

Flex London Summary Findings

- A Mayor of London Programme
- 2018-2020

MAYOR OF LONDON



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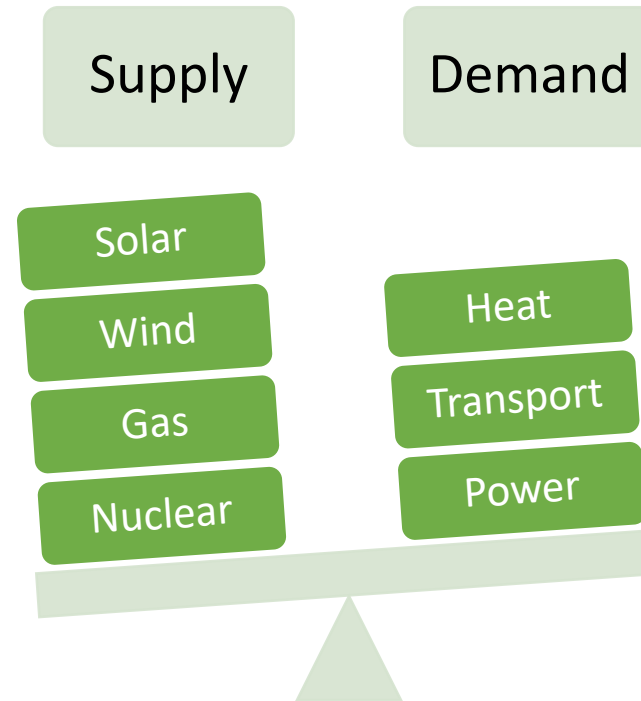
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Our Energy Systems are Changing

In the past we had to generate what we needed when we needed it – this favoured carbon - gas and coal which store huge amounts of energy.

But this is changing **as we increase the amount of renewable energy** we use. The amount of electricity renewable generation produces is dependent on the wind and sunlight so, if we can use or store renewable energy when it is abundant, we can reduce the total amount of generation needed.

Flexibility is about *when* and *where* we use energy, particularly electricity. By shifting demand, we allow the entire energy system to be more cost effective for all users.



Energy flexibility is where energy users or generators can increase or decrease their demand or supply, sometimes with the use of energy storage, without affecting their normal business activities.

As the electrification of heat and transport accelerates and the amount of energy we want our local electricity system to deliver increases, flexibility will be key to managing the impact on the grid.

Smart Systems **flex** when we use energy to make **best use of low carbon sources** like wind and solar **maximising use of this infrastructure**

If we invest in **improving efficiency** to reduce demand and invest in **smart energy** to maximise use of renewable capacity, we can **minimise the cost** of decarbonising our energy systems

What is smart energy and flexibility?

Overview

Why Cities and Flexibility?

We will not reach net zero without energy system flexibility. The least cost energy transition includes using local 'smart' electric vehicle charging and behind-the-meter batteries as well as demand side response (consumers being able to change the time they use energy) according to BNEF and the Climate Change Committee.

Therefore, a city has a unique role to play. As the Great Britain power system adds intermittent renewables, and as more de-centralisation occurs (EV charge points, batteries, rooftop solar, heat networks), the system requires more flexibility on the 'demand side' and optimization of Local Energy Systems to ensure we are fully utilizing that clean energy system, at least cost.

London's Potential

The potential is for London to *provide 1 GW of flexibility* to the GB system.

But what does that mean for Londoners? And how is this valuable to them as well as the national electricity system?

The FlexLondon Programme

The FLExLondon Programme brought together solutions providers and energy consumers to create new flexible energy projects that deliver London's environmental goals, while meeting the needs of both the end user and wider energy system. In scope were domestic and non-domestic consumers with potential to use solutions ranging from smarter control of existing energy-using appliances and heating systems, through to thermal or electrical storage and local generation, and into Energy-as-a-Service or Heat-as-a-Service.

FlexLondon Phase 1 identified and engaged owners and managers of unused flexible energy demand, production or storage who are keen to explore the benefits of flexibility.

FlexLondon Phase 2 planned to generate between 5 and 10 project proposals, 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. Phase 2 would identify potential funding mechanisms as well as policy opportunities and market barriers.

