Secondary Heat – London's Zero Carbon Energy Resource

http://www.london.gov.uk/priorities/environment/tackling-climate-change/energy-supply

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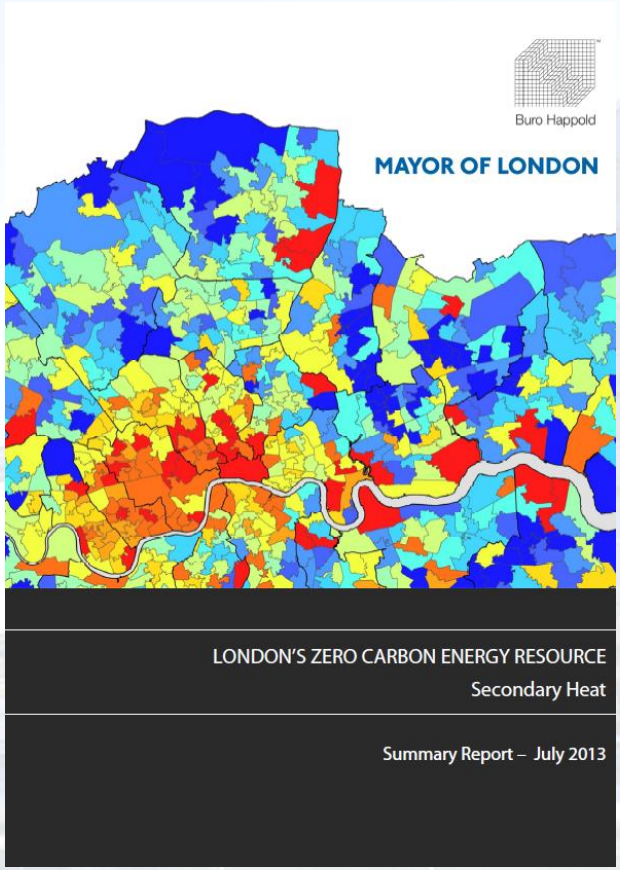
London’s zero carbon energy resource – secondary heat



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Secondary heat?

- Waste heat arising as a by-product of industrial and commercial activities
- Heat that exists naturally within the environment (air, ground, water)

- Variable temperature (usually ‘low grade’)
- Variable availability (seasonal, diurnal)

- Usually requires heat pumps (500KW +)

- higher inflow temp = higher COP of heat pump = better £ + CO_2

- Efficiently distributed via heat networks (at say 70ºC)

- Increasing value as grid decarbonises and carbon budgets tighten

Why?

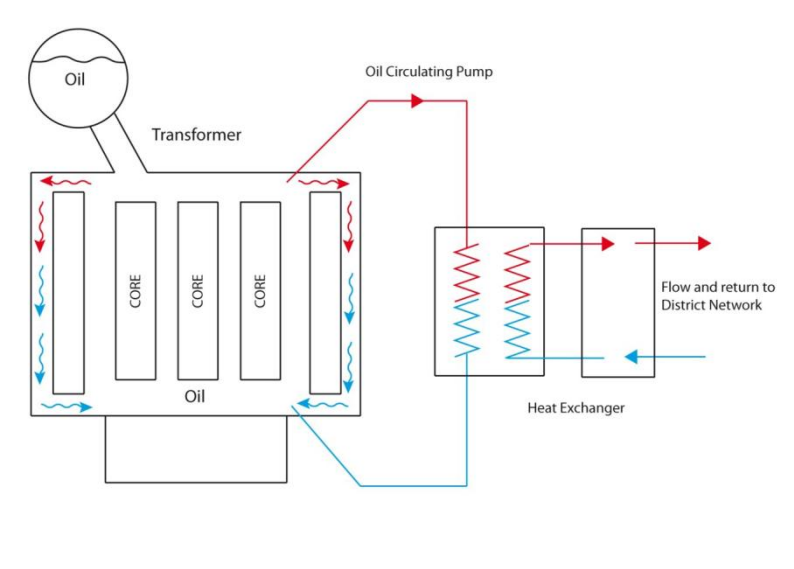
- Availability / viability of combustion fuels diminishes towards 2050
- Long-term viability of heat networks (not stranded assets ‘post-gas’)
- Greater energy self-sufficiency (London’s 25% DE target)
- Zero NOx

