

Ground Source Heat Pump Association Webinar Series

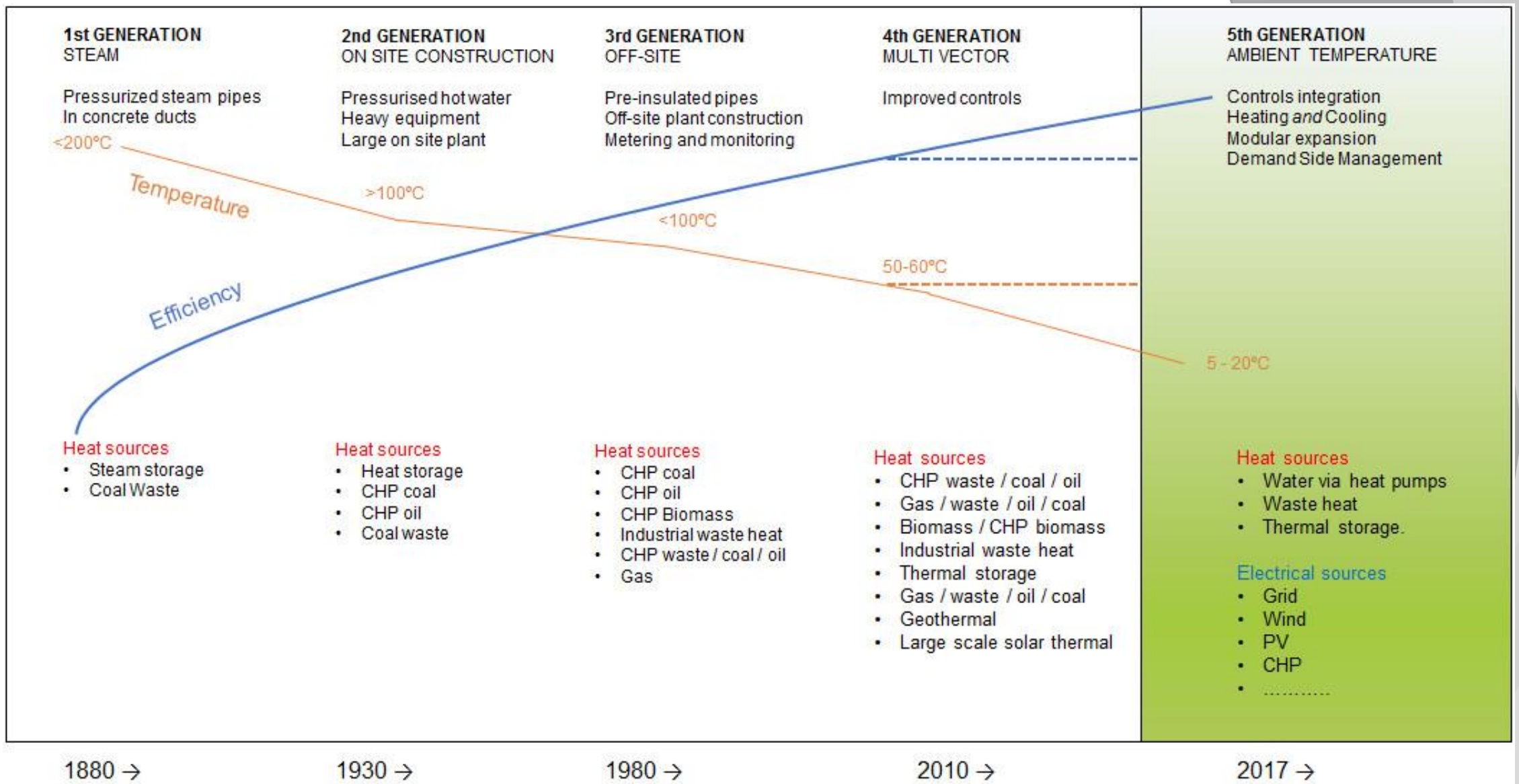
Fourth to Fifth Generation District Heating

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How has district heating developed?

