Committee(s): Policy & Resources Committee	**Dated:** 21/09/2023
Subject: City of London - Local Area Energy Plan (LAEP)	**Public**
Which outcomes in the City Corporation's Corporate Plan does this proposal aim to impact directly?	4; 5; 10; 11.
Does this proposal require extra revenue and/or capital spending?	**No – please see section on financial implications**
If so, how much?	**N/A**
What is the source of Funding?	**N/A**
Has this Funding Source been agreed with the Chamberlain's Department?	**N/A**
Report of: Acting Executive Director for the Environment	**For Decision**
Report author: Aled Thomas, Department for the Environment	

Summary

The City Corporation's Climate Action Strategy committed to producing a Local Area Energy Plan (LAEP) for the Square Mile. The LAEP Executive Summary is included as Appendix 1. This report provides a summary of the LAEP produced as well as initial considerations on the implementation phase.

The LAEP sets out a routemap and priority intervention areas for transitioning the energy system in the Square Mile to net-zero by 2040, in line with the ambitions of the Climate Action Strategy. It sets out high-level estimates of the capital expenditure required to deliver the LAEP, the governance arrangements for supporting implementation and a set of short and medium-term actions to be taken forward by the City Corporation and local stakeholders.

A LAEP is becoming the established approach to delivering effective local energy planning, led by local government and developed collaboratively with defined stakeholders. The approach is encouraged by Ofgem, the energy regulator, and approximately 20 local authorities have adopted LAEPs to date. The City Corporation commissioned Arup to produce the LAEP and a broad range of stakeholder were engaged in its development, from the provision of key data through to proposed actions. The following summarises the key points and recommendations:

- The **recommended pathway to a net-zero energy system by 2040 is a blend of deep retrofit interventions applied to the City's building stock and heat networks, using both centralised and decentralised heat pumps**.

- **Seven priority intervention areas** should be the focus for the City Corporation and wider stakeholders within the City in pursuing the recommended pathway. The areas are - **maximising the energy-efficiency of buildings; maximising**

rooftop PV; decarbonise transport; decarbonise heat; implement waste capture and exchange; reinforce the electricity distribution network; rollout energy system flexibility.

- A **routemap and proposed actions** across the 7 priority interventions areas. Each action includes a description, a proposed action owner, key stakeholders and suggested City Corporation resources commitment to take forward the action. The actions are mapped against a short- and medium-term timeline.

- An **indicative capital expenditure programme of £1.2bn - £3.1bn+ up to 2040 has been calculated as a high-level estimate. which underlines the high level of investment required to achieve the desired goals of a net-zero energy system** which includes some key uncertainties as to the costs of the specific interventions to be pursued. The proposed actions are subject to further study and feasibility assessments.

- A **spatial analysis of the potential mix of low carbon technologies** (rooftop solar; air-sourced heat pumps; electric vehicle chargers; and heat networks) across 11 sub-zones in the Square Mile, based on UKPN's electricity sub-stations.

- **Three specific initiatives should be considered as a way of enabling the delivery of the LAEP** – a dedicated **LAEP committee** to include key stakeholders identified in the plan; a **business-led grouping to support the decarbonisation of commercial buildings**; and the procurement of a **strategic energy partner** to unlock opportunities regarding the scaling and implementation of some of the actions.

The LAEP provides a valuable evidence-base for a whole-system approach to energy decarbonisation in the Square Mile. It sets out the changes needed to the local energy system and built environment detailing 'what, where, when and by whom.'

The following sets out the proposed next steps:

- A Square Mile 2040 partnership is one of the agreed CAS actions for this year and is in the process of being established. The partnership will oversee the implementation of the LAEP and related climate actions in the City and will formalise the collaborative arrangements developed in the production of the LAEP. The partnership proposal is set out in Annex 2.