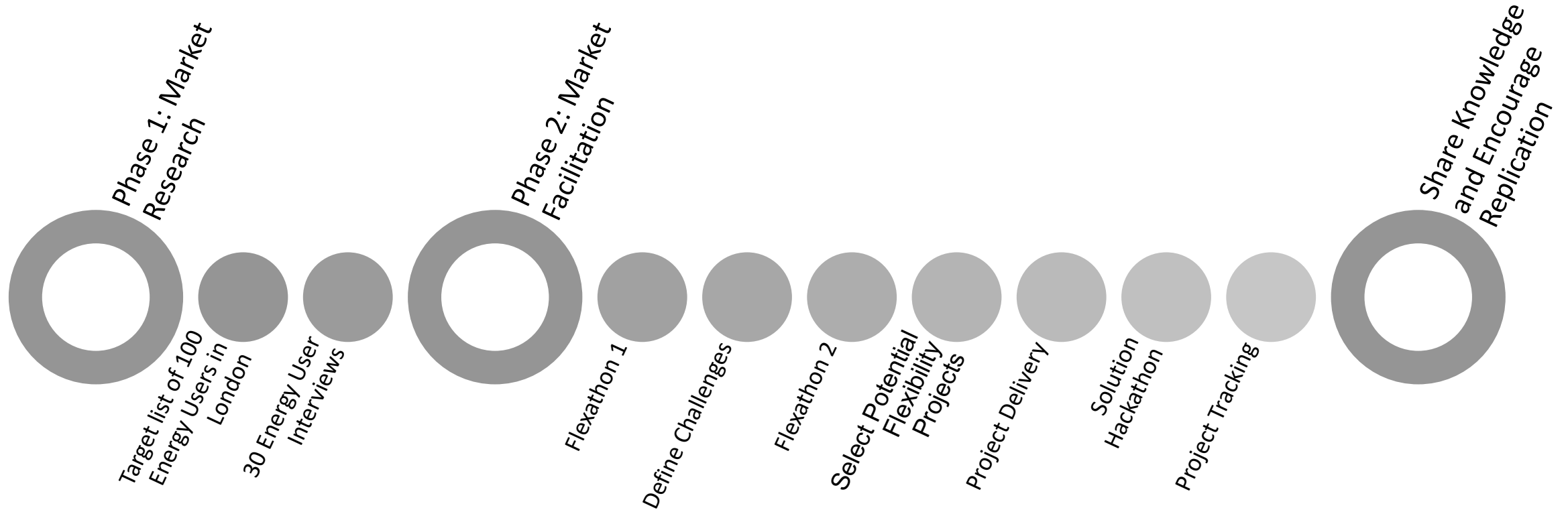
Delivery Partners

ENERGYUNLOCKED

EigenVentures



Project Phases and Delivery



Objective 1: Increase the adoption of Flexibility



Engagement Results

Objective 1: Increase the pace at which flexibility could be deployed in London in any private or public sector site through building a pipeline of potential projects starting with energy 'users' in dialogue with 'solution providers'

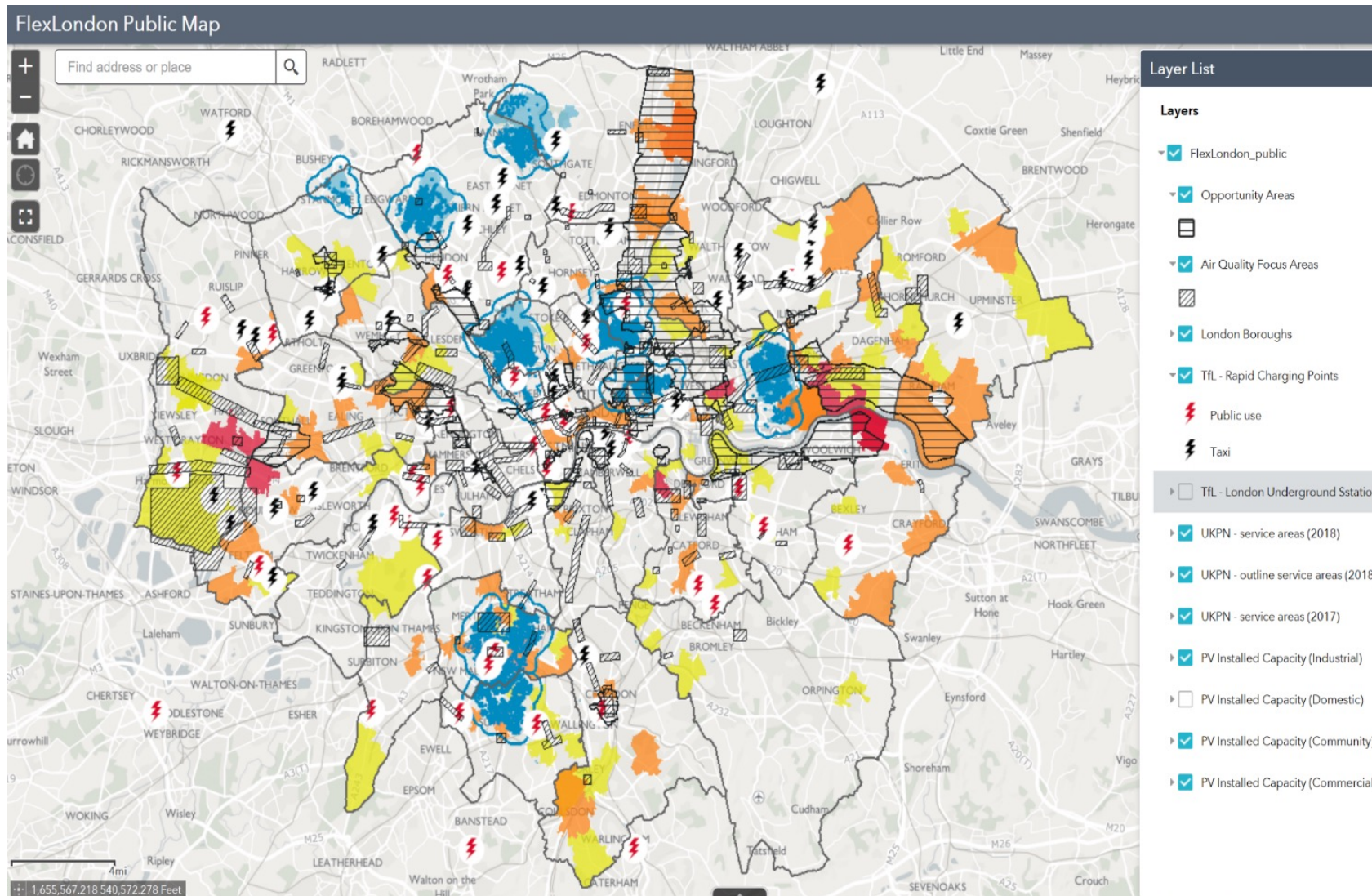
Key Results:

- Pipeline of projects created.
- Over 100 innovators engaged.
- Identified 3 scalable use cases - value cases documented for each.
- Flexibility adoption journey understood and documented.

