HEAT NETWORKS

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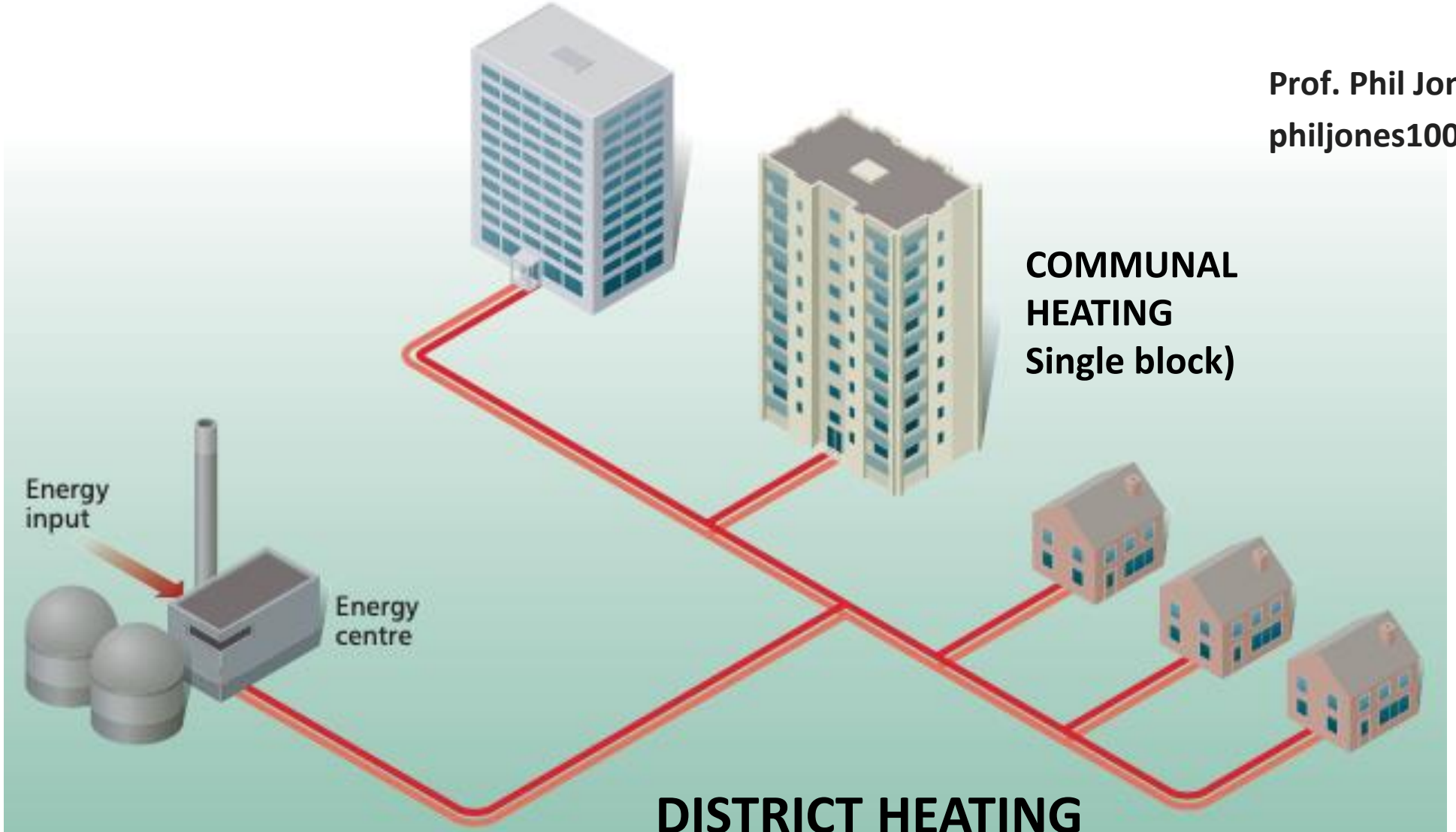

COMMUNAL HEATING
Single block)