- The partnership would be the forum to assess the proposed actions; explore and confirm commitments; and develop more detailed delivery plans, including resourcing. The City Corporation will seek to take forward those actions allocated to it, through existing CAS programmes and through other means. For example, the CAS programme is already supporting work on those recommendations relating to the energy-efficiency of buildings, heat networks and multi-offtake Power Purchase Agreement.

- Those recommendations which have strategic implications for the City Corporation, such as the procuring a strategic energy partner to enable the

implementation of the LAEP, will require more detailed exploration and assessment. The committee will be updated on the progress with these assessments as they develop.

- In the last few weeks, the GLA has confirmed it will be supporting and funding the development of a sub-regional LAEP for Central, Inner East and North London, to include the City of London and 10 other London boroughs. This work will build on the City of London LAEP and facilitate a common approach to cross-boundary energy planning in terms of the provision of data and taking forward specific actions e.g. heat networks. The work will be completed by March 2024 and the City Corporation will be fully involved.

Recommendation(s)

Members approve the recommended pathway to a net-zero energy system in the City (points 21-24 below) and priority intervention areas (point 25).

Members note the routemap and proposed actions (summarised in points 26-30 below).

Members endorse the proposal for the Square Mile 2040 partnership to oversee the further development and implementation of the Local Area Energy Plan, in particular the routemap and proposed actions (summarised in points 26-30).

Main Report

Background

1. In April 2023, the Committee approved the Climate Action Strategy Project Plans for Year 3 (2023/24). The development of a 'City of London Local Area Energy Plan' was one of the actions of the CAS Square Mile Project Plan.

2. As the UK transitions to net zero, our energy system will be required to transform from the current, predominantly centralised, fossil fuel intensive gas and electricity system to a flexible, decentralised predominantly electrified low carbon system.

3. Local Area Energy Planning (LAEP) is a data driven and whole energy system, evidence-based approach that sets out to identify the most effective route for the local area to contribute towards meeting the national net zero target, as well as meeting its local net zero target. The LAEP process is led by local government and developed collaboratively with defined stakeholders.

4. The City Corporation has worked with Arup and a range of external stakeholders to produce the Plan, set out in Appendix 1. The following technical analysis has been carried out:

- Baselining current demand and infrastructure for provision of heat, cooling, power and transport.
- Estimations of future energy demands, accounting for climate change, building energy efficiency improvements and the effects of new development
- Modelling of key decarbonisation scenarios including heat pumps, heat networks and waste heat, renewable energy generation, transport electrification and the future role of hydrogen
- Carbon emissions and energy pathways analysis and high-level costing.

5. The results are a spatial plan for the City that sets out the change needed to the local energy system and built environment and the potential combination of low carbon technologies in different parts of the Square Mile. It defines a long-term vision for a clean energy system and identifies near-term actions and projects, providing stakeholders with a basis for taking forward activity and prioritising investments and action. Additional detailed design work is required for identified projects to progress to implementation.

Current Position

6. The move towards decarbonisation and a more decentralised energy system, will increase the level of interaction between local interventions and actors. Currently, the decisions made by these stakeholders are often made in isolation, with divergent plans, objectives, incentives and actions across spatial and energy planning frameworks.

7. Recent modelling work by the Energy System Catapult revealed that without local planning and coordination to manage a higher energy demand, the power system could end up increasing by almost 40% in capacity terms and require increased compensatory investments in production, storage transmission and distribution to help balance supply and demand.

8. The City of London LAEP attempts to secure the benefits of a more coordinated approach to energy planning, action and investment in the Square Mile.

Sub-regional Local Area Energy Plans

9. In August 2023, the Greater London Authority confirmed it had secured funding to develop 2 sub-regional Local Area Energy Plans in London in 2023/24. These sub-regional areas will cover i) Central, Inner, East and North London; and ii) South London. The City of London will be part of the former grouping together with Camden, Enfield, Hackney, Haringey, Islington, Newham, the Royal Borough of Kensington and Chelsea, Tower Hamlets, Waltham Forest and Westminster.

