24/4 Carbon Free Energy London

How a 24/4 carbon free energy approach can help London

Key information

Publication type: General

Publication status: Adopted

Publication date: Tuesday 2 July 2024

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1. 24/4 Carbon Free Energy London roadmap report

A 24/7 Carbon Free Energy (CFE) approach promotes matching energy demand to carbon free sources at every hour of the day, by using flexibility enhancing technologies (for example, demand side management tools, battery storage, carbon reporting tools) and investment in carbon free energy generation.

A 24/7 CFE approach can enable ‘carbon flexing’. Carbon flexing is an approach that matches electricity demand to the carbon intensity of electricity, daily, hourly or moment to moment. This approach can incentivise flexibility in energy usage to encourage decarbonisation and generate carbon savings. One of the criticisms of replacing fossil fuel generation by renewables is that of intermittency. Flexing demand (rather than supply, as with fossil fuels, particularly gas) is an answer to that.

In 2022, C40 and Google launched a joint 24/7 Carbon Free Energy for Cities programme. This helps cities around the world run on clean energy at every hour of the day. As part of this programme, three pilot cities – London, Copenhagen and Paris – received support from C40 to develop and implement innovative approaches to decarbonise their energy use.

The 24/7 Carbon-Free Energy for London – Implementation Roadmap was commissioned by the GLA as part of this programme, with funding from Google through C40 and produced by Arup, Energy Unlocked and Quantenergy.

The report finds that:

- A 24/7 CFE approach can help asset owners and operators understand their buildings better and make improved operational and investment decisions to decarbonise their electricity use.

- Between 4–8 GW of demand-side flexibility capacity could exist across London by 2030 (for context, peak demand in Scotland in winter is 5.5 GW).

- In addition, London can avoid up to 9% of its 2030 grid electricity residual emissions through citywide demand-side carbon flexing of its demand-side capacity (this is additional to 22% residual emissions modelled in the Accelerated Green Pathway).

- 80% of major carbon-driven demand turn-down events are expected to occur during the typical electricity network peak hours, contributing to reducing pressure on electricity networks in addition to generating carbon savings.

- Domestic buildings offer the most flexibility opportunities of all building types – representing 64% of the total carbon reduction potential in our most ambitious scenario, mainly from distributed thermal storage (heat pumps for hot water tanks as well as heating). 17% of the opportunity comes from office buildings.

The report recognises the need for a coordinated approach to harness the potential of 24/7 CFE in London and beyond. This requires involvement of a range of actors, including local authorities, central government, network/systems operators, regulators and market actors. All of whom have a fundamental role to play in creating the institutions, regulations, information systems and physical infrastructure that will enable carbon flexing practices.

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