MAYOR OF LONDON

FlexLondon Challenge Key Findings

Unlocking London's flexibility to reach net zero

May 2021

A Mayor of London Energy for Londoners Programme 2018-2020

Greater London Authority, Energy Systems Team: Daniel Barrett and Rick Curtis
Delivery Team: Mark Bornhoft, Robert Friel, Aneysha Minocha and Molly Webb

---

1 Why FlexLondon?

As part of delivering London's goal to become a zero-carbon city by 2050, The Mayor's £34m Energy for Londoners programme aims to make London's homes warm, healthy and affordable, its workplaces more energy efficient, and to supply the capital with more local clean energy.

The FlexLondon project supported the delivery of the Mayor's objective by addressing the 'demand side flexibility' that is considered a necessary enabler of decarbonisation in an energy system increasingly connected to large scale or decentralised energy resources such as solar or wind, local dynamic energy loads in buildings or on streets that will come with new heating technologies, increased smart devices and electric vehicles. Nationally, the UK government estimates the benefits of a smart flexible energy system to be *£17-40 billion to 2050 (or between £2.9 billion - £8 billion annually in 2030)*.[1]

The Greater London Authority's modelling shows that there is up to 1 GWe of demand side response 'flexibility' in London in 2050. Demand side flexibility creates value throughout the energy system. FlexLondon's objective was to design a way to unlock this 1 GW potential by creating value for users and system operators. Phase 1 of FlexLondon sought out large energy users across 9 sectors with the potential to be most flexible in London alongside strategic stakeholders including the borough councils, UKPN and TfL to understand the value they were gaining from becoming more flexible, the barriers to flexibility, and their interest in participating in a programme that would allow them to influence design of flexibility markets for London; 18 organisations were interviewed in some depth.

[1] https://www.theccc.org.uk/wp-content/uploads/2015/10/CCC_Externalities_report_Imperial_Final_21Oct20151.pdf

FlexLondon Phase 2 generated 9 challenges with associated project proposals, 12 'sprints' to deliver projects sourced from a 100+ strong community of innovators, facilitated by a small project team, with the aim to deliver new flexibility by the end of 2019.

Phase 2 aimed to create an environment bringing together a diverse range of flexibility challenges with a pipeline of innovators to better understand how to shorten the time it takes to commercialise flexible energy services in London, contributing to a smart, resilient zero-carbon city. 3-4 replicable use cases were identified during Phase 2.

- 2 Flexathon Events - Q4/2018
- 1 data-led Hackathon – June 2019
- 28 major energy users engaged
- 122 innovators registered with FlexLondon
- 12 Project Sprints identified
- 90 solutions proposed by innovators
- 4 progressed to feasibility and business case phase

Key findings from the programme have since been fed into the existing broader Energy for Londoner delivery programmes and the ongoing engagement by the Greater London Authority with the local network operator, UK Power Networks, and national government.