DISTRICT HEATING

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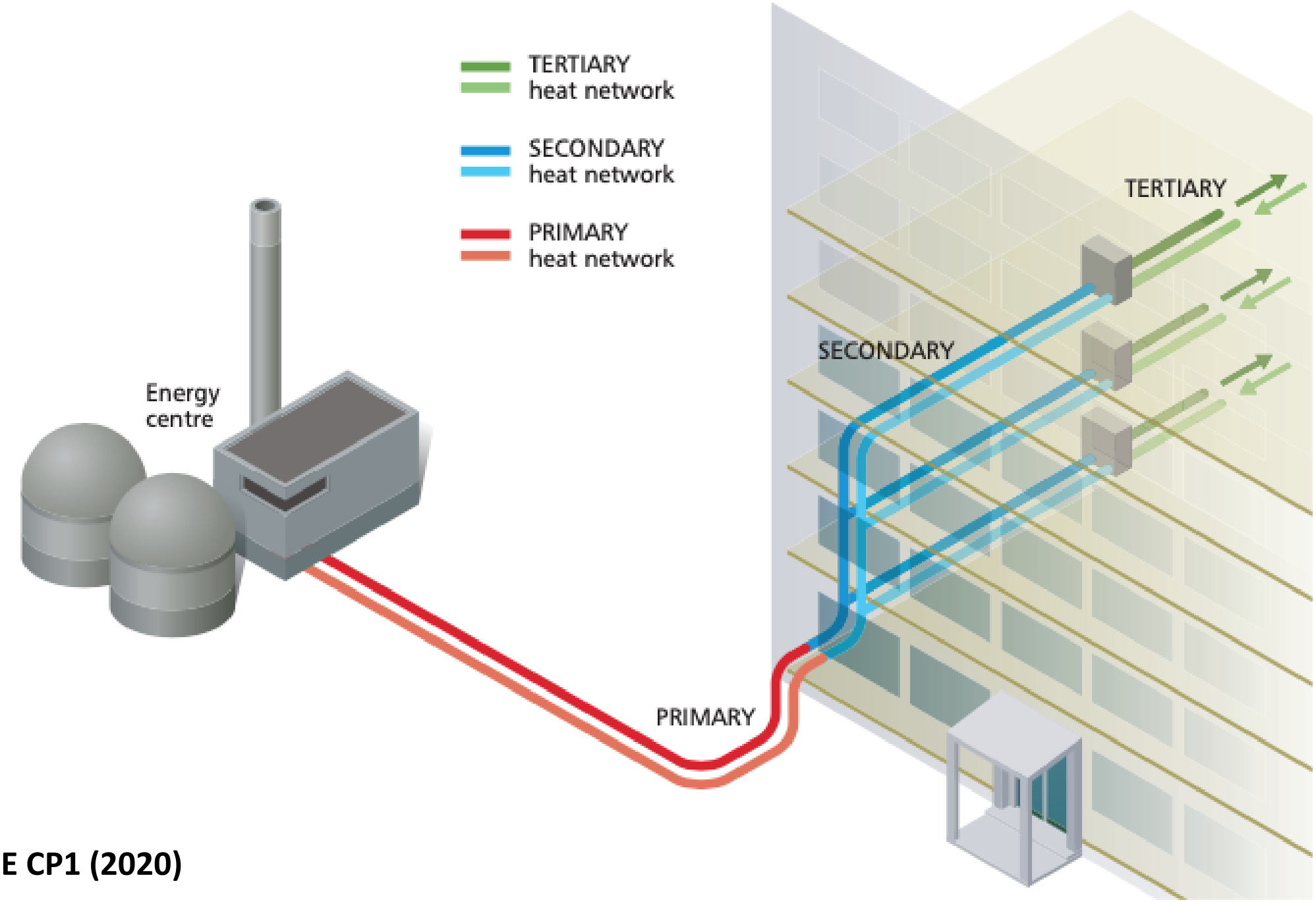


CIBSE CP1 (2020)


No longer a CO2 saver due to grid decarbonisation
CHP
KINGS CROSS

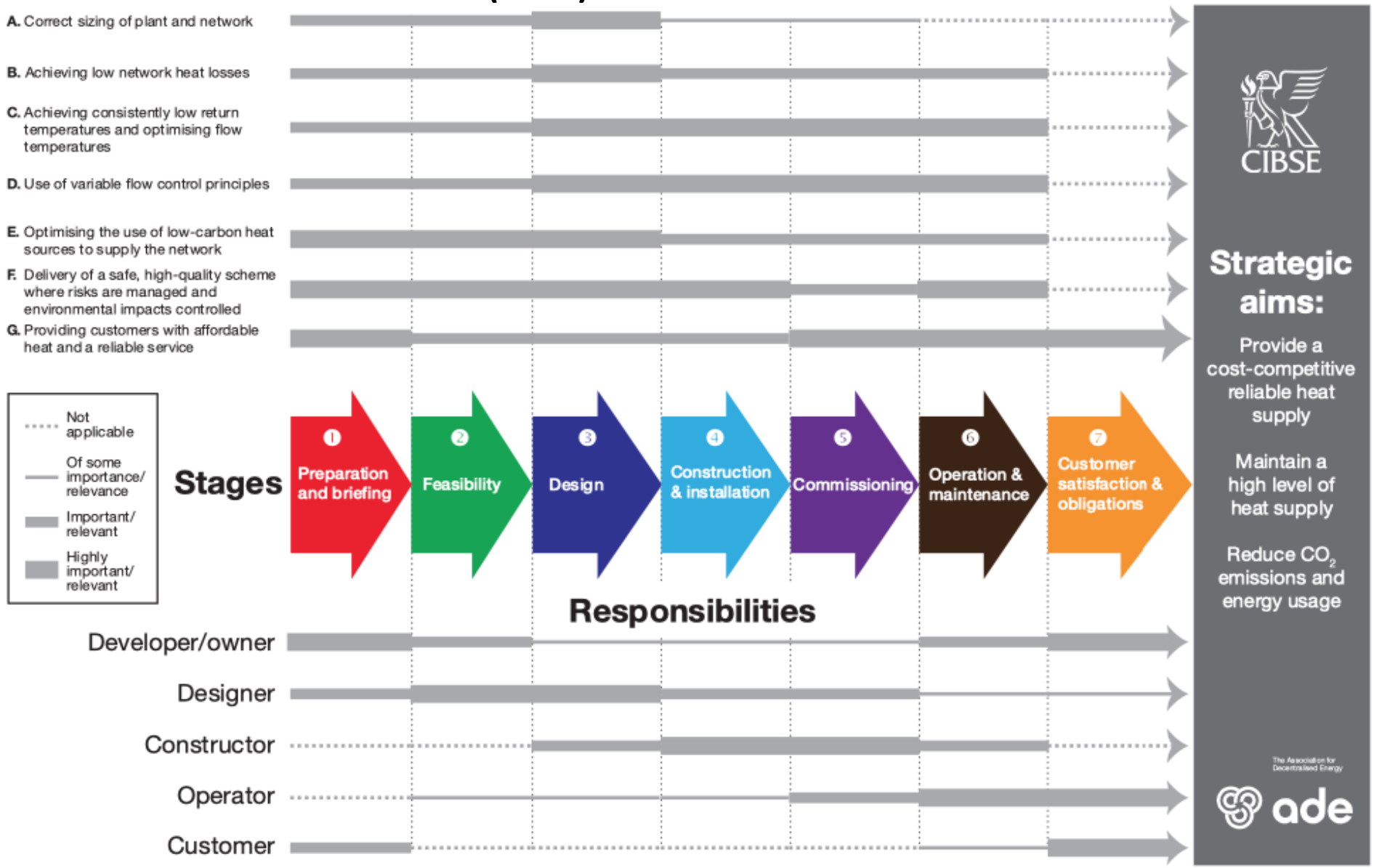
Large scale high temperature heat pumps for heat networks

