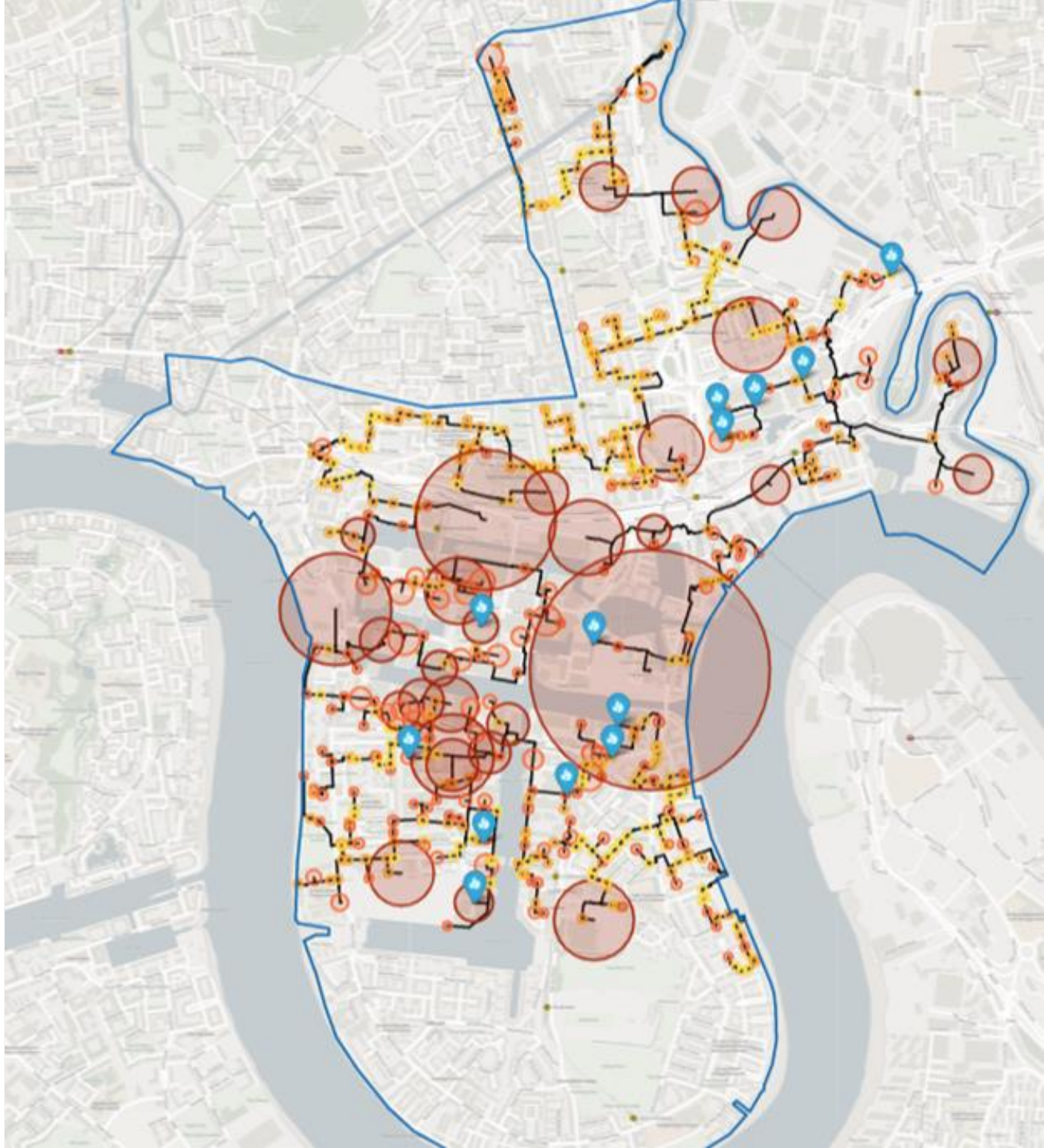
Heat Networks + Data Centres

Arup presentation to TechUK members



Alban Leiper

September 2023

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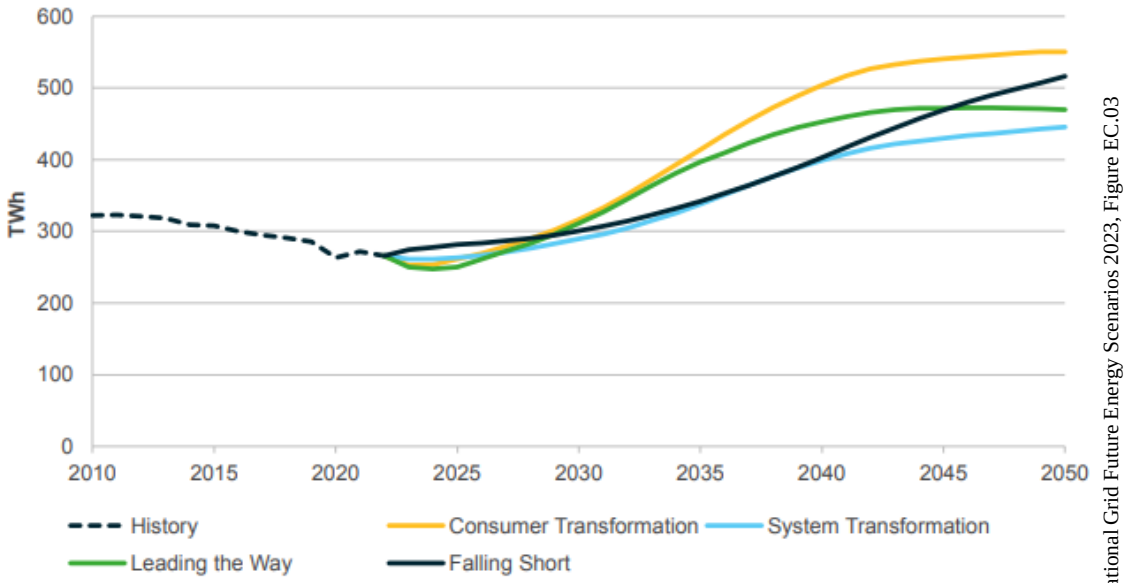
What is the future for energy networks?