10. The sub-regional work will provide added value to the City of London LAEP by facilitating cross-borough energy planning and produce data visualisation tools to inform plans and actions.

Options

11. Drawing on extensive technical analysis, the LAEP assessed emission reduction pathways in three ways:

    i) a series of **'optimised' scenarios** drawing on current energy consumption and future energy demand in the City;
    ii) the **cumulative emissions** of these pathways up to 2027 and 2040 (key timelines for the Climate Action Strategy).
    iii) A multi-criteria assessment of non-technical factors (achieving CAS net zero targets; benefits to society; affordability; deliverability)

    These assessments are summarised below.

Optimised scenario

12. The LAEP sets out a series of 'optimised' scenarios which draws on emission pathways, drawing on current energy consumption and future energy demand. In addition, a multi-criteria assessment (covering net-zero target alignment, benefits to society, affordability and deliverability) has been used to identify and compare other criteria that are important to the City and the City Corporation.

13. An examination of the current energy consumption and associated emissions across the City has produced the definition of an energy baseline, from which this study builds upon. Future energy demands have then been projected out to 2040 accounting for the development of new buildings, retrofit of existing buildings and future transport projections and associated decarbonisation.

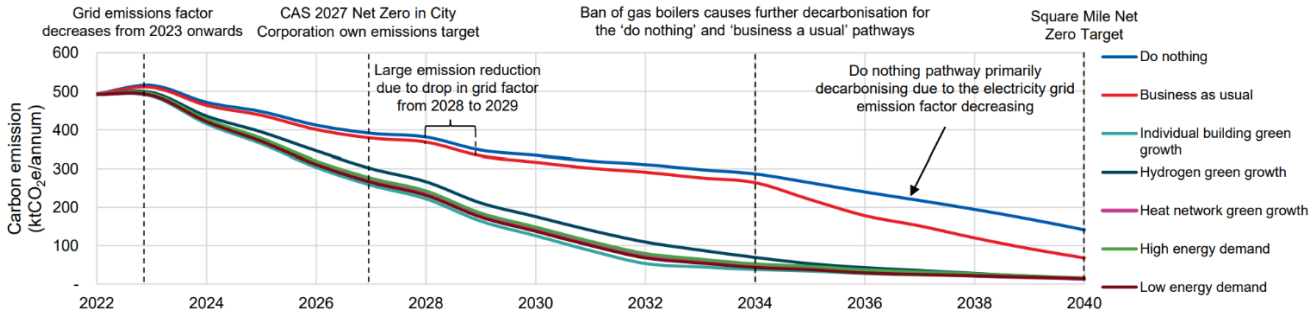
14. Variations in these inputs were combined with energy system components to test future energy scenarios and pathways:

    - **High Energy Demand** - tests the potential maximum system demand and resulting electricity grid capacity/upgrades.
    - **Low Energy Demand** - tests the synergies of both centralised (heat networks) and decentralised (building-level) heat pump deployment.
    - **Green Growth** - tests an 'ideal' low carbon future demand scenario regarding new development and efficient energy consumption reduction via considerable retrofit of the existing building stock. Within green growth, three pathways are analysed:
        - Individual building – decentralised electrification of heat on a building-by-building basis
        - Heat Network – maximum heat network deployment
        - Hydrogen – conversion of the current gas grid to low carbon hydrogen

15. The following figure displays this series of future pathways that demonstrate how the City's carbon emissions could change between now and 2040. The business as usual curve shows the current trajectory, whilst the green growth curves reduce emissions through deeper building energy efficiency improvement, and deeper

electrification, hydrogen or heat network rollout, representing the scale of the opportunity to reduce carbon

The following figure sets out the City of London projected annual carbon emissions based of energy transition pathways.