Market and Stakeholder Engagement Results

- 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

Engagement



Public link: <http://cityhall.maps.arcgis.com/apps/webappviewer/index.html?id=c71905c7c7f64aa4b534ffb42d4e578a>

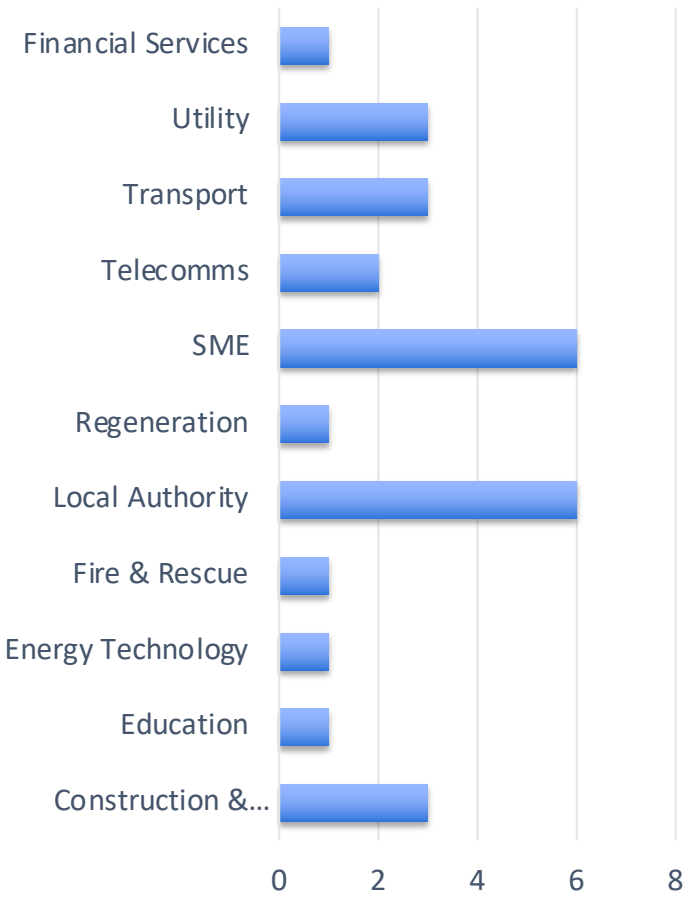
Mapping using public and private datasets

The FlexLondon GIS map included the existing community and installed solar PV capacity, air quality focus areas, rapid charge points, and UK Power Networks service areas where they were planning to tender for flexibility.

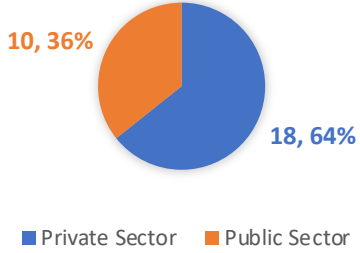
Participants in the programme could identify their own postcodes of interest, and map their own potential energy projects here. Where neighbours had similar goals, synergies for project development could be found.

Engagement

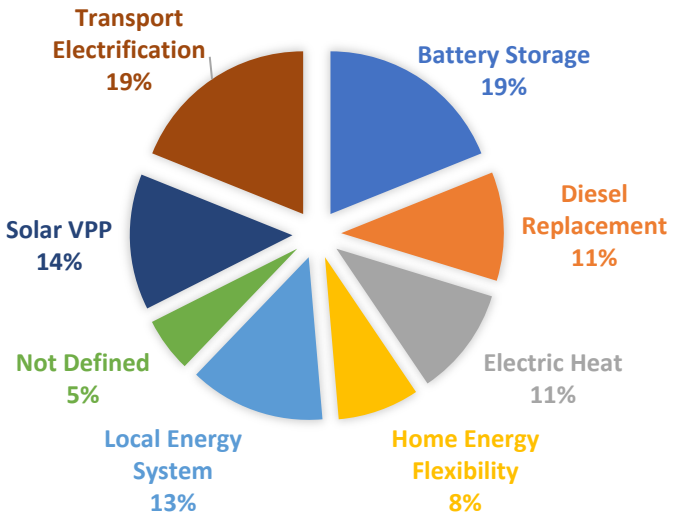
Organisations Total



ORGANISATIONS - PUBLIC VS PRIVATE

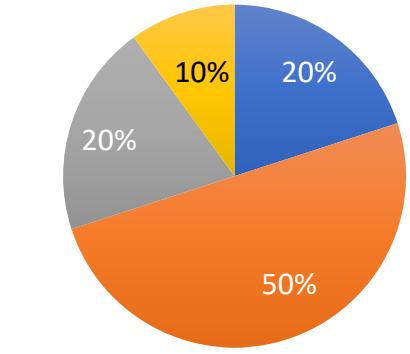


PROJECT CATEGORIES %



- Energy users were keen to engage
- Understanding the possibilities and potential of flexibility required significant time
- Flexibility was best enabled when upgrading energy systems – needs to be embedded

Time Spent



- Engagement Outreach
- Awareness and Understanding
- Identifying Opportunities
- Feasibility and Business Case Development

Replicable Use Cases



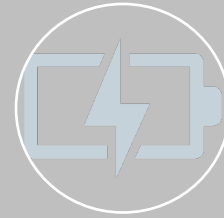
eMobility

- ✓ Enhanced usage of street cabinets for resilience and grid flexibility through battery upgrades
- ✓ Scale up opportunity – utilisation of existing assets enabling transport electrification



Social Housing Heat

- ✓ Electric Storage Heating optimisation
- ✓ Flexible charging to meet user demand for heat
- ✓ Impact on fuel poverty
- ✓ Scale up opportunity for 160,000 homes (1.2-1.6 GW)



Solar + Clean Storage

- ✓ Storage & flexibility for buildings with Solar PV
- ✓ carbon reduction & enhanced self-consumption
- ✓ Reduced grid reliance and flexibility provision
- ✓ Scale up opportunity across London Boroughs (1.5 – 2.2 GWh/annum)



Diesel Generator Replacement

- ✓ Decarbonisation of backup supplies for offices
- ✓ Local Air Quality improvements
- ✓ Future Proofing for businesses
- ✓ Flexibility resource

Solar + Battery Use Case

Solar + Storage Flexibility

London Borough of Merton - Invest to Save Project to better utilise the PV output to make full use of the site resources and flexibility.