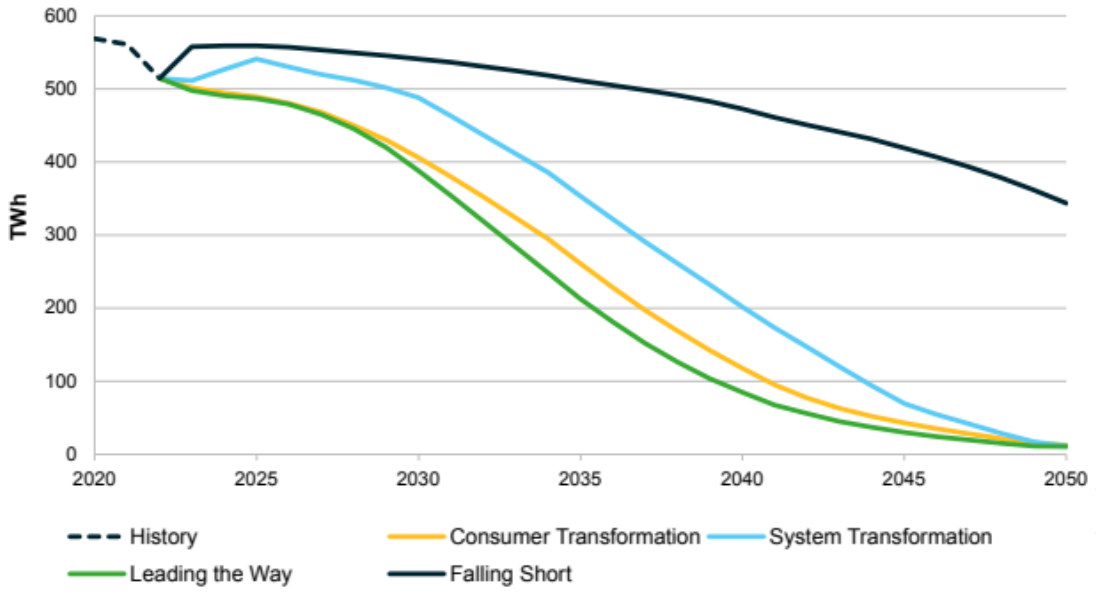
Future Energy Scenarios 2023

Electricity peak 120-190% ↑

Gas peak 50-80% ↓



National Grid Future Energy Scenarios 2023, Figure EC.03



National Grid Future Energy Scenarios 2023, Figure EC.04

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Storage and Flexibility

Essential components for system resilience

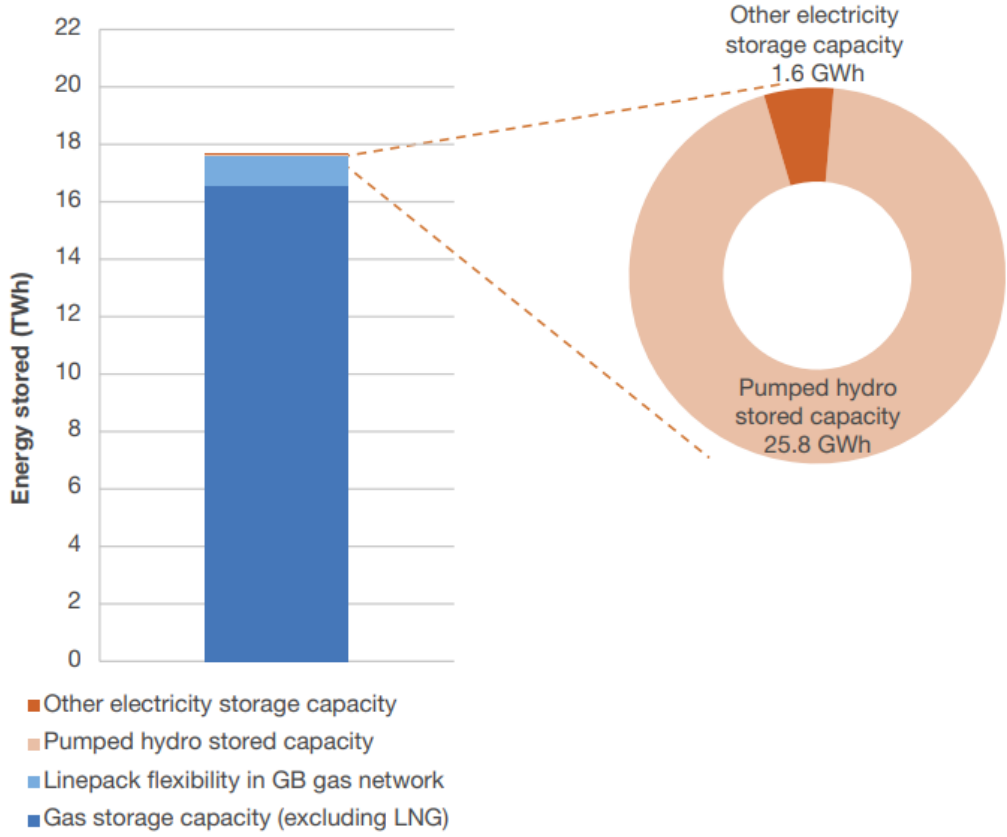
Large-scale interseasonal storage

- 11-56 TWh needed by 2050
- Key role for Hydrogen: 300-500 salt caverns needed

Flexibility needs 2021 → 2050

- 50 GW → 150-220 GW
- Of which ca. 50% from demand side measures

Figure FL.01: Electricity and gas storage capacity in 2021[5]