DISTRICT HEATING RULES …… ok!

CP1 (2020)
NOW PUBLISHED

DS439 translated
into English

CIBSE CP1 (2020) Themes



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Greater emphasis on compliance

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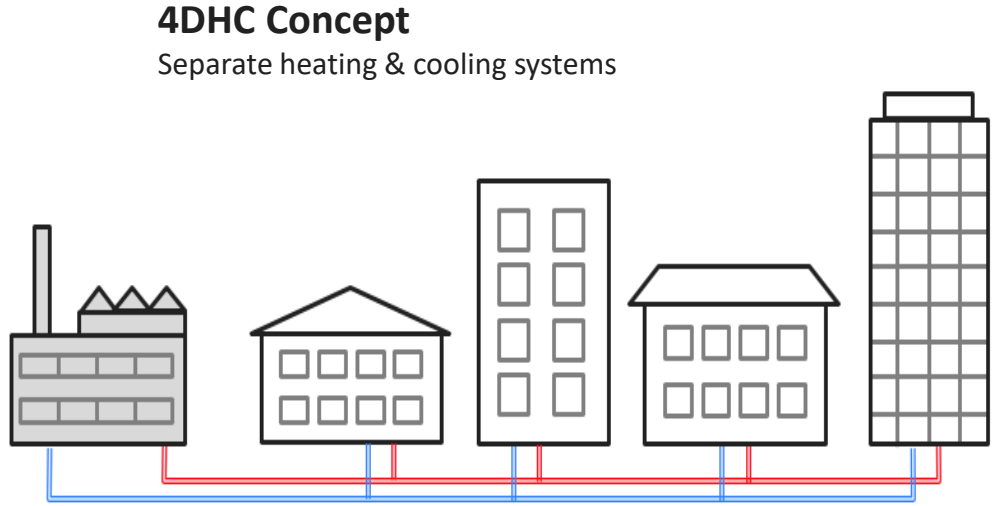
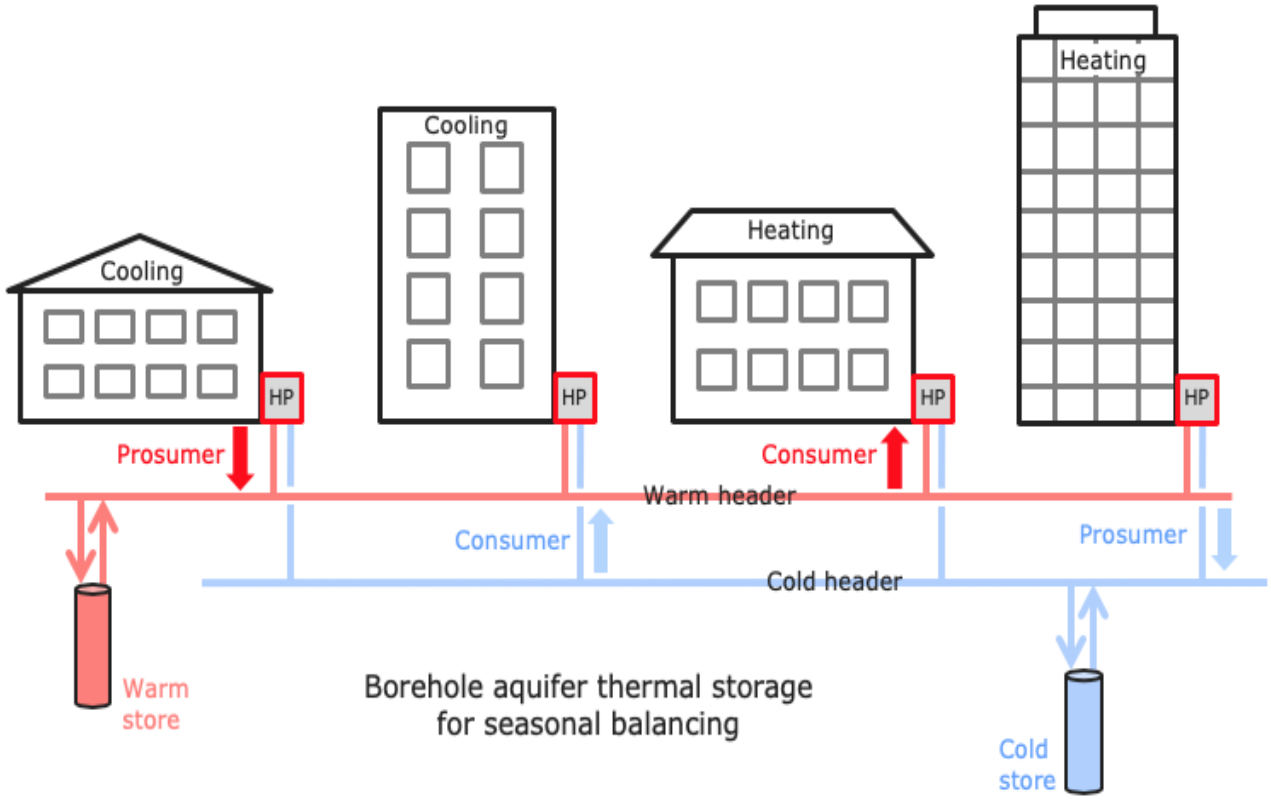
4th Generation District Heating & Cooling (4DHC)