Description

Optimising value from existing renewable generation assets and energy use across Borough of Merton building estate.

- 9 sites including schools, libraries and community centres
- Feasibility undertaken for co-locating battery storage with existing solar PV installations to assess self-consumption and flexibility potential
- 485 kWp of existing solar assets analysed

Delivered:

- Hackathon generated high level ROI model
- Detailed feasibility study undertaken for 9 sites by Quantenergy
- Business case prepared
- Assistance with PSDS (Public Sector Decarbonisation Scheme) funding application for funding
- Next Steps – Awaiting funding to enable procurement and project delivery

Scale potential:

High – 32
Boroughs + and
nationally

Partners

- Quantenergy
- Storage suppliers
- Aggregation providers



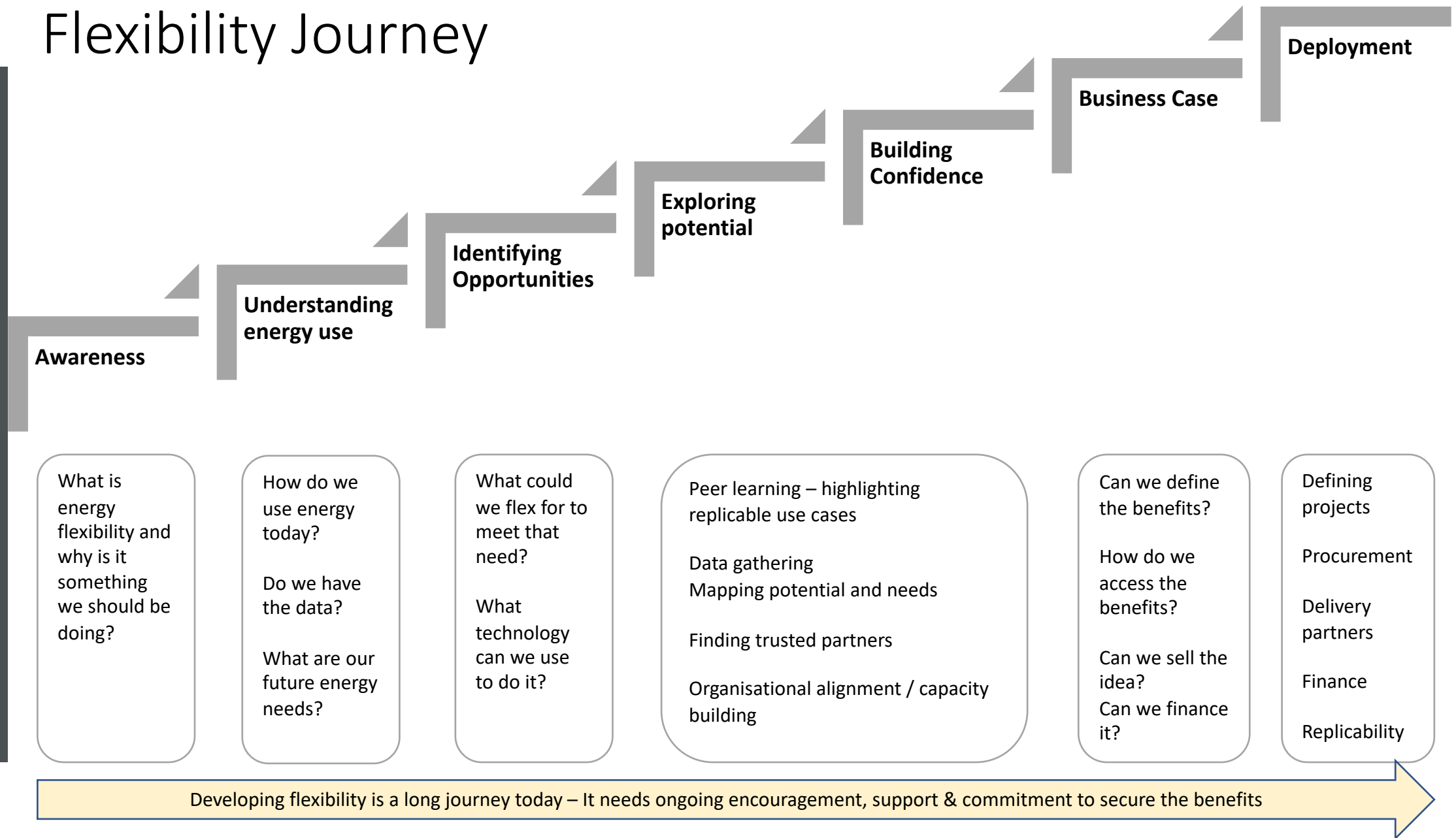
Benefits and Impacts:

- 21.7% carbon reduction projected through detailed analytics
- Financial benefits to borough – reduction of energy bills
- Enhanced self-sufficiency of sites to 51.5%
- Flexibility revenue predominantly from National Grid schemes 32% of total cost benefit