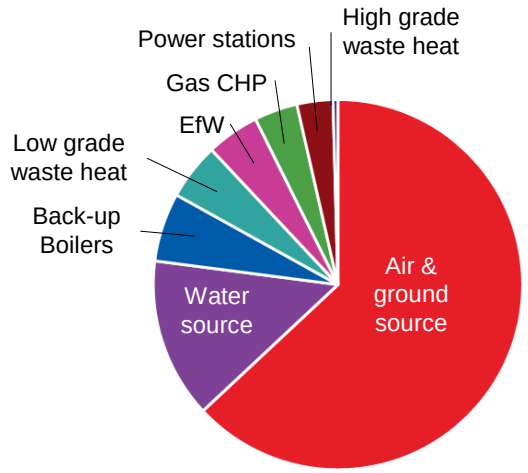


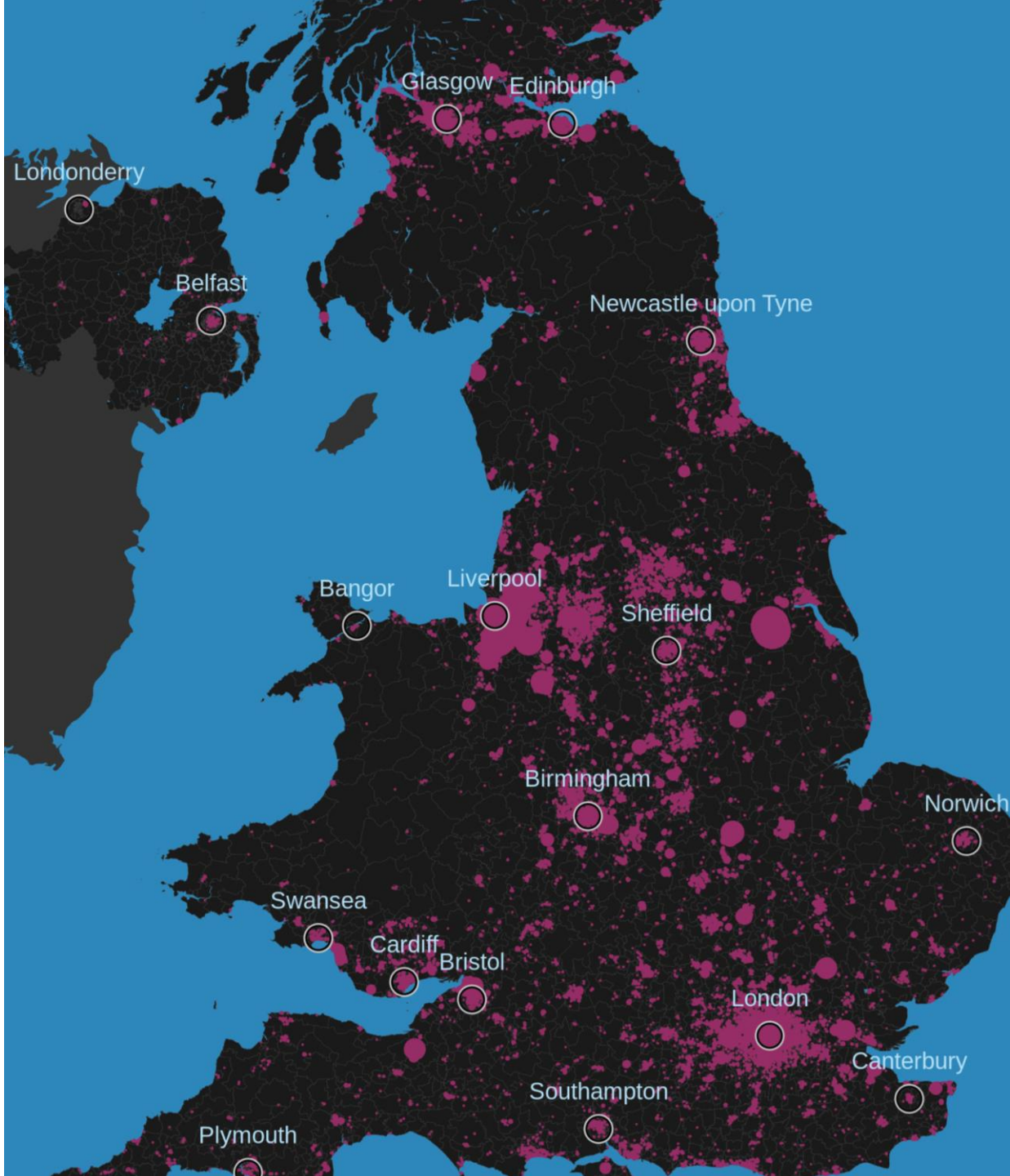
National Grid Future Energy Scenarios 2022

Low carbon heat networks

How to get from 2% to 20% of UK heat demand?