Key objectives

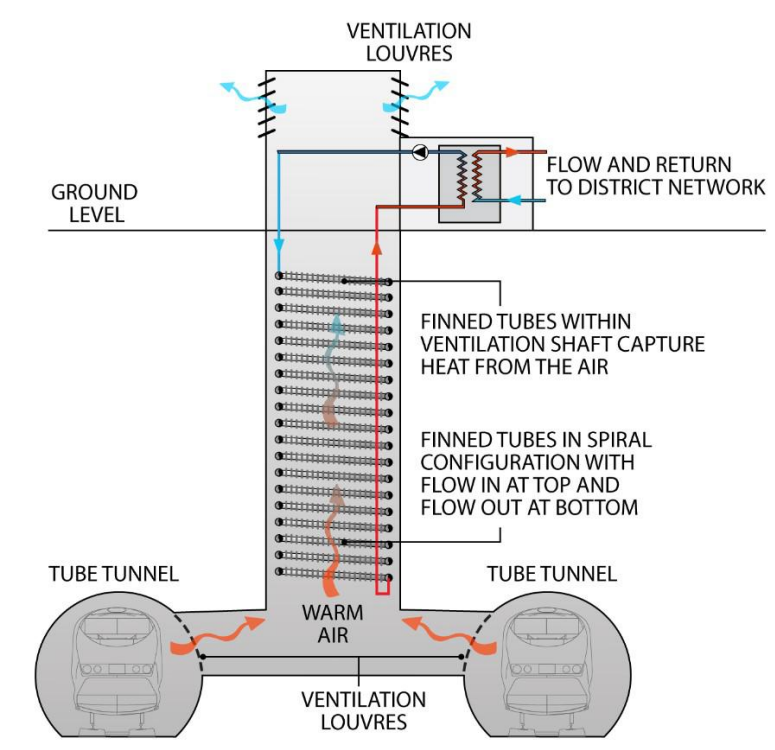
- Quantify availability, cost and energy utilisation considerations
- Understanding issues of integration with heat networks and buildings
- Inform national and city policy and the ‘market’
- Identify emerging project opportunities in London