Key Learning

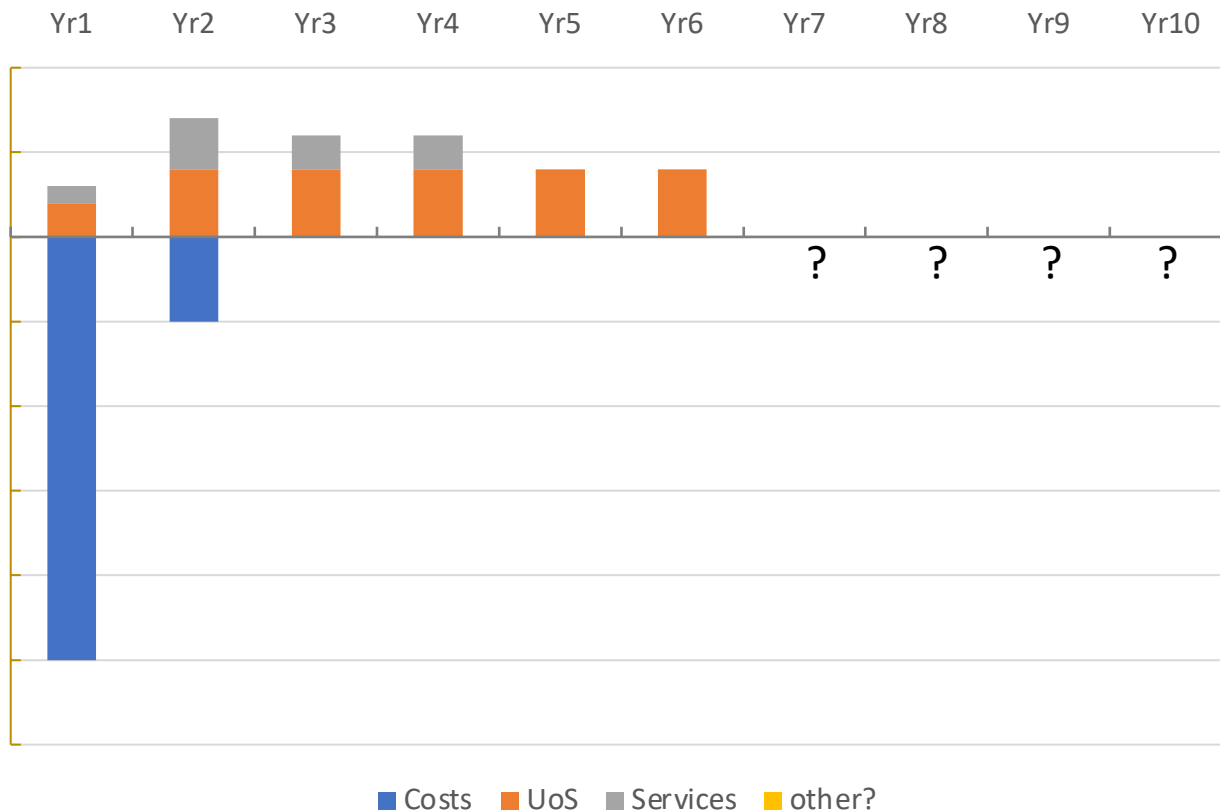
- Organisational alignment across departments
- Working with procurement and contracting frameworks
- Data availability supported project development
- Funding structure supportive of longer payback
- Local flexibility revenues (UKPN) limited / negligible

Flexibility Journey



Objective 2: Identify Challenges for scale-up

Revenue Uncertainty



Objective 2: Where flexibility could not be achieved, document evidence of the barriers to flexibility in London to inform the GLA's ongoing energy systems policy and programme development.

Key Results:

Information, technical, regulatory and market barriers were identified and evidenced (1) Uncertain business case (2) Requires deeper understanding of data needs – there are real data access and sharing challenges, and (3) Market barriers for aligning stakeholders across the city to 'stack value' or economically price non-energy values.

(1) Challenge 1: Revenue Uncertainty: Uncertainty in the revenue streams makes financial investment hard

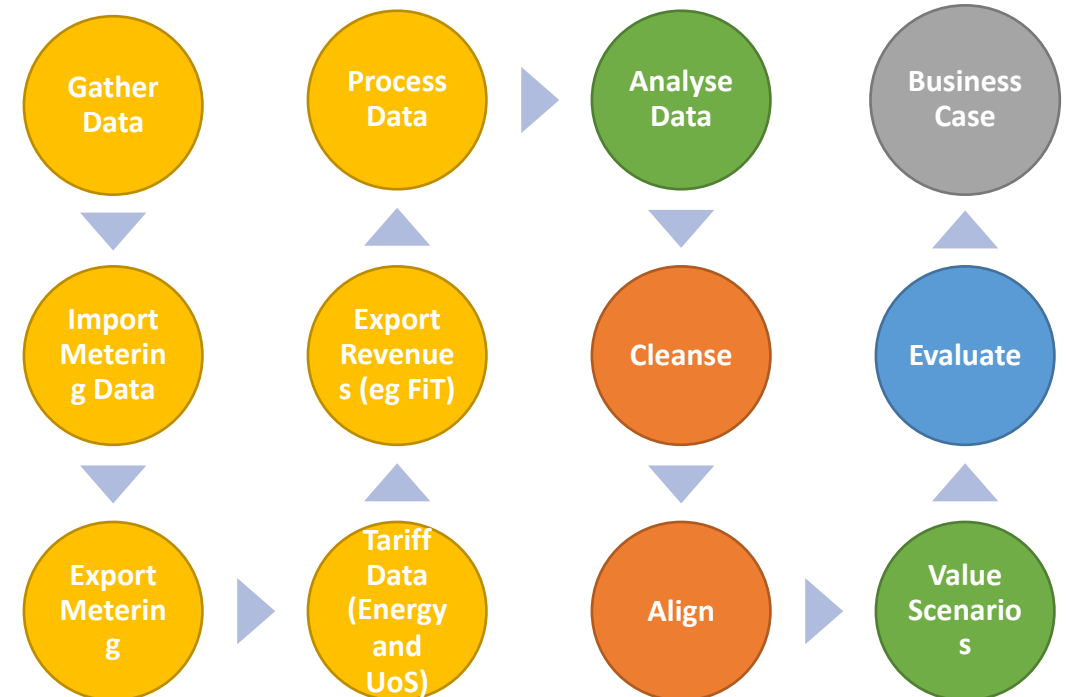
- Many revenue streams uncertain beyond the near term.
- The combined payback from local and national flexibility value streams do not make individual, distribution connected batteries economic.