- 95 TWh / 28 GW of heat could be met by low carbon heat networks
- ~£85bn investment need
- 20-40x increase in annual investment





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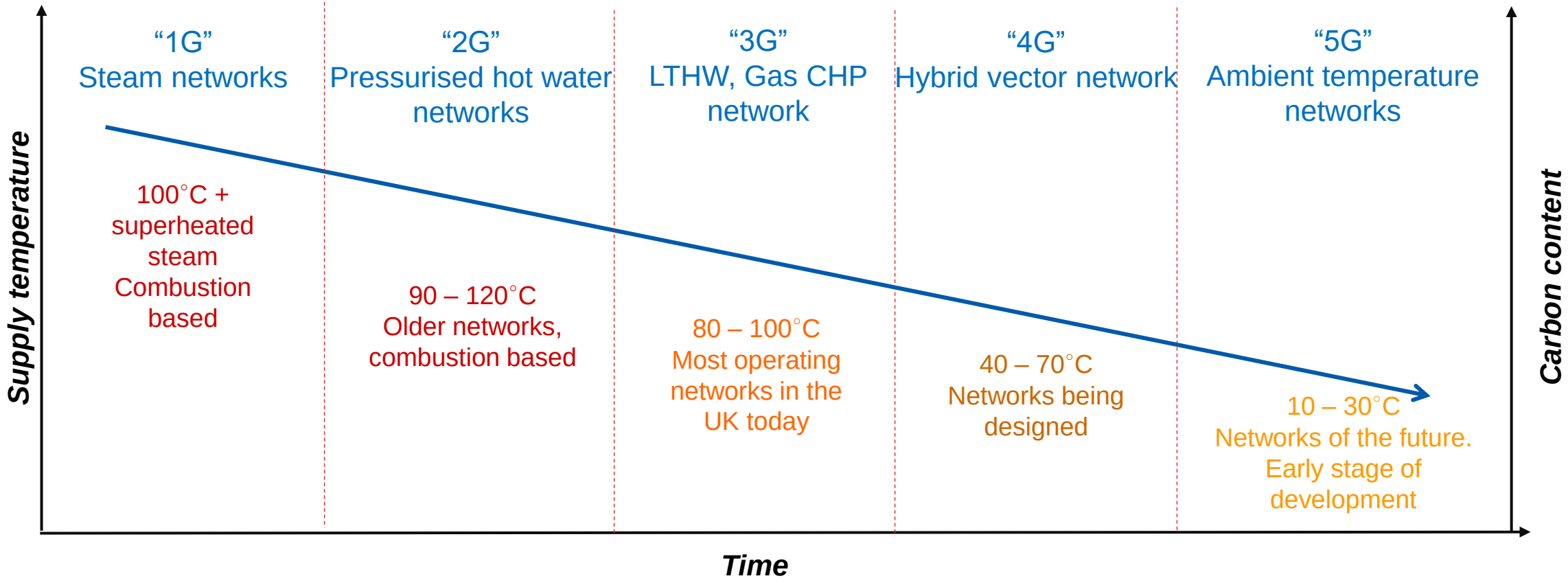
Evolution of district heating