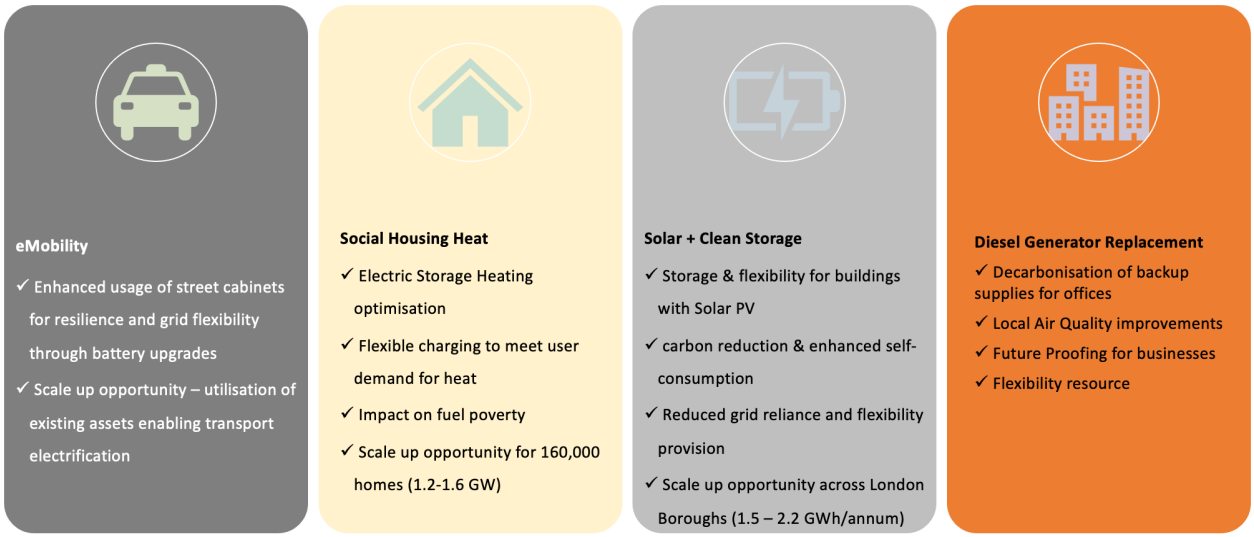
2 Key Findings

2.1 Flexibility Could be the City's greatest Energy Decarbonisation Asset

The city's density and the intersection of heat, transport and power use make cities a key participant in decarbonisation. The development of demand side flexibility within the built environment is crucial to decarbonising heat and transportation, as both will increase electricity demands and have the potential to be 'shifted' to times when carbon intensity is lowest, or to better match supply to demand. Aligning the many interests in communities within cities will allow stakeholders to make

best use of both local and national infrastructure. The role for the city to support new participants (such as boroughs, commercial landlords or housing associations) in the energy system through their demand-side 'capacity' is not well understood.

However, there were four replicable use cases identified during FlexLondon which, if scaled, support cost-effective decarbonisation, alongside delivering other environmental outcomes for London.



2.2 Flexibility is complex

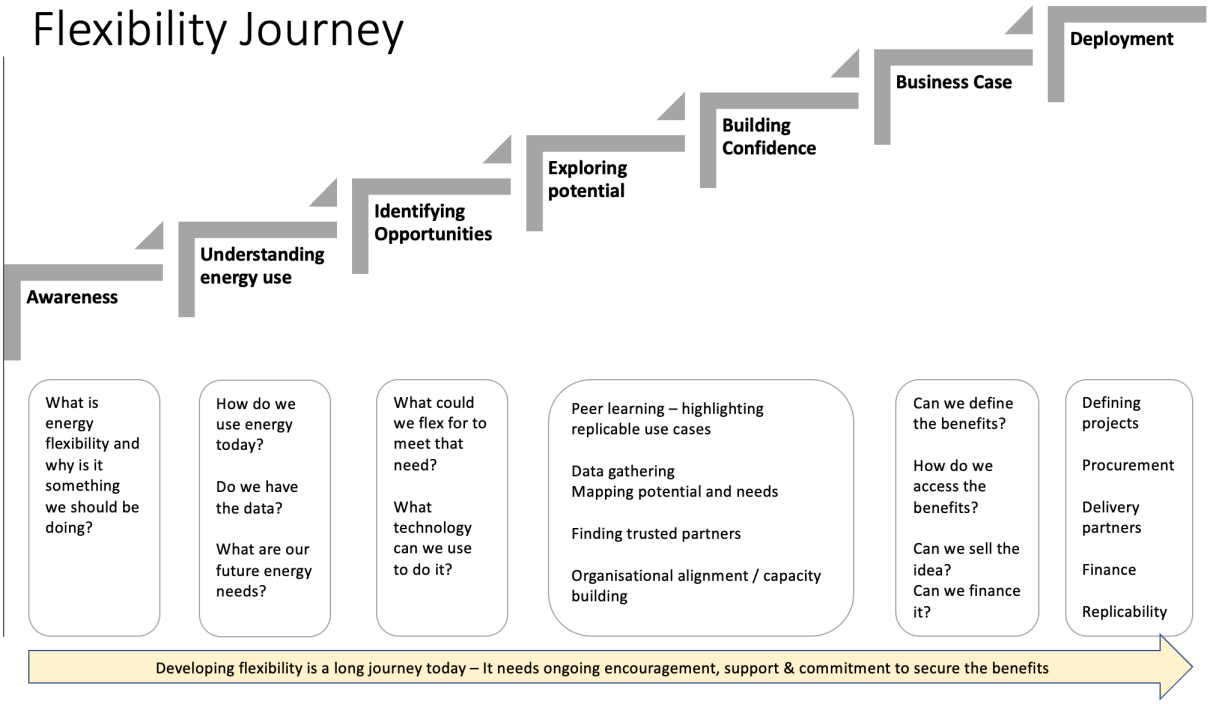
The journey to flexibility is long: Most organisations are not yet knowledgeable about the energy service benefits that solutions like demand side response or battery storage would bring. While many have begun to address decarbonisation on site, the understanding of how flexibility can enhance their own goals for improved energy service or decarbonisation is lacking. Decisions to invest in new technology can take time and require organisations to be convinced enough of the value that they will alter organisational arrangements make an extra effort to make flexibility achievable.