- Traditional centralised shape - energy centre supplying heat outwards to buildings
- Supplying at ~60-50C with a wider ΔT and return temperatures ~30-20C
- Cooling would be a separate system
- No interchange of heat between buildings is possible



What is a 5th generation heat network?

- Low temperature headers act as heat source for multiple decentralised energy centres that take-out and feed-in heat
- Requires a means of balancing heat in the headers, when all buildings are in heating mode for instance
- Greater opportunity for heat recovery



5DHC provides a single integrated 'plug-and-play' heating & cooling system allowing buildings to be 'prosumers' across the network

This gives flexibility in timing & temperature for developers

5DHC is a good solution where there is a significant mix of cooling and heating demands, allowing prosuming across the heat network itself

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5th generation heat networks in practice

Heerlen 5th generation DHC using mine water

www.mijnwater.com

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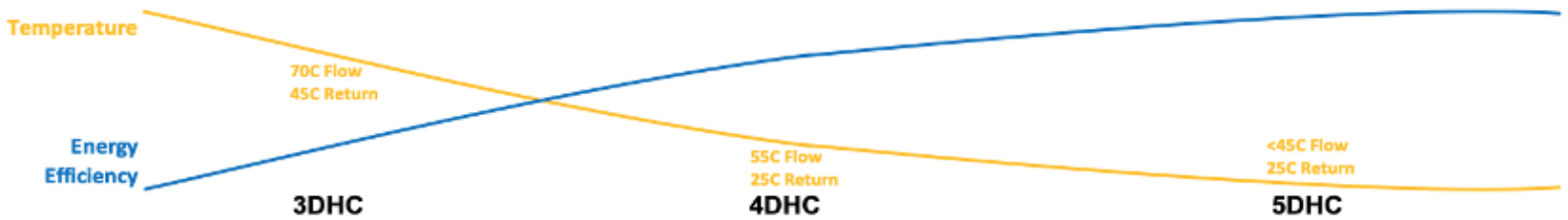
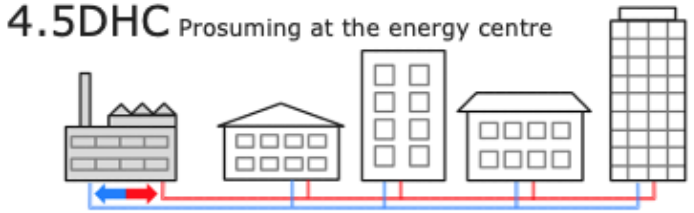
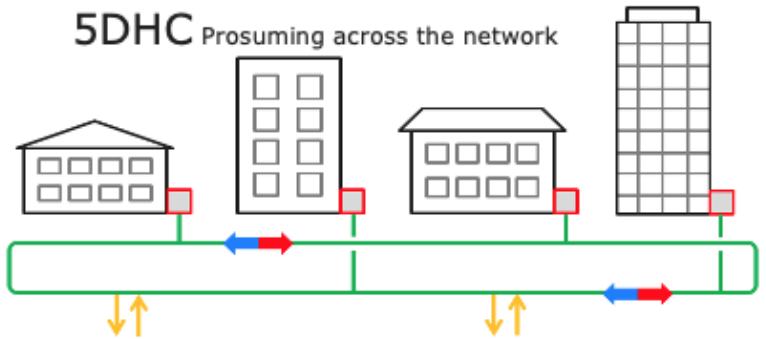
The progression of heat networks