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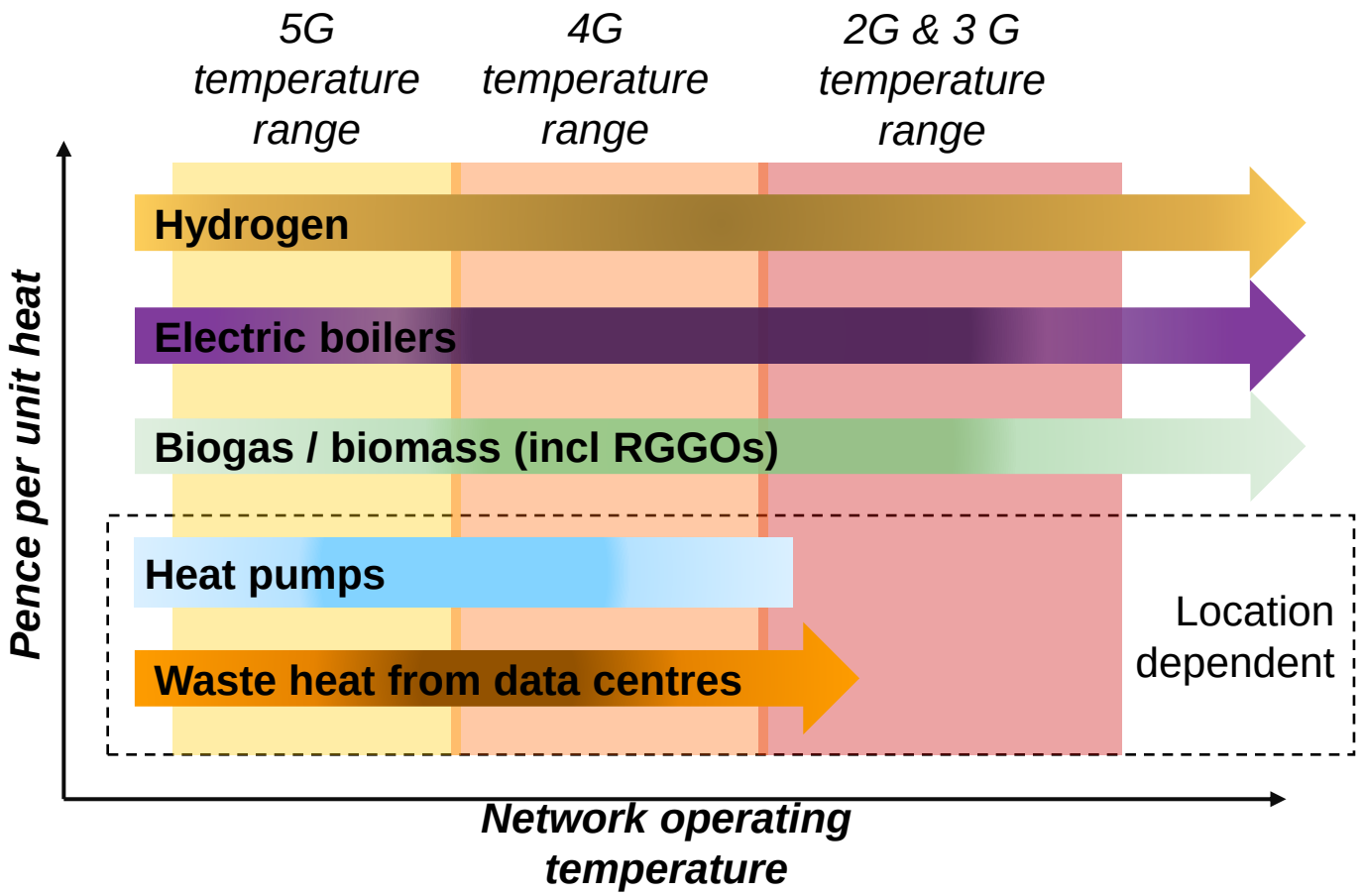
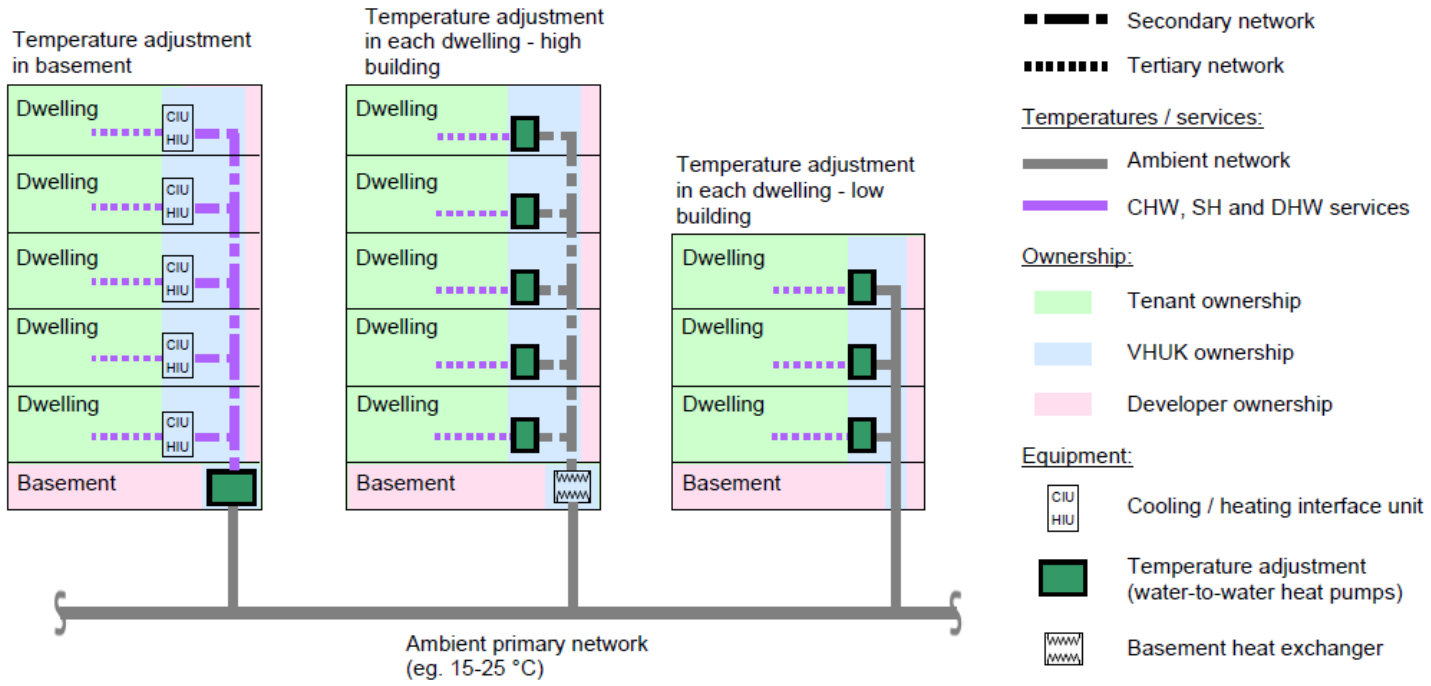
Low carbon network sources of the future



5G / ‘Ambient’ temperature networks

- Bigger pipes
- Lower temperatures
- Plastic pipes, i.e. cheaper
- Incorporation of multiple heat sources
- Lend themselves well to areas with heating *and* cooling demand