Heat Recovery

Transformer



Metro Tunnel



Heat Pump COPs

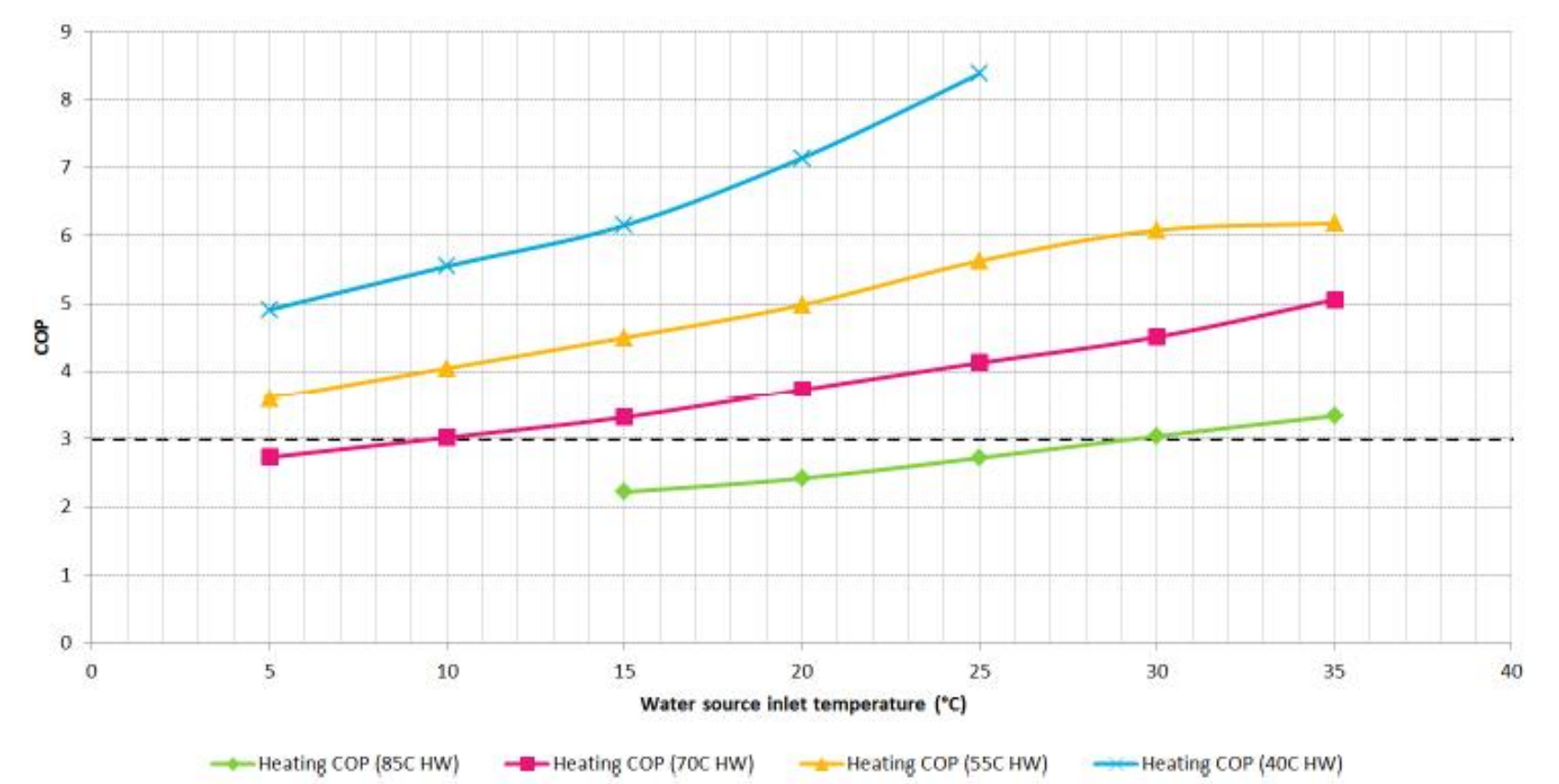
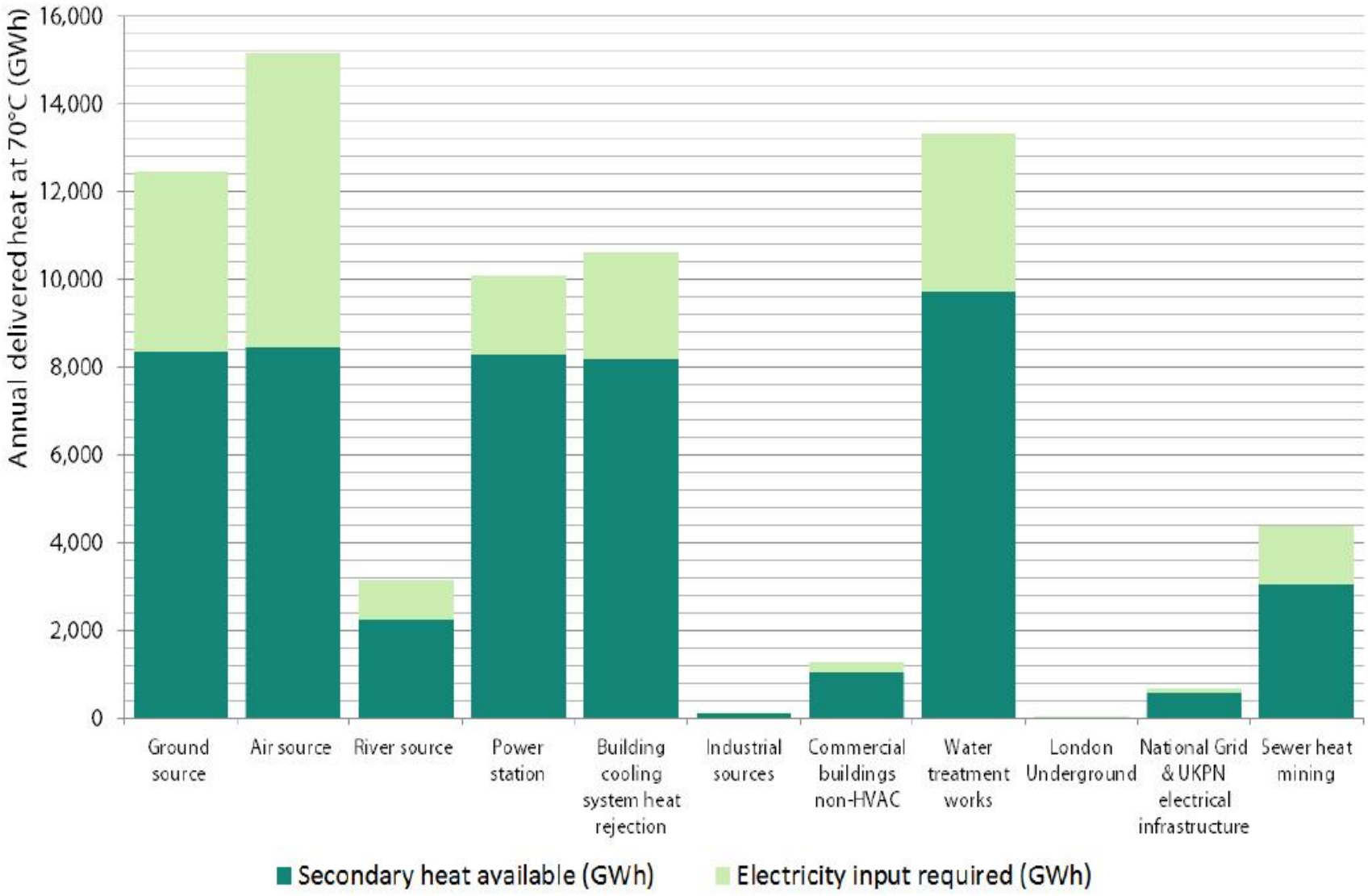


Figure 2 - Heat pump COPs for four different heat output temperatures (500-1000kW scale heat pump).