The consumer journey is complex: In fact, many see flexibility as something that would complicate or add cost, rather than enhance their current operations. The awareness of the benefits of flexibility is at an early stage for many people and organisations, in contrast to the awareness of the benefits of energy efficiency. A key challenge is that only some of the value of flexibility is monetisable today through the energy system.

Today, that value is difficult to aggregate and create due to lack of awareness on the part of developers and customers, reticence to changing the assets and technologies in a building, the complex regulatory environment and lack of long-term revenue opportunities.

We found that organisations will go through a number of steps for developing awareness, identifying and evaluating opportunities, and planning flexibility programmes and projects. In all examples of the use cases identified during FlexLondon, there have been multiple value, cultural, organisational or information barriers to be overcome. The time/cost for analysis or feasibility study of options was often beyond what an innovator or consumer organisation could realistically support. Internal teams would need to be organised differently or in some cases, they would be constrained by procurement models outside the organisation's control (such as with fleets). These factors add to the time and complexity of delivery and can make it easy for organisations to 'leave it for another year'.

Figure 1. Flexibility Roadmap for the consumer



2.3 Flexibility needs local solutions

The local value case is variable (not the same in every borough or neighbourhood in London): The challenges of decarbonising heat and transport will vary across London and solutions such as heat networks may be highly localised. The benefits of flexibility are harder to determine and are more uncertain than those for energy efficiency. Value to consuming organisations and households relies on their close attention to overall energy services costs, resilience and future-proofing their energy solutions. Value to the local area is not transparent (or monetised).