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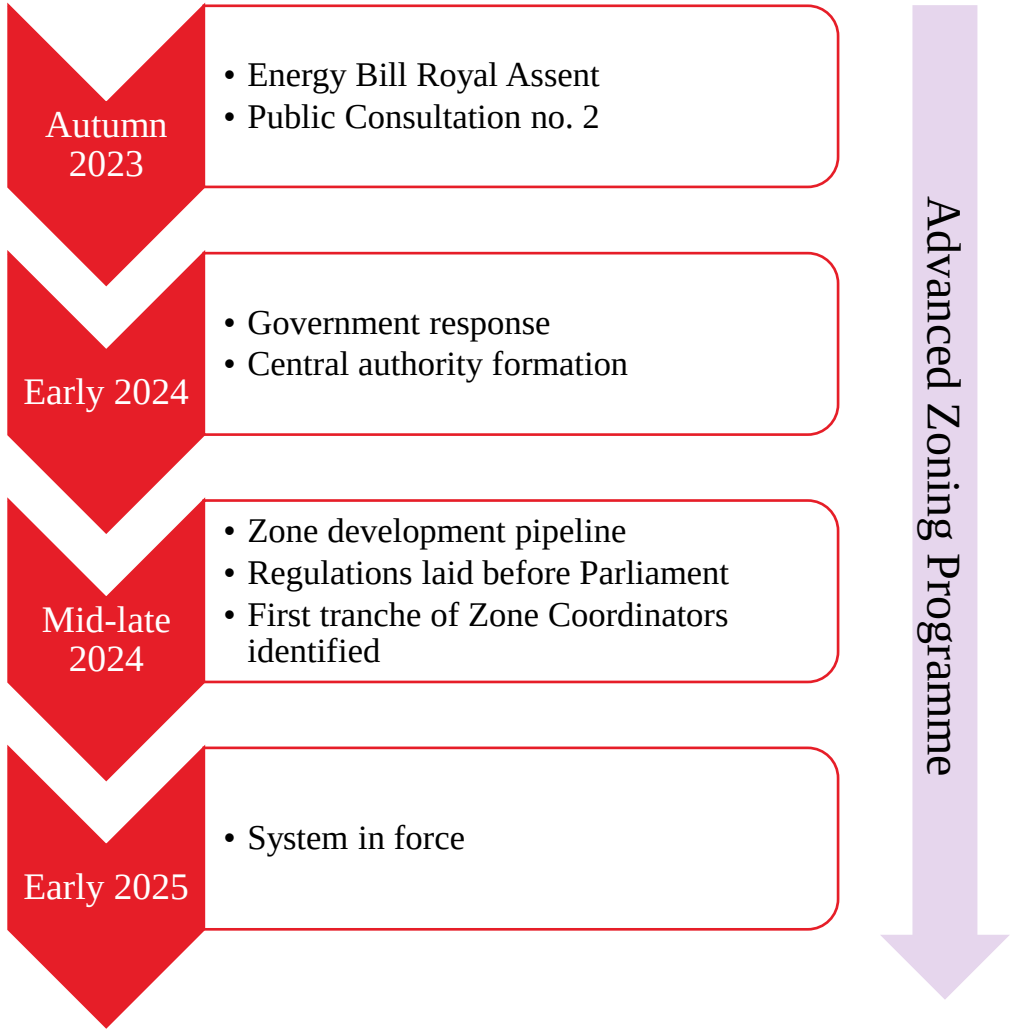
Heat network policy commitments

Unlocking barriers to investment at scale

- Heat network zoning
- Heat network market framework
- HN Technical Assurance Scheme
- Technical funding and financing support
  - Heat network investment project (HNIP - expired)
  - Heat network efficiency scheme (HNES - open)
  - Green Heat Network fund (GHNF - open)



Indicative heat network zoning programme

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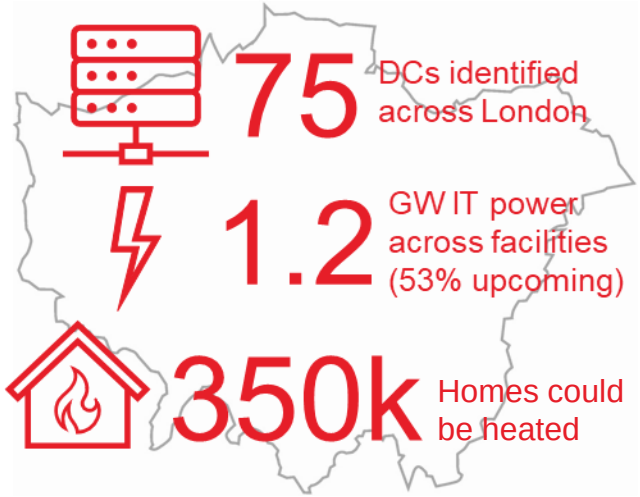
The opportunity for Data Centres

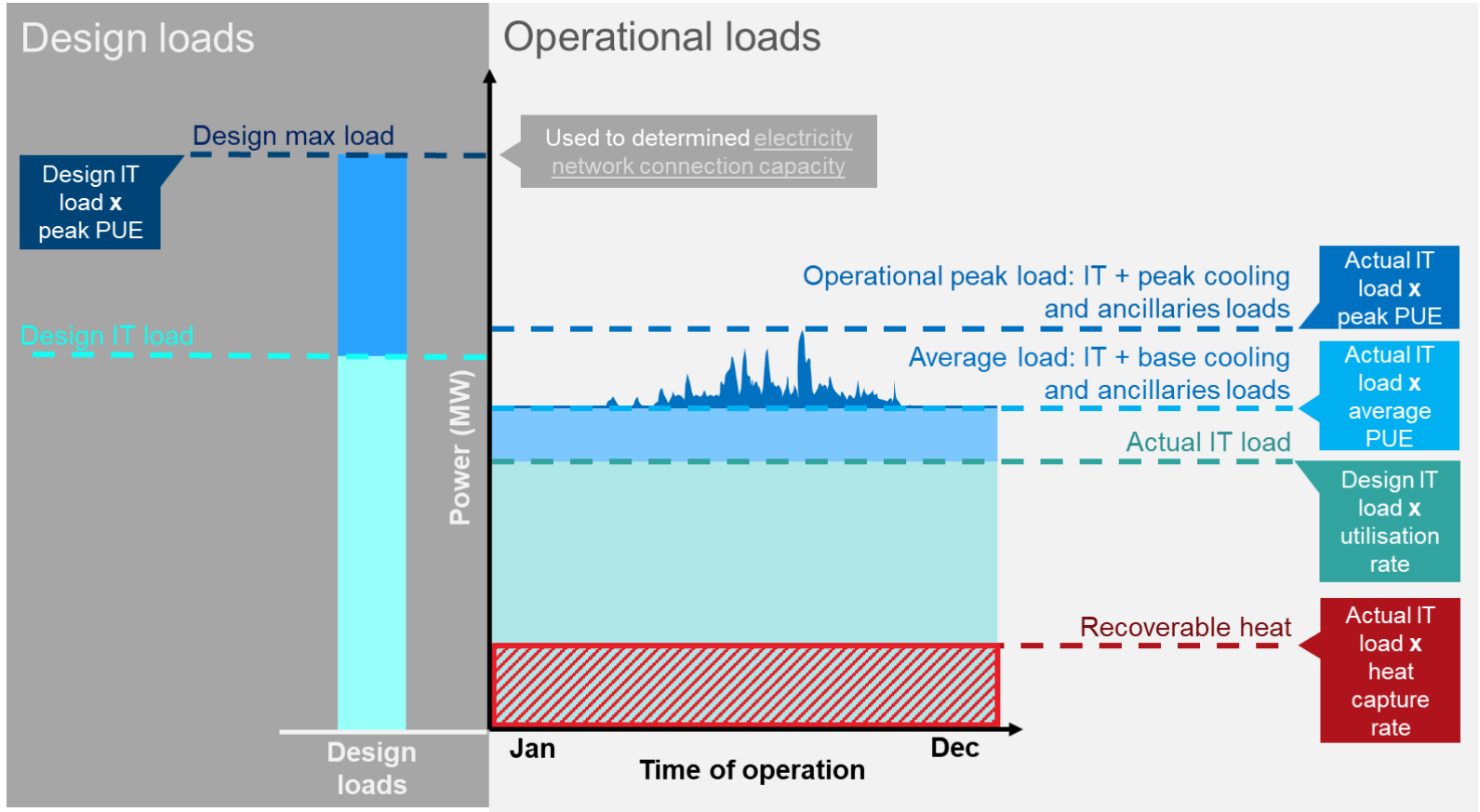
- Lower cooling plant condensing temperatures
- Cooling as a Service
- Heat sales revenue (if efficiencies aren’t improved)
- Potentially lower carbon offset payments
- Directly offset gas consumption = big carbon savings