Data-Related Challenges

Data Needs to be easier to access and understand

(2) Challenge 2: Data Sharing and Access: Time and resources are needed to assess and analyse the options can be too intensive for the value on offer.

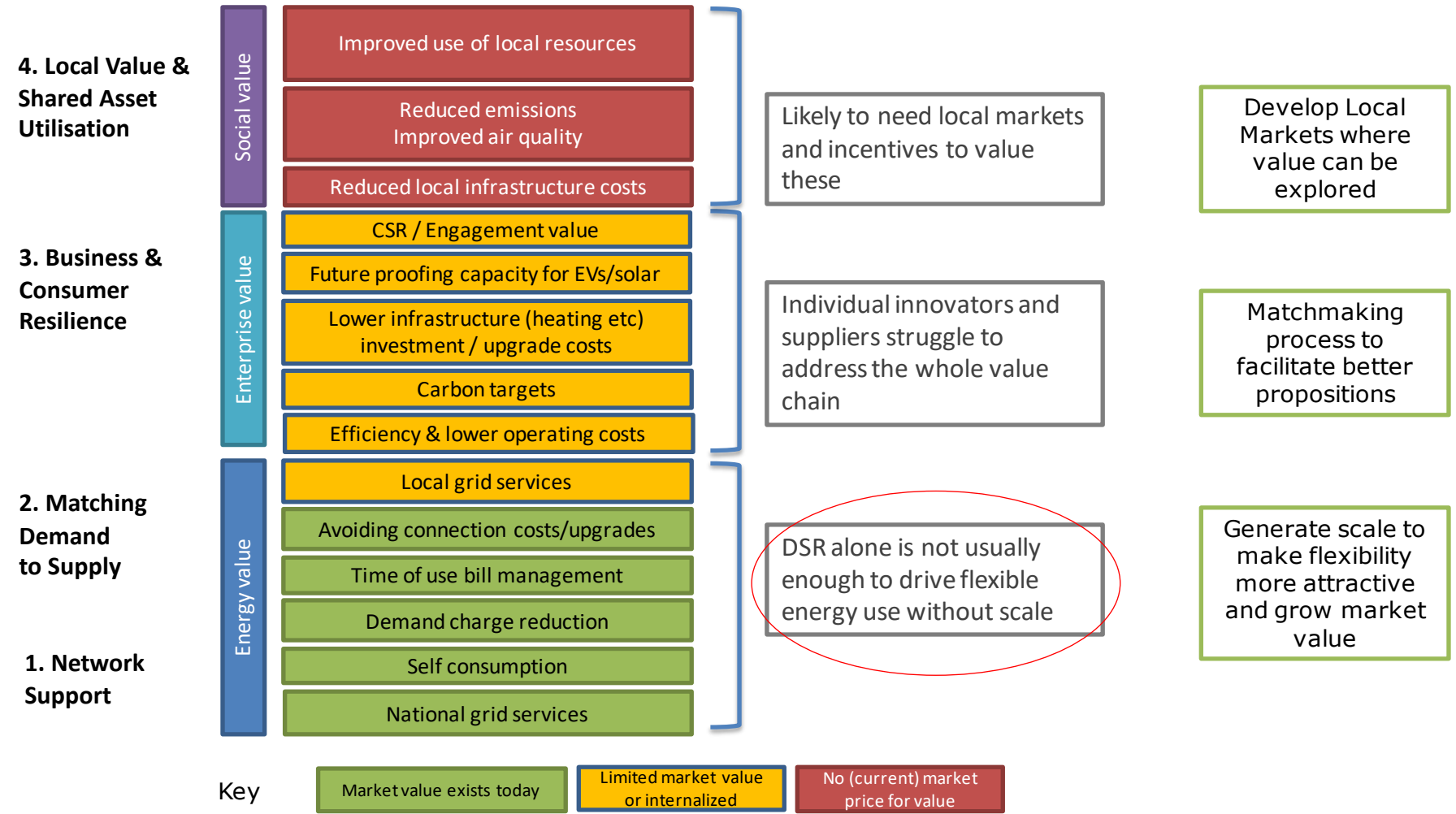
- Gathering data for multiple metering points largely manual process
- Aligning and cleansing data time consuming and requires insight
- Understanding energy use and value stream options creates many scenarios to evaluate, increasing time and complexity of building a proposition – particularly if aggregating smaller assets.



Flex London Value Stack

In Phase 1 of FlexLondon, a range of values were identified based on discussion with project owners.