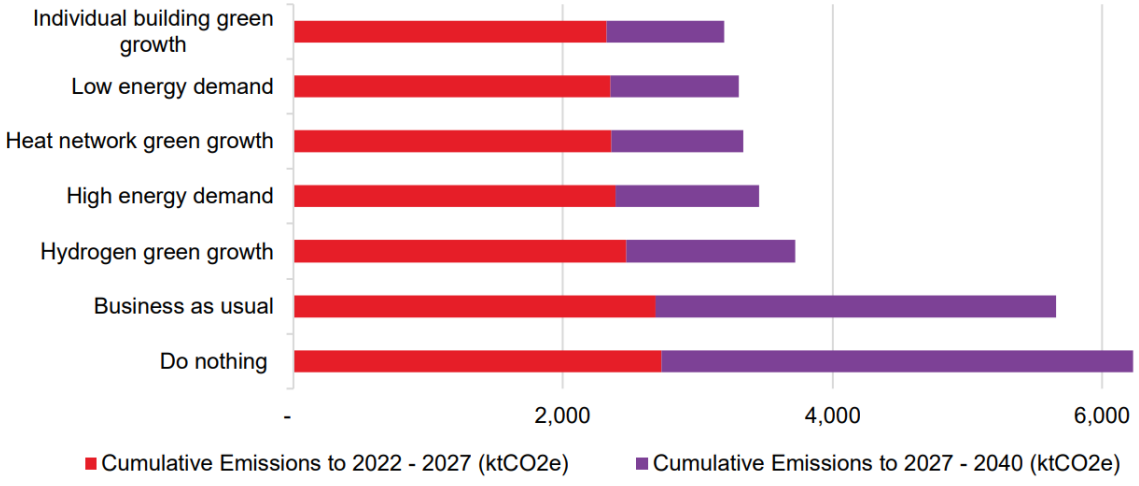


The 2040 carbon emissions for the 5 optimised scenario pathways are set out in the figure below.

Pathway	2040 emissions (ktCO2e)
High energy demand	16.02
Low energy demand	14.64
Individual building green growth	14.15
Heat network green growth	14.01
Hydrogen green growth	12.64

Cumulative emission scenarios

16. The following figure sets out the modelled cumulative emissions of each pathway from 2022 to both 2027 and 2040.



17. This indicates that the lowest cumulative carbon emissions are associated with the individual building green growth pathway. The low energy demand scenario is associated with a lower level of building development and hence is not reflective of the likely demand for growth in the Square Mile – it is therefore not included within the recommend future pathway.

Multi-Criteria Assessment (MCA)

18. In addition to the analysis undertaken for energy, carbon and infrastructure of the future energy system a multi-criteria assessment has been used to identify and compare other criteria that are important to the City and the City Corporation.

19. Four overarching criteria themes were defined that encompass the City Corporation's wider ambition beyond the carbon focussed analytical modelling undertaken for the scenarios - achieves CAS net zero targets; benefits to society; affordability; deliverability.

Proposals

20. The scenario modelling outlined in the previous section resulted in:
    i) a recommended emission reduction pathway;
    ii) priority intervention areas;
    iii) a routemap and proposed actions;
    iv) governance, implementation, monitoring and review.

These are summarised in the sections below

Recommended pathway

21. The modelling resulted in a recommended pathway which is a blend of the heat network and individual building green growth pathways. It focuses on deep retrofit interventions to the building stock in the Square Mile and heat networks which combine both centralised and decentralised heat pumps and other low carbon technologies where feasible. Hydrogen was discounted due to the lack of credible plans to supply hydrogen into the City within the timeframes required.

22. The level of heat network deployment will be driven by up-coming Heat Network Zoning policy, currently under development by the UK Government through its Energy Security Bill. The UK Government has identified heat networks as playing a crucial role in delivering its net-zero strategy. The zoning policy will introduce a formal regulatory framework for district heating in England and Wales to incentivise growth and investment. It will establish a zoning coordinator role for enforcing zoning requirements and it will require certain buildings and heat sources to connect to a heat network. The City is already participating in the Advanced Zoning Pilot run by the Department for Energy Security and Net Zero.