Data centres in London. Arup research for GLA, 2023
(More exist, but these are the prominent ones)

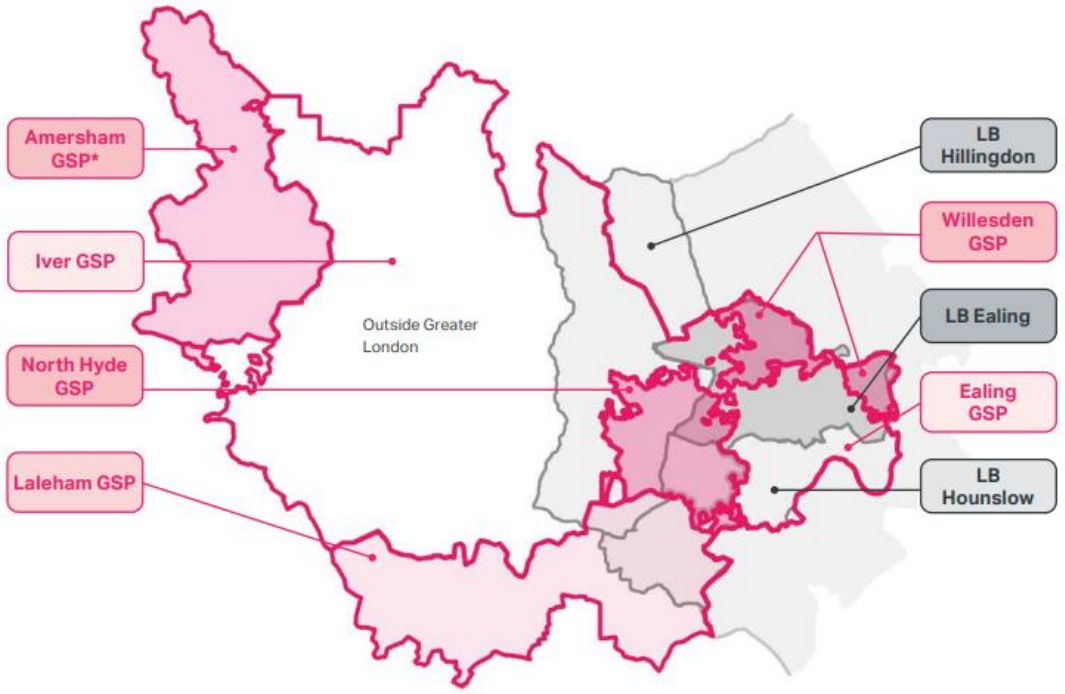
Heat availability

Not to scale…



The challenges for Data Centres

- Power connections, e.g. West London
- Location of plant e.g. heat pumps
- Water usage
- Resiliency and security of supply (of cooling)



SSEN Network, West London. Source: GLA
https://www.london.gov.uk/programmes-strategies/better-infrastructure/infrastructure-coordination/development-service/west-london-electricity-capacity-constraints

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What can data centres do?

Some actions you can take to promote heat network uptake

- Understand the technical and commercial models – what works for you and your assets?
- Help local authorities better understand the opportunity – how much heat is there, where is it (and when!), and under what terms would you consider sharing it?
- Engage with the heat network industry – talk to heat network operators (you could go as far as signing heat offtake agreements), engage with the Association for Decentralised Energy
- Help the public sector understand what actions need to happen to increase uptake e.g. changes to planning policy, preferred technical and commercial arrangements
- Engage with developers – to identify where there are opportunities for co-location of data centres and significant new developments with new heat demand
- Map the heat demand around you – what are the opportunities?