(This acknowledges and builds on work by Lund et al)







- No clear progression from 4th to 5th
- 5th generation (5DHC) is an entirely different type of DHC altogether

Phil Jones
Building Energy Solutions

@CIBSEepg

A roadmap to achieve 5th generation heat networks in the UK

Plymouth Concepts Team

Phil Jones – Building Energy Solutions
Chris Dunham – Carbon Descent
Chris Davidson – Genius Energy Lab

CIBSE Technical Symposium 2019

GREENSCIES

Green Smart Community Integrated Energy Systems

> 10,000 residents connected to the network

Low carbon heating and cooling to more than 3500 homes

Renewable power generation enough to supply nearly 500 homes

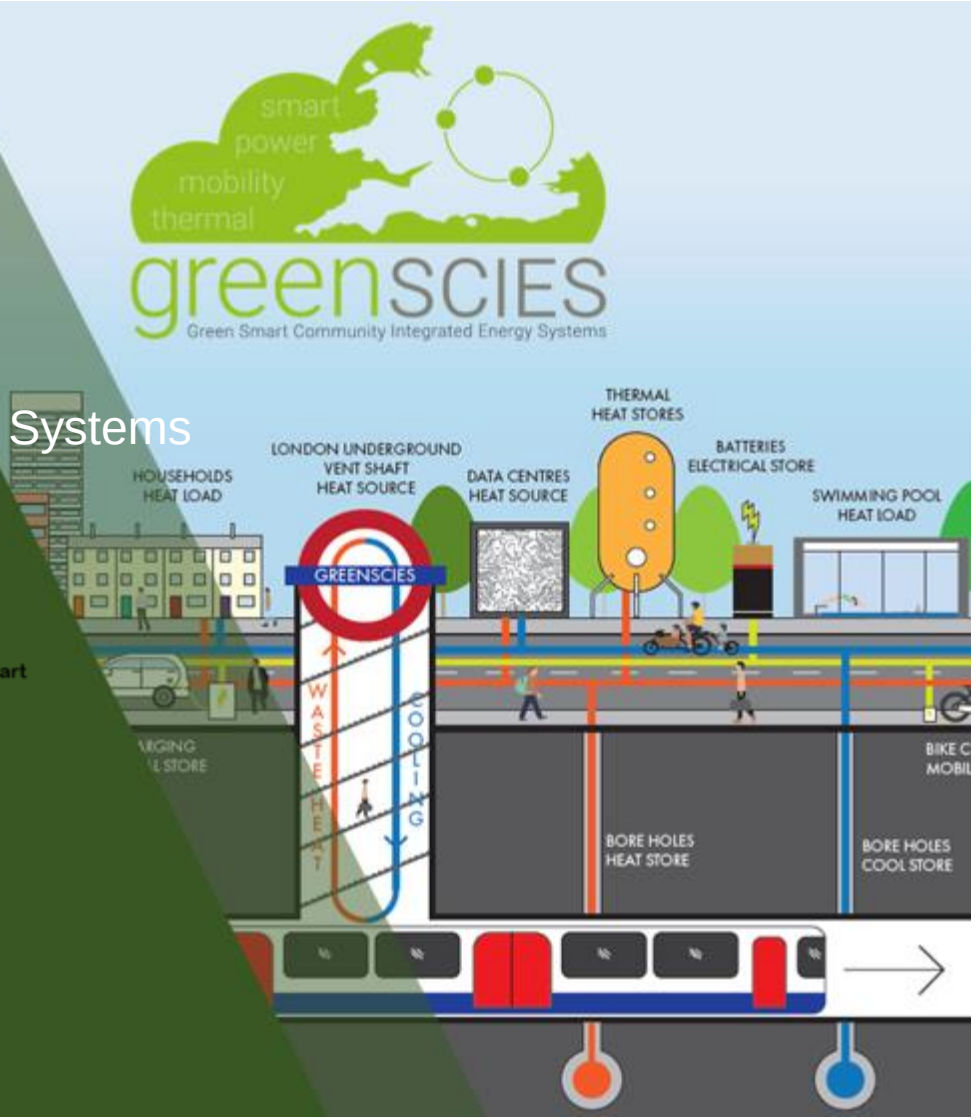
> 160 new EVs connected to the smart energy network