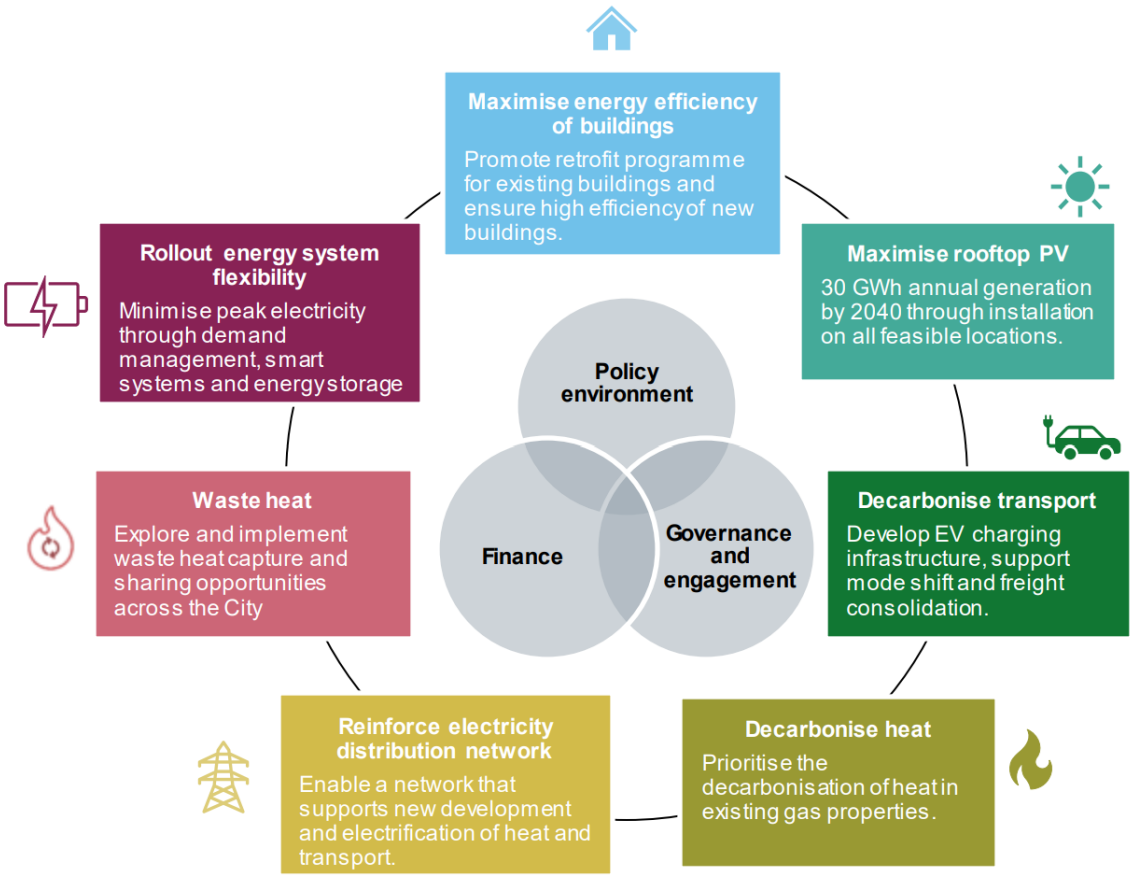
23. Where buildings are not mandated to connect to heat networks, it is recommended that individual heat pumps are used to decarbonise heat. Office buildings should also participate in wider City heat networks where possible as heat suppliers, sharing rejected thermal energy from their cooling systems. The new Local Plan

and Supplementary Planning Document on Sustainability will reinforce this approach.

24. Due to the quantum of office buildings present, there may also be opportunities for the area to become a heat exporter at certain times of the year, where heat rejected is supplied into surrounding areas, where residential heat demands are higher.