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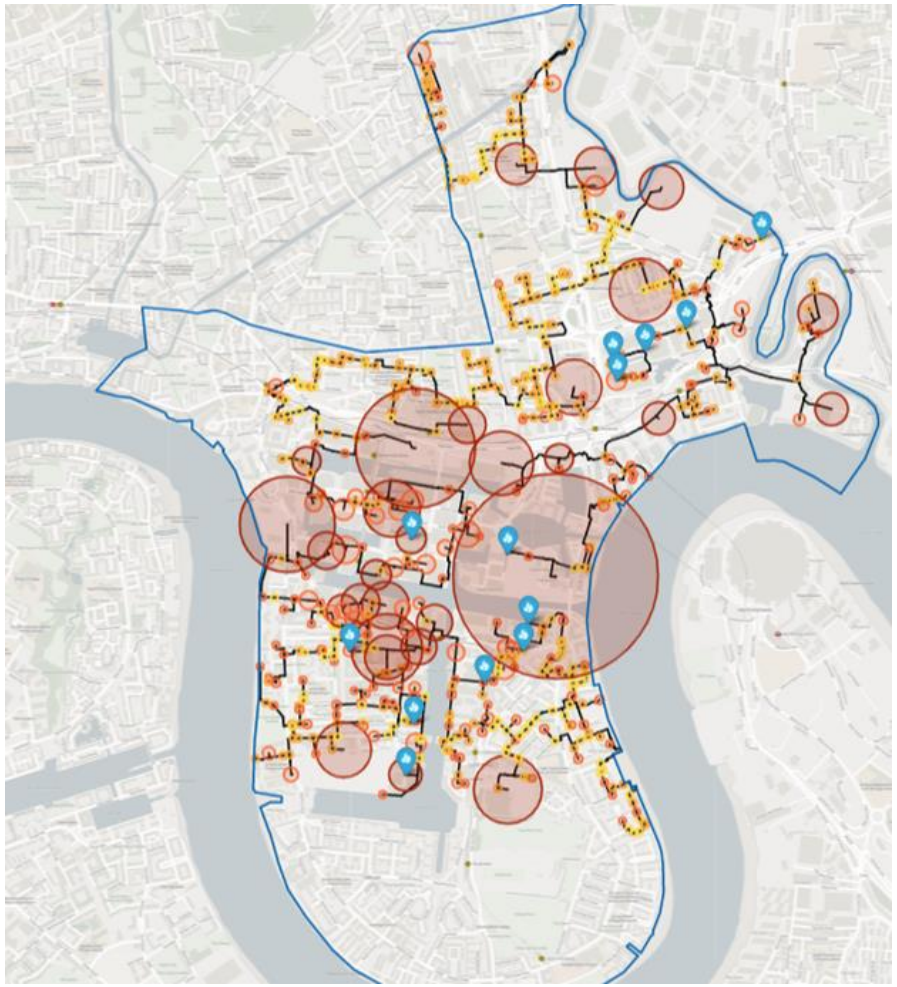
Case study 1: Isle of Dogs

Subject to future policy decisions

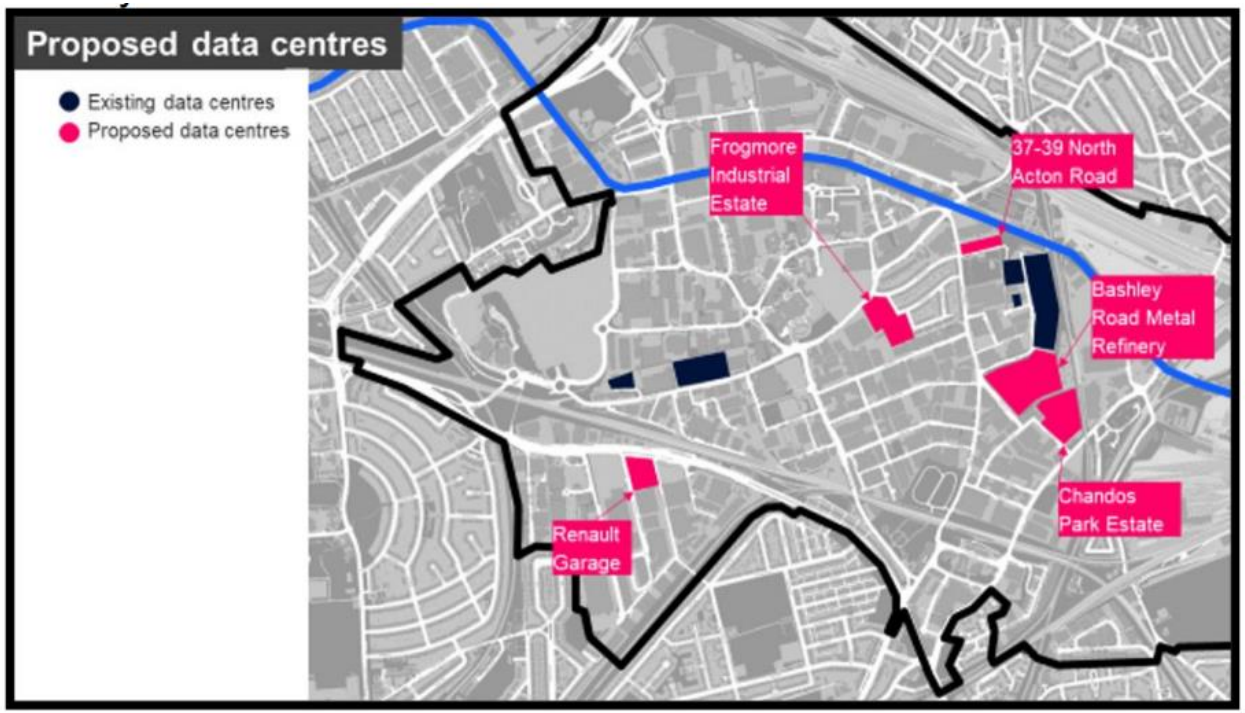
- For the area shown: more heat emitted than consumed!
- Multiple data centres in this location
- Potential for area wide heat network, delivered via heat network zoning



Case study 2: OPDC

Subject to future policy decisions

- Heat network planned for the area
- Power significantly constrained
- Aiming to use data centre waste heat
- Outline Business Case under development



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Contact

Alban Leiper, PhD, CEng

Associate, Integrated Energy, Bristol

Alban.Leiper@arup.com

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