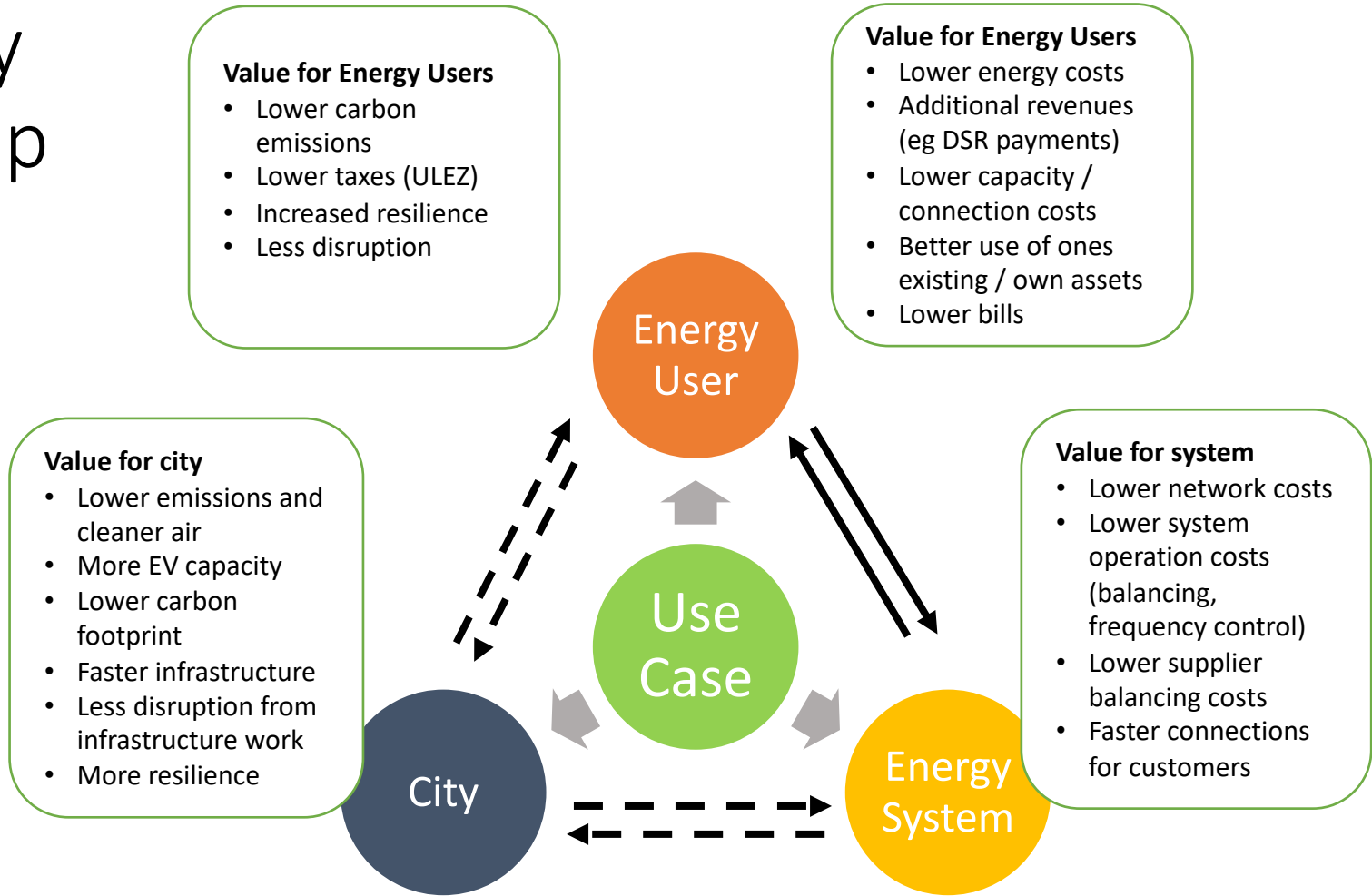
Alignment of value, or 'stacking' of this value is the future opportunity to best utilise the city's built environment to benefit all stakeholders. However, this value is not easy to realise.



Flexibility Value Gap

Straight lines = value exchange possible, though limited

 Dotted lines = value is possible but not able to be realized economically by either party



(3) Challenge 3: Fragmented value

Flexibility generates many types of value, which may be challenging to access

Accessing value depends on your role in the system – suppliers, aggregators and users do not have same access to the sources of value

Value varies locally (eg DSO areas)
Non-financial value hard to use in making the business case

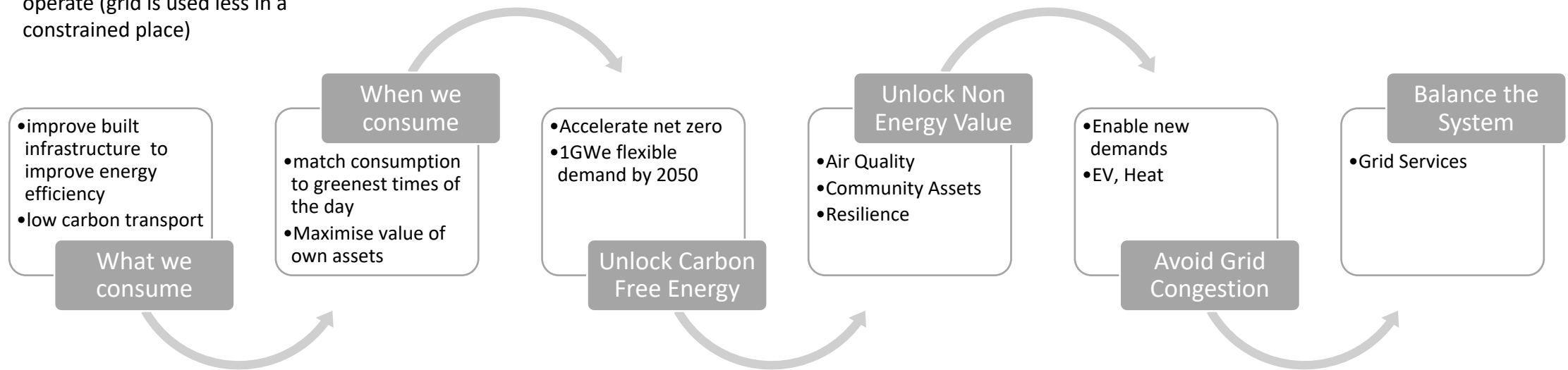
Non energy values such as decarbonisation and emissions hard to access and monetise