5th Generation heating & cooling

Integrated Mobility, Power & Heat

Smart Local Energy Network

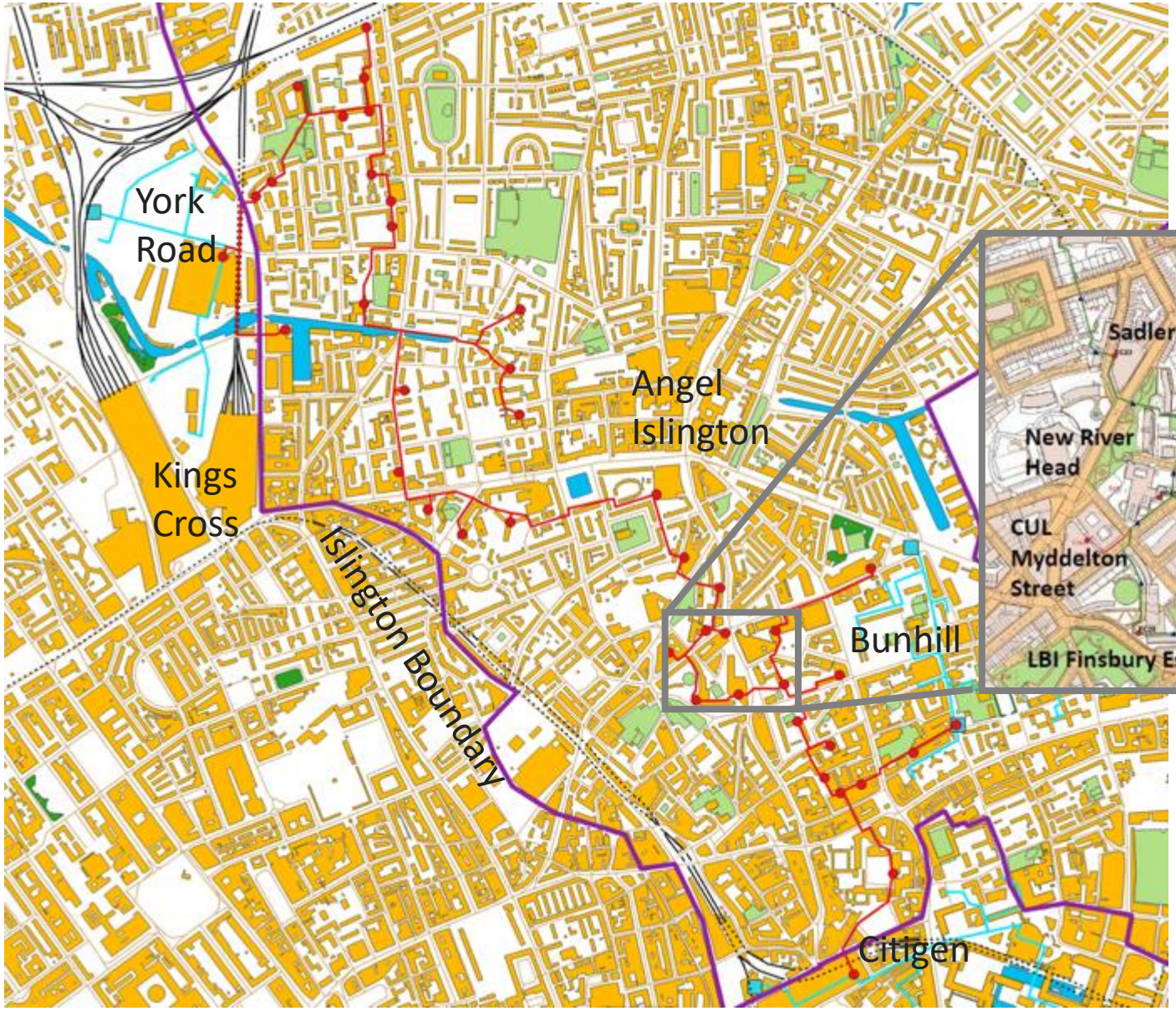
IA Control & Demand side response



Consortium of 15 partners funded by Innovate UK

Smart Local Energy System www.GreenSCIES.com

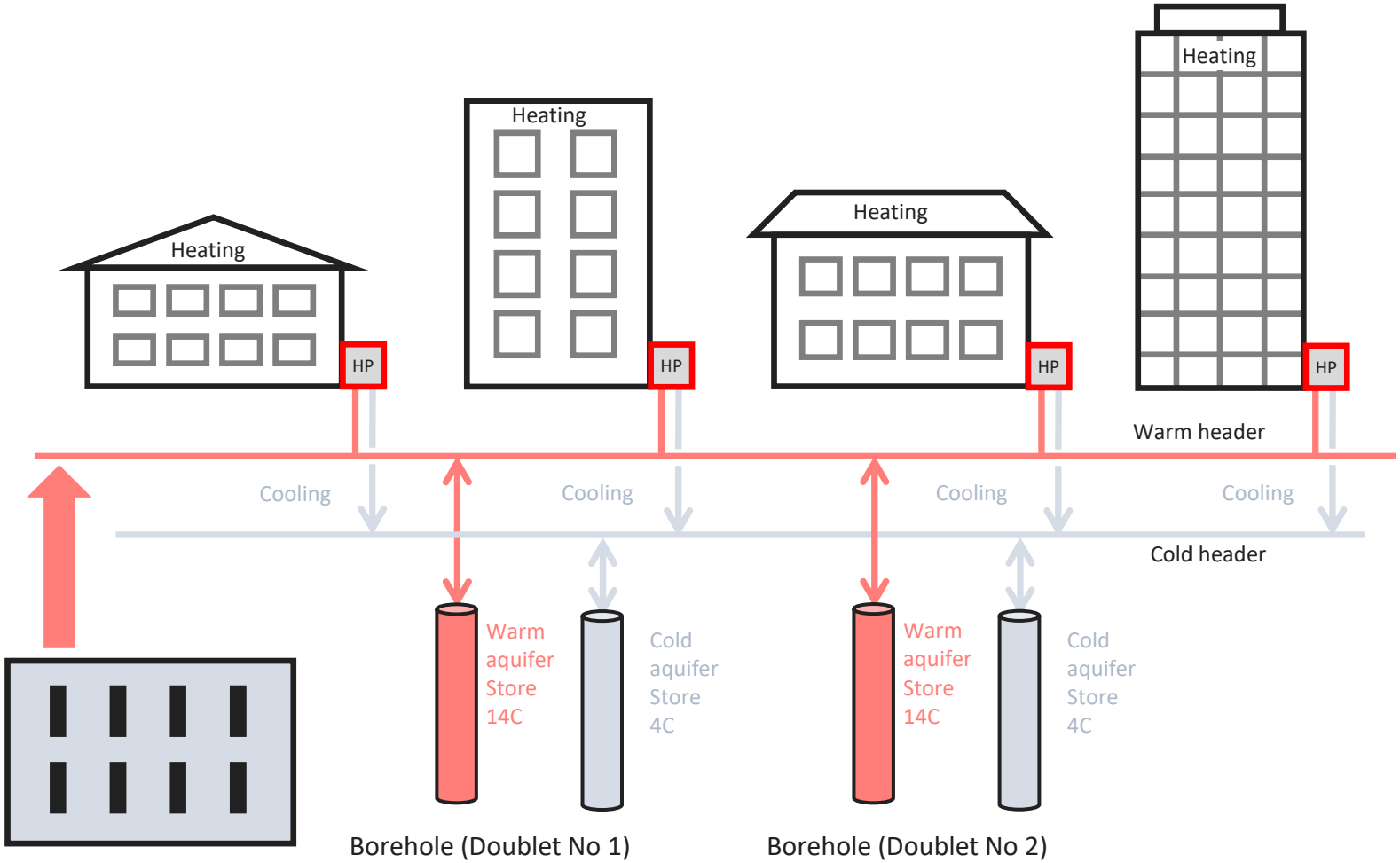