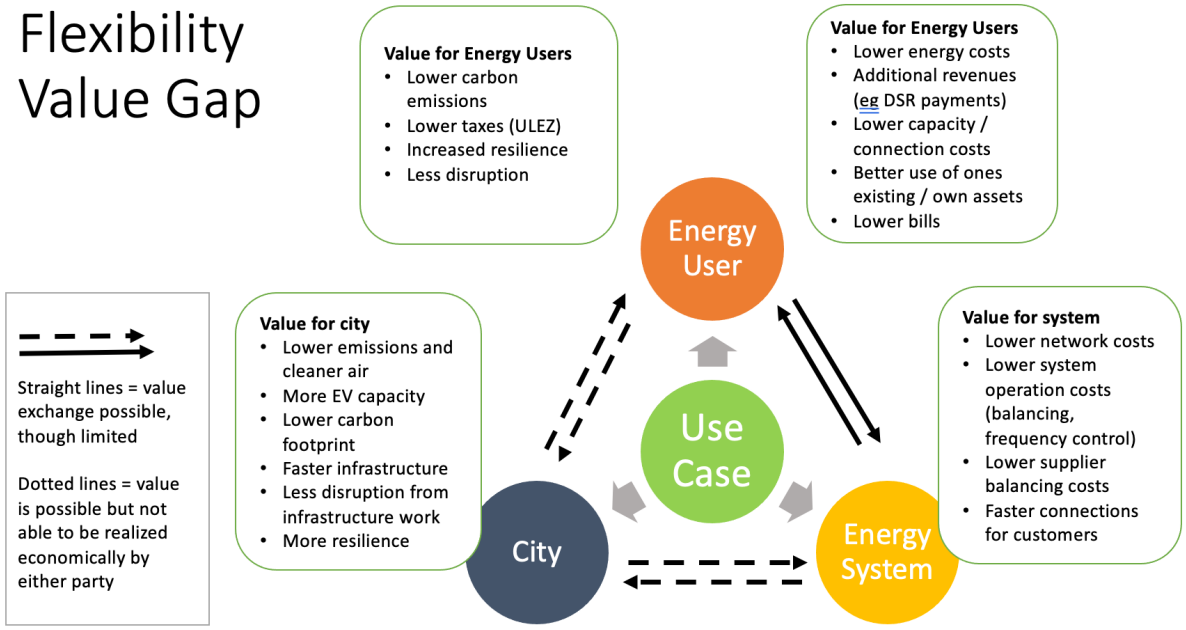
Value has to be aggregated from multiple sources (ESO, DNO/DSO, Suppliers) and is not always easily accessible to innovators. Whilst we are seeing good indications from UK Power Networks on the value to their distribution network of flexibility, this seems to not yet be sufficient to ensure we get the flexibility we need in future to smooth out the local demand on the grid.. Much of the value today has come from peak charge avoidance and grid system services with local 'Distribution System Operator (DSO)' services providing limited additional value. Today the financial value from flexing is not great enough, lengthy enough or consistent enough across London to make the flexibility business case consistently strong.

2.4 Better Information is Essential

A broken information value chain: Data is a key enabler of building a value case as well as operating a flexibility-enabled project. We found numerous ways that the data is difficult to access, clean, use in a timely way or consistently apply for an organisation's operational efficiency. In summary, data must be usable.

Decarbonisation and other non-energy values not part of the revenue stack: Carbon value is the ability to use flexibility to manage or shift demand so as to consume energy at times of least carbon intensity over a given period. Carbon value of flexibility has been of interest to organisations and businesses during FlexLondon 2, but is valued differently depending on the organisation, which means it is not currently a consistent driver of flexibility revenue across the city. If we do plan to accelerate local flexibility as a low carbon transition tool, this inconsistent approach will need to be addressed. Other non-energy value, such as the health benefits from the reduction in emissions of airborne particulates, are not accessible as part of an investment case today, other than through mechanisms such as the ULEZ. Business resilience can also be improved by flexibly enabling an organisation's energy-using assets, particularly by adding energy storage or the ability to partition demand to cover essential services first. These benefits accrue internally to consumers but require consistent metrics for communicating the value of the resilience added.

Lack of certainty for innovators: Many solutions providers asked for a clear signal from the city of the direction of travel, such as a planning or policy rollout with timescales. This approach could address some of the other challenges above.



3 The City Role

Key considerations for the city:

The national system will tend toward a one-size fits all approach which may not be appropriate for local network challenges, and it will be unlikely to overcome all the barriers identified in FlexLondon for end users. The complexity of aligning multiple sites/consumer interests with system value is not one that national government alone can tackle. A city has other policy objectives for decentralised assets (EV charge points, buildings) than simply national system optimisation which must be considered.

The city role in bridging the gap between customer and industry complexity falls across 4 main areas -- (1) data stewardship; (2) policy influencing; (3) planning and infrastructure related actions; (4) market facilitation -- and are all possible today. Our recommendations span these areas of influence.

4 Key Recommendations

4.1 Recommendation: A study of the value of flexibility to the city

A detailed study of the 'value gap' for funding flexibility – including the non-energy values - in London would help better define the design of a flexibility programme for GLA in future. For non-energy values important to the city, identify and engage the key stakeholders in London whose remit covers the other 'non-energy' values identified during Flex London Phase 2.

