-out

4.5 **Risks.** There are risks and benefits associated with each of the technologies and options explored in the LAEP. Peterborough's actual transition is expected to vary from what is presented in the LAEP. Therefore, before making any widescale and significant commitment to one option

or technology over another, evaluation of multiple factors will be needed. In addition, there may be additional market, policy and regulatory change that could also result in a need to reconsider aspects of the pathway and LAEP.

4.7 **Delivery approach to developing and connecting projects to unlock investment.** The Energy Systems Catapult recommends the following five next steps to unlock investment to fund delivery of projects within the LAEP.

Prioritise – Prioritise projects based on ownership of assets, carbon emission saving potential, delivery of co-benefits and risk profile
Assess – Undertake desktop feasibility to understand costs, conditions and impacts to develop business cases
Connect – Assess business model delivery routes
Engage – Identify key stakeholders, including local residents
Design – Undertake engineering design to progress the project design and investment plan

4.8 **Next steps.** The LAEP was developed in collaboration with Council officers and staff from the local District Network Operators and the Gas Distribution Operator. The Energy Systems Catapult will be hosting a workshop with a wider range of stakeholders to discuss the findings of the LAEP and explore potential projects and solutions to any barriers that may exist. This will begin informing the "prioritise" stage of the delivery approach.

It is proposed that this stakeholder group is established as a longstanding group to continue to lead the delivery of the LAEP and progress towards the development of viable business cases and unlock investment. It is proposed that Peterborough City Council act as the group chair. Additional stakeholders may join to reflect proposed decarbonisation activities.

It is proposed that the findings of the LAEP be used to develop the City-Wide Climate Change Action Plan. This base line of the current and projected energy demands of the city will be used to demonstrate the scale of the challenges and highlight any areas which need urgent and significant activity to decarbonise. The identified and prioritised projects, as supported by the stakeholder group, will be included in the City-Wide Climate Change Action Plan. As delivery of the proposed LAEP projects progresses, later versions of the City-Wide Climate Change Action Plan may include details of activities across the Prioritise, Assess, Connect, Engage and Design stages. The activities which have been identified as requiring key decisions will be explored within the City-Wide Climate Change Action Plan. This information will be supplemented with data and insight relevant to areas not covered within the LAEP (an estimated 30% of the city's emissions). The City-Wide Climate Change Action Plan will be developed following engagement with the public and local businesses and organisations.

5. CONSULTATION

5.1 The LAEP was developed in collaboration with council officers and staff from the local District Network Operators and the Gas Distribution Operator. The Energy Systems Catapult will be hosting a workshop with a wider range of stakeholders to discuss the findings of the LAEP and explore potential projects and solutions to any barriers that may exist. This will begin informing the "prioritise" stage of the delivery approach.

Public Engagement will commence on the development of the City-Wide Climate Change Action Plan ahead of council adoption.

6. ANTICIPATED OUTCOMES OR IMPACT

6.1 It is anticipated that the Climate Change and Environment Scrutiny Committee will support the use of the Local Area Energy Plan in the development of the City-Wide Climate Change Action Plan and support the establishment of the stakeholder group to deliver upon the Local Area Energy Plan.

7. REASON FOR THE RECOMMENDATION

7.1 The Local Area Energy Plan represents the most comprehensive insight known about Peterborough's current and future energy demand. Developing the City-Wide Climate Change Action Plan using the modelled findings and proposed projects will lead strengthen the plan as it features reliable, evidence-based projections.

8. ALTERNATIVE OPTIONS CONSIDERED

8.1 The alternative options considered were:

1) Do not incorporate the findings of the LAEP into the City-Wide Climate Change Action Plan. This option was rejected as the LAEP provides a strong evidence base upon which to develop the action plan.

2) Do not establish a stakeholder's group to continue delivery on the Local Area Energy Plan. This was rejected as there are many influential stakeholders across the city who it will be essential to involve in plans for decarbonisation if plans are to be successful. Council has previously supported the establishment of a Partnership Group to deliver upon city wide decarbonisation.

9. IMPLICATIONS

Financial Implications

9.1 There are no direct financial implications associated with this report.

The LAEP highlights the finance needed to decarbonise the city. This significant value will require multiple sources of funding, which may include private investment, payment of households retrofitting their own properties and government grants. Council investment may be sought in the future to fund feasibility or enabling works to occur.

Legal Implications

9.2 This paper does not seek authorisation to deliver upon an individual project, and any legal implications will be explored when doing so.

Equalities Implications

9.3 The Independent Commission on Climate, established by the Cambridgeshire and Peterborough Combined Authority, detailed an approach to a just transition to net zero. This will be followed in development of the City-Wide Climate Change Action Plan.

This paper does not seek authorisation to deliver upon an individual project, and any equalities implications will be explored when doing so.

Rural Implications

9.4 Some actions identified in the LAEP differ between rural and urban areas, due to differences in housing build type, density of housing and availability of off-street parking.

This paper does not seek authorisation to deliver upon an individual project, and any rural implications will be explored when doing so.

Carbon Impact Assessment

9.5 There are no direct carbon impacts associated with using the Local Area Energy Plan to inform development of the city-wide climate action plan. There may be minimal carbon emissions associated with the hosting of a stakeholder group if meetings are held in person, however the majority of meetings are expected to be held online. Use of the evidence and projections included in the Local Area Energy Plan to develop the City-Wide Climate Change Acton Plan, will

strengthen the action plan, giving a higher chance of deliverability, and therefore it is expected that city wide carbon emissions will reduce due to the use of the Local Area Energy Plan as a guide.

10. BACKGROUND DOCUMENTS

Used to prepare this report, in accordance with the Local Government (Access to Information) Act 1985

10.1 None.

11. APPENDICES

11.1 N/A