GreenSCIES Concept Design



Lead scheme

5,000 Tonnes/yr

5th generation heat network
(Ambient loop balanced by boreholes, with decentralised heat pumps & data centre)



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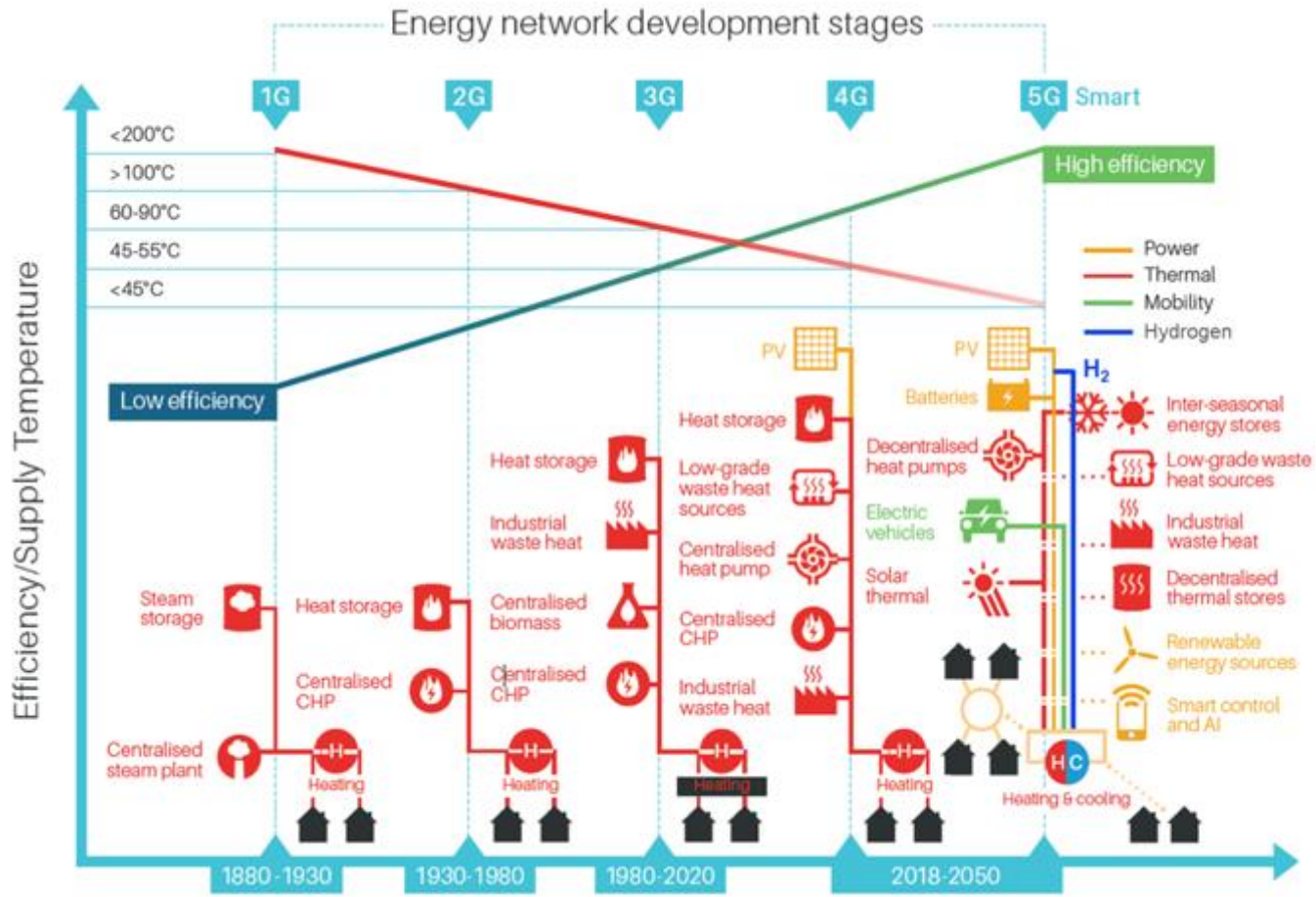
Smart local energy networks