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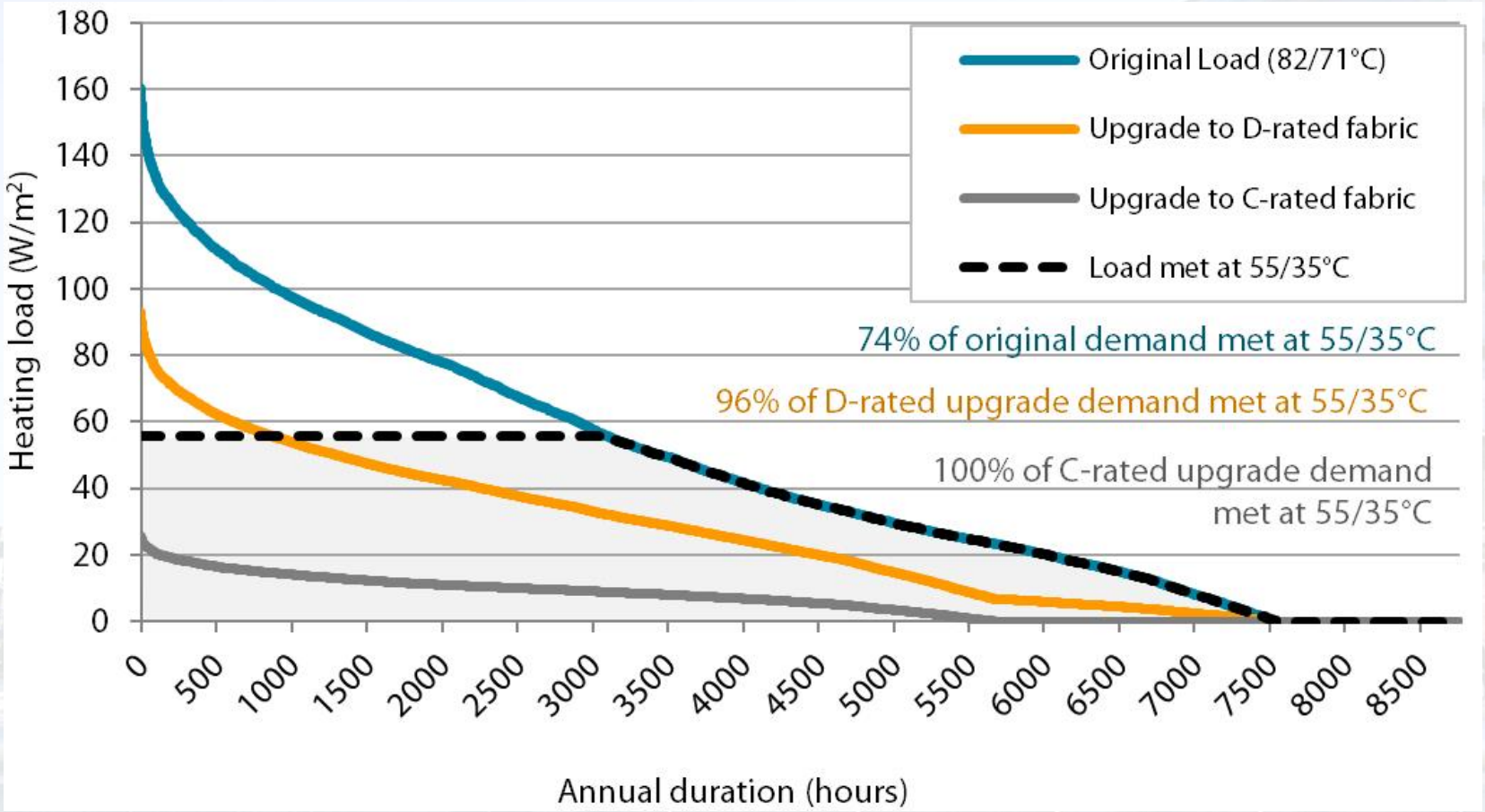
Key findings