4.2 Recommendation: Understanding the full carbon value of flexibility

Building on the 'value gap' study, develop an agreed carbon offset or accounting methodology of the carbon value of flexibility, which may allow this to be added to the future value stack. City-national coordination around modifications to the climate change levy may be necessary.

4.3 Recommendation: Identify and promote Use Cases – To Maximise Opportunities for GLA programmes and London

Continue to keep the community engaged around a specific set of use cases to allow the peer learning that builds a confident industry, maximising the opportunities from London wide programmes (eg Warm Homes, ReFiT, Solar Together).

Ensure flexibility is part of all key energy related programmes, including smart vehicle charging, renewal of building infrastructure. The business case for adding flexibility as a stand-alone project is challenging, but it can be a small incremental cost to build in as part of retrofit programmes.

As evidence of where markets are and are not producing efficient outcomes for the city across the value chain, further actions to create markets for these values could be taken, for example creating incentives for low emissions buildings or low emissions alternatives to standby generation. Sharing the use case examples helps those renewing or developing built infrastructure to see how they can use energy flexibility to meet the GLAs energy objectives. It can also support UK Power Networks as it plans and develops the local market signals for flexibility.

4.4 Recommendation: Open up City Energy Data

It is vital to ensure data is available to make it possible for users of energy and solutions' providers to more rapidly build business cases and then operate in the market in a cost-effective way. At city level, there will be unique use cases particularly at the integration point for sub-sectors and as we electrify heat and transport. The city as a 'steward' of data about the city, has a role to play in ensuring data is available and can be used to facilitate the harder-to-achieve use cases. The City can coordinate with national regulators to ensure city's infrastructure supports the efficiency of a national solution to this challenge. The city should promote or commission the development of an open data platform to support the development of a London Energy Data Platform

This could enable visibility of data such as that described below to enable improved propositions by solutions providers, support energy users in developing more holistic investment cases, and provide better information for planning of development and infrastructure:

- information on building types and generic usage data developed for city and infrastructure planning
- specific demand data where authorised

- infrastructure development plans or needs, eg network limits, new EV charging needs
- transport data to enable requirements planning
- environmental data such as air quality,

Consideration should be given to the role of the City as host for a data platform, as a neutral facilitator in providing data across sectors such as electricity, gas and transport, where no sectoral organisation could justify doing so alone.

4.5 Recommendation: Flexibility should be embedded across the city's Zero Carbon Policy and Delivery programmes

Consider policy approaches alongside the supporting/enabling role that programmes can provide with funding or networking. For instance, changes in planning, taxation, 'bans' or standards.

Area-based approaches to decarbonisation can benefit from flexibility and the practice in London can inform GLA and UK government low carbon policy development. In principle, the policy will be better informed through the following principles:

- **Maintain visibility of actions and barriers.** Creates visibility of collaborative opportunities for flexibility (by building up picture of local needs). During FlexLondon, a geospatial map was created to share existing assets, grid constraints and supported engagement across boroughs and stakeholder groups in the city.
- **Coordinate engagement processes.** Provides a framework to ensure that end-users planning an energy project think about flexibility (and smart local energy solutions) early in their planning. Identifies help needed to assess feasibility and value, ideally bringing the rapidly evolving market participants regularly into contact with those making retrofit and new asset financing decisions.
- **Ensure projects align with city net zero goals.** Provides a framework for developing common understanding of where the opportunities are, feasibility, and benchmarks for cost/benefit. This understanding gets more granular as projects and programmes report outcomes.

5 Conclusions

When smart system co-benefits are unlocked, councils get more value out of their existing assets, such as solar PV, *and* the national system is more cost-effective and lower carbon to operate (because the grid is used less in a constrained place). This happens when **energy system optimization aligns with other city policy goals and actions** such as reducing pollution, for instance, when batteries are used for backup power instead of diesel. With the city taking a role to overcoming barriers to local energy integration (cross-vector, distributed energy assets) the **national system can share more benefits with local end users, and drive down costs for all.**