Revesz et.al (2019) Initial Assessment of a 5th Generation District Energy Network in Central London, ASHRAE Winter Conference

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Are low carbon Heat Networks possible?

YES!

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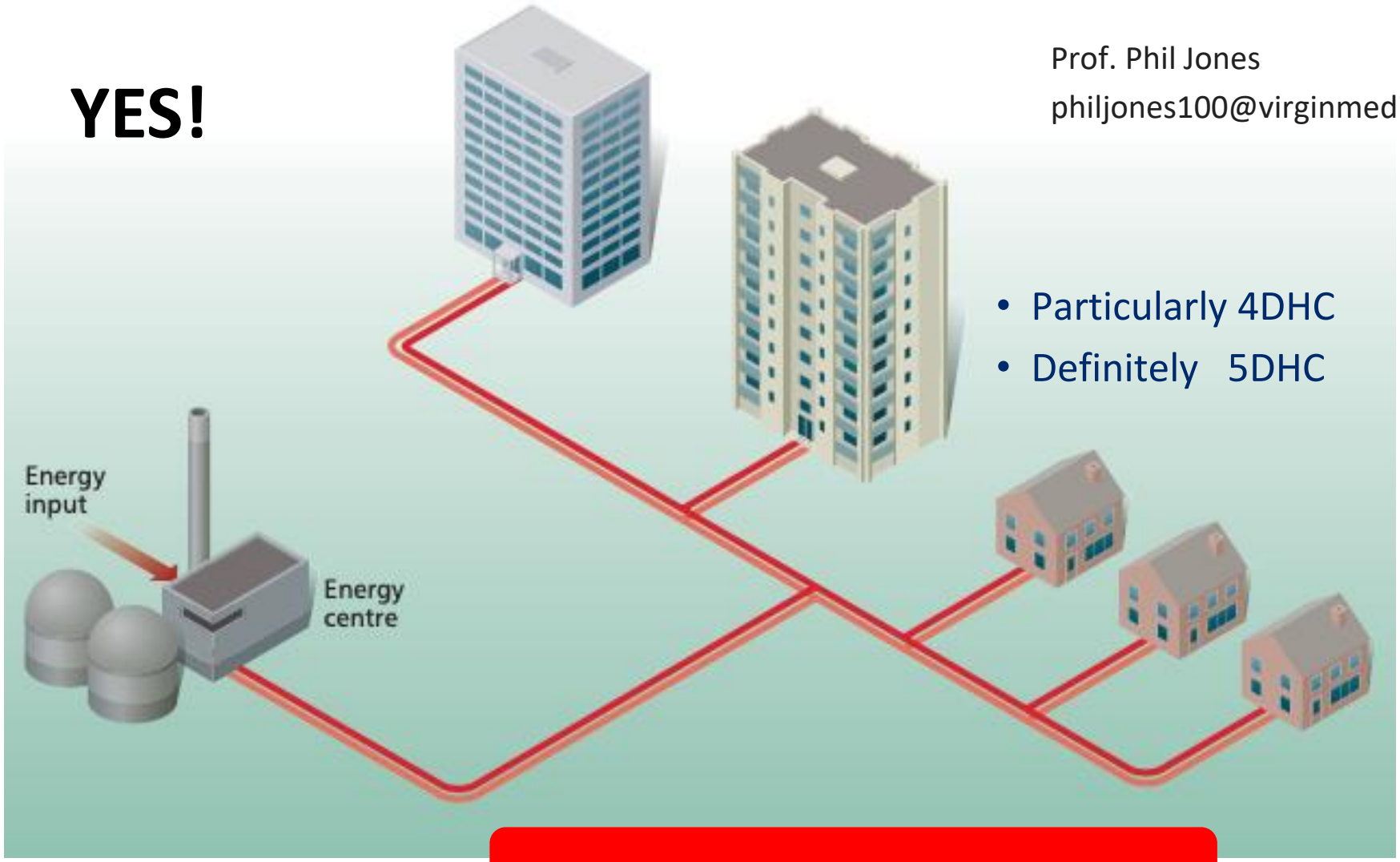

- Particularly 4DHC
- Definitely 5DHC

But making these economic is the challenge