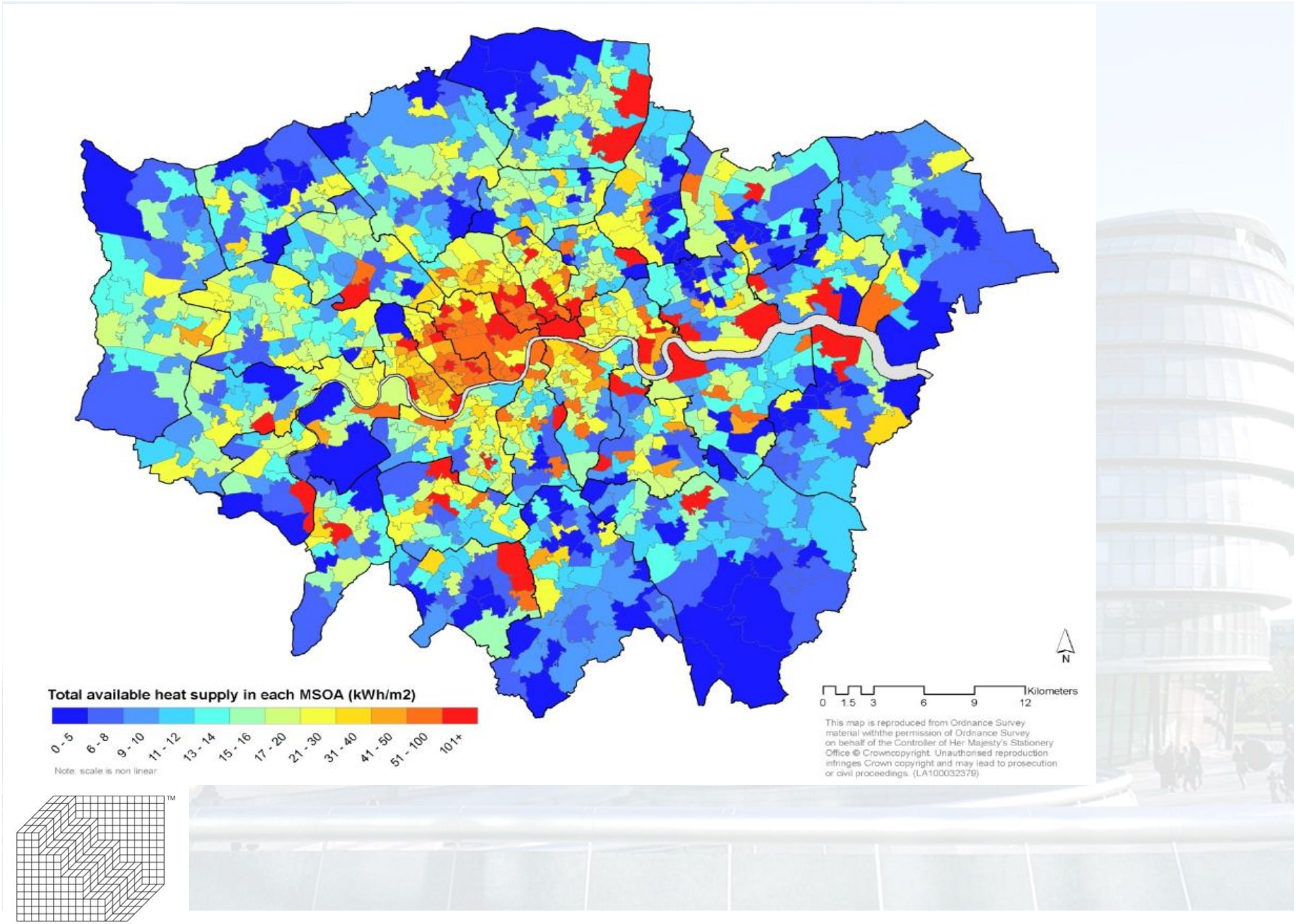
- Most secondary heat sources need upgrading to higher temperatures to be useable in heat networks, this requires heat pumps.
- The minimum suitable operating temperature for heat networks is 55°C
- London's 2010 heat demand is 66TWh/yr - secondary heat sources can provide up to 71TWh/yr of heat at 70°C, of which:
  - 50 TWh/yr is attributed directly to the heat sources and
  - 21TWh/yr to the electricity required by heat pumps.

•Compared to conventional gas boiler heating

- 12 TWh/yr of secondary heat can be considered 'cost effective'. This is equivalent to 18% of London's 2010 heat demand.
- 56 TWh/yr of secondary heat can be considered 'CO2 effective'. This is equivalent to 56% of London's 2010 heat demand.

Impact on load duration curve of upgrading the fabric of a poor quality building (ie. residential E-rated)





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