Looking Ahead: What is the city role?

1. Smart system co-benefits are unlocked so councils get more value out of their existing assets (e.g. solar and storage) *and* the national system is more cost-effective and lower carbon to operate (grid is used less in a constrained place)

2. System optimization aligns with other city policy goals and actions so reducing pollution (i.e. batteries used for backup power NOT diesel).

3. 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



Key questions going forward:

- The City must integrate infrastructure to provide value beyond energy alone – how?
- What can existing Greater London Authority programmes do to scale flexibility so it benefits more of the existing delivery programmes?
- What can flexibility do to support a more accelerated net zero target to 2030?

Looking Ahead: Summary and Key Findings

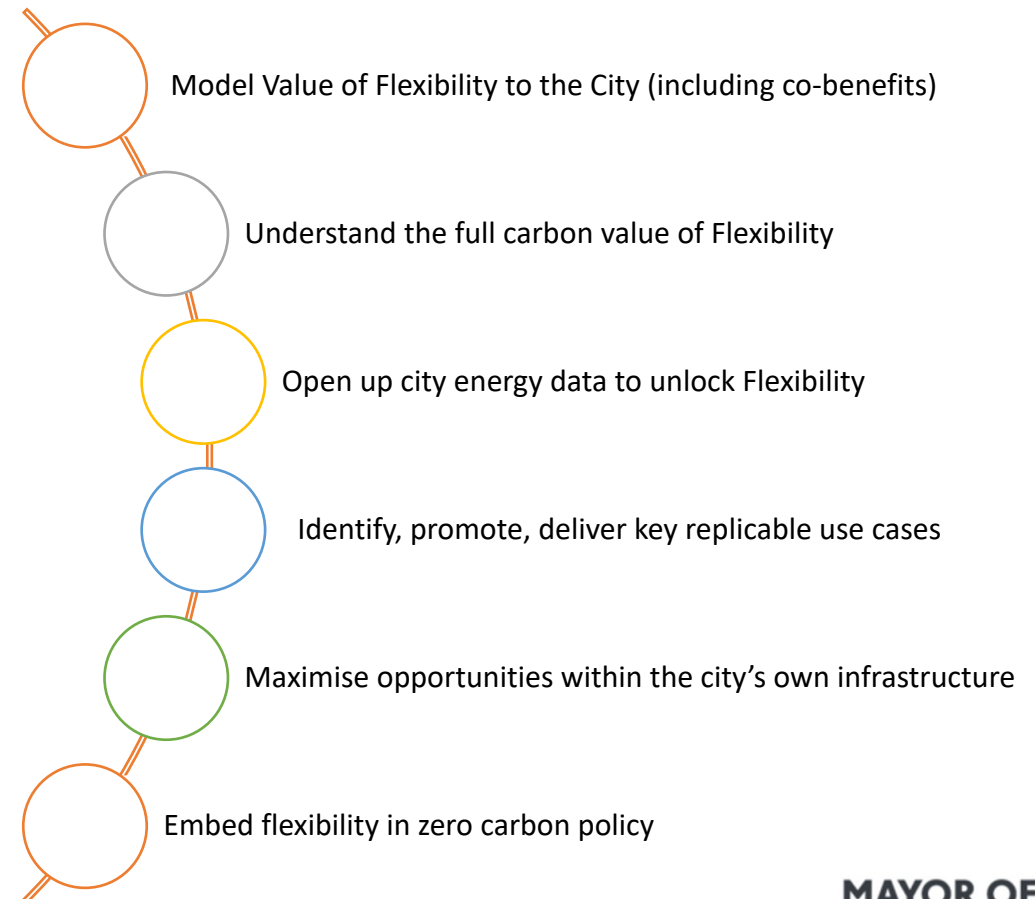
Key Takeaways

- Flexibility could be a city's biggest asset for delivering net zero.
- Cities have a critical density of assets and intersections where energy needs and uses interact
- Information/ data, awareness/ trust and market **barriers remain**
- These make flexibility 'too complex' or just a 'nice to have' for an energy consumer
- "Non-energy" (ie: environmental, social) value to city hard to price into decisions
- **National policy and city action is needed** to ensure that the creation of flexible capacity will happen 'ahead of need'

Key considerations for the city

- Cities do have a key role in enabling and optimising the value of flexibility services
- The national system will prefer a one-size-fits-all technology neutral approach.
- Local energy challenges will need local solutions. Variety of solutions to heat, transport and power based on local resources and needs (Hydrogen, Solar etc)
- The complexity of aligning multiple sites/consumer interests with system value is not one that national government and national energy infrastructure operators alone can tackle.
- A city has other policy objectives for local distributed assets (EV charge points, solar and heat networks) than simply national system optimisation which must be considered.

Key Recommendations for the city



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