Priority Intervention Areas

25. The recommended pathway is further developed into a series of priority intervention areas together with their interdependencies, the level of investment required for each area, uncertainty risk analysis and costing considerations. These priority intervention areas are set out in the following figure.



Routemap and Proposed Actions

26. This section of the LAEP sets out a number of specific actions within each of the seven intervention areas (summarised in the figure above), alongside high-level routemaps to set these actions out over time. An action priority matrix has been created to identify the actions that are high priority (higher effort but higher impact) and quick wins (lower effort and higher impact) to aid action prioritisation.

27. Actions are described in further detail with the action owners, other stakeholders involved and resource commitments from the City Corporation detailed. There will be a need for additional third-party resources as well.

28. The route maps provide a focused view of actions that will be taken in the coming decade, while also showing key milestones on the decarbonisation trajectory to 2040. Each intervention requires four key elements to be successful:

    - Mobilising finance
    - Strong and consistent policy framework
    - Delivery owners
    - Local engagement

29. The role that the City Corporation can play for each intervention will vary. Some intervention areas will call for direct action from the City Corporation in the material delivery of programmes, while other interventions will require the City Corporation to act more as a facilitator for market driven change.

30. Although the exact form of the decarbonised energy system in 2040 is uncertain, there are actions that can be taken now to maintain the ability to meet the 2040 and interim targets.

Governance, implementation, monitoring and review

Governance

31. A significant aspect of developing this plan was the engagement of local and wider energy system stakeholders. This engagement process was utilised to both collate and verify data used within the modelling and enable the development of actions for both the City Corporation and wider stakeholders, which accompany the recommended pathway.

32. Meeting the recommended pathway is highly dependent on a number of factors outside of the City Corporation's control, or at least heavily reliant on action from others, such as delivering significant energy efficiency improvements in commercial buildings, grid reinforcement at scale, heat network deployment, maximising solar generation and capturing waste heat. The City Corporation will play a key role in enabling and influencing others to ensure this plan and the recommended actions are undertaken.

33. To support the delivery of the actions defined within this LAEP it is recommended to establish a City of London LAEP partnership to include key parties from the wider stakeholder group identified in the proposed actions.

Implementation

34. A Net-Zero Delivery Unit will be established to support the implementation of the plan. This will consist of dedicated staff from the City Corporation as well as staff and resources from the wider partnership.

35. Beyond the partnership structures, the LAEP recommends two key enabling actions:

    - **Sustainable City Charter**. This business-led group will support the decarbonisation of commercial buildings and include building owners/operators in the area.
    - **Procurement of a strategic energy partner(s)**. This could unlock opportunities regarding the scaling and implementation of some of the actions that have been defined.

    These actions will require further assessment by the City Corporation and partners.

Monitoring and review

36. The LAEP recommend the City Corporation identify a set of indicators against which to measure progress in meeting the LAEP objectives, summarising these in an Annual Monitoring Report.

37. Although spanning out to 2040, this plan and the associated actions will need to be reviewed and revised on a 3- to 5-yearly basis. The revisions will be focussed on progress to date, developments of targets and ambitions, and the uptake of novel mechanisms and technologies that might assist in accelerated decarbonisation of the whole energy system.

Key Data

38. The LAEP sets out key data, scenarios and modelling on an emission-reduction pathway with recommended actions to achieve a net-zero energy system in the Square Mile by 2040, in line with the ambitions of the Climate Action Strategy.

Corporate & Strategic Implications

39. The Local Area Energy Plan is a key component in delivering the ambitions of the Climate Action Strategy, in particular the goal of supporting a net-zero Square Mile by 2040.

40. It also connects to various other important policy initiatives such as the new City Plan, the Transport Strategy, the forthcoming Infrastructure Strategy and other Climate Action Strategy actions.

Financial implications

41. It is clear the fulfilment of the energy strategy envisioned in the LAEP would require a substantial programme of capital investment up to 2040 by a range of parties. The Plan includes a high-level estimate of capital expenditure of between £1.2bn - £3.1bn+ for the recommended scenario to reach net-zero by 2040 in line with the targets set out in the Climate Action Strategy.

42. The Climate Action Strategy has funded the development of the LAEP and is also providing resources to initiate some of the actions identified in the LAEP, for example on heat networks and the Multi-Offtake Power Purchase Agreement.

43. However, the scale of investment to deliver the Plan would require additional public and private funding. A substantial part of the investment needed to undertake deep retrofit of buildings and the expansion of heat networks is anticipated to come from the private sector, with public funding focused on pre-commercial activity or de-risking particular schemes.

44. The main proposal in the LAEP for attracting commercial investment at scale is for the City Corporation to procure a strategic energy partner as a way of attracting commercial investment at scale. This model has been established or is being pursued by local authorities in other parts of the UK e.g. Bristol and Coventry. This proposal will require further detailed assessment and will also need to consider the future regulatory framework for heat networks in particular.

45. The partnership established to oversee the implementation of the LAEP will be tasked with developing an implementation plan which captures these funding possibilities and options. As part of this process, the City Corporation will explore the suitability of various funding mechanisms, such as the Community Infrastructure Levy, in supporting the planned actions.

46. At this stage, there are no requests for additional City Corporation funding. Where additional investment and expenditure is required, these will be subject to 'business as usual' governance and approval processes for capital and revenue expenditure.

Resource implications

47. The Climate Action Strategy is providing initial funding to coordinate the development and delivery of the LAEP. The Square Mile workstream manager has led the development of the LAEP, as part of the Square Mile project plan, and will continue to coordinate the implementation. CAS funding has also been provided to initiate some of the immediate LAEP actions on heat networks and the Power Purchase Agreement. Further consideration will need to be given as to how the Square Mile project plan and other CAS workstreams can resource the implementation phase, while recognising several actions will be for partner organisations to lead.

48. As set out in the LAEP and the approved Square Mile project plan for this year, the resources provided to support delivery will be brought together into a Net-Zero Delivery Unit (NZDU) to enable a coordinated approach to implementation and build the necessary capacity and capability. The NZDU would not be restricted to City Corporation staff but will also encompass those individuals from partner organisations or contracted consultants involved in the delivery of specific actions. The NZDU involve will also act as the secretariat and project team for the Square Mile 2040 Partnership.

Legal implications

49. Part of the recommended pathway and actions relate to upcoming primary legislation regarding energy and heat zoning, and as such the City Corporation will monitor and (if necessary) seek to influence such powers as they evolve through the parliamentary process.

Risk implications

50. A risk analysis of the priority intervention areas is included in the LAEP (page 70). As expected from a plan up to 2040, there are significant uncertainties and risks related to the future energy system, not least in terms of wider policy changes as well as technology development, adoption and cost. The LAEP is an attempt to manage these risks in a planned and coordinated way, in partnership with local stakeholders.

Climate Implications

51. The Local Area Energy Plan is a central part of the Climate Action Strategy and delivering on the ambition of a net-zero Square Mile by 2040.

Equalities, Resource and Security implications

52. None

Conclusion

53. The Local Area Energy Plan sets out a whole-system approach to energy decarbonisation in the City. It provides a robust evidence-base and routemap for collaborative action over the short and medium-term to support a net-zero Square Mile by 2040.

54. A dedicated partnership will be established to oversee the delivery of the LAEP and other related actions of the Climate Action Strategy. The partnership will include key local stakeholder, many of whom contributed to the development of the LAEP.

Appendices

- Appendix 1 – City of London Local Area Energy Plan (Summary)
- Appendix 2 – Square Mile Partnership 2040
- Appendix 3 - City of London Local Area Energy Plan (Full) - Circulated Separately

Background Papers

- Year 2 quarter 4 update on Climate Action Strategy & Year 3 Plan, 20th April 2023

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