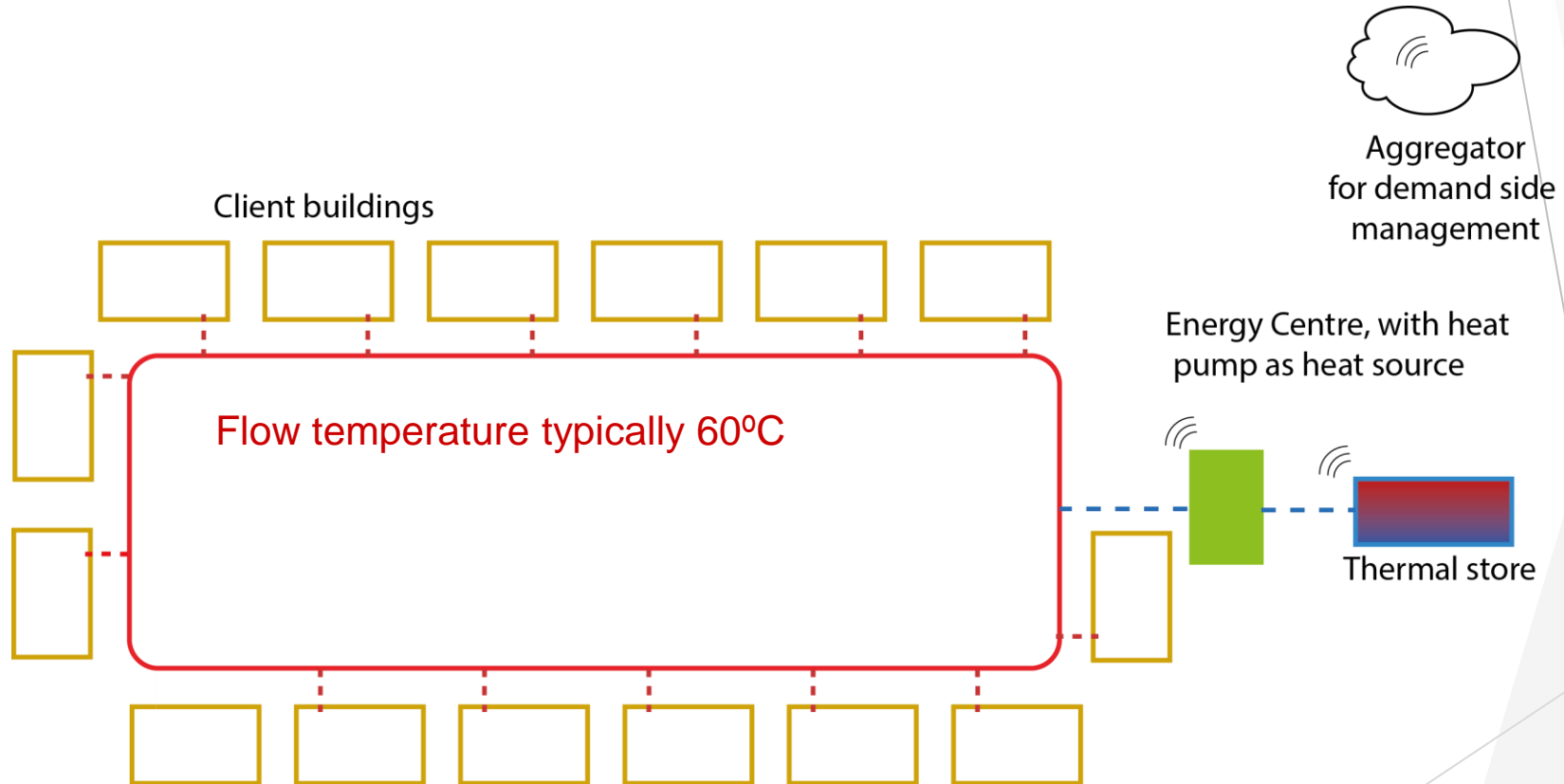
- ▶ When did district heating start?
- ▶ What are the trends over the five generations?
- ▶ How is it evolving?
- ▶ Change of heat source
- ▶ Lowering of heat distribution temperature
- ▶ Lowering of heat losses to the ground
- ▶ Combustion gives way to heat transfer



Heat network trends to lower distribution temperatures and higher efficiency

Fourth Generation District Heat Network

Heat from *energy centre* from gas, CHP, high temperature heat pumps or a mix
If heat pumps are used, the carbon emissions are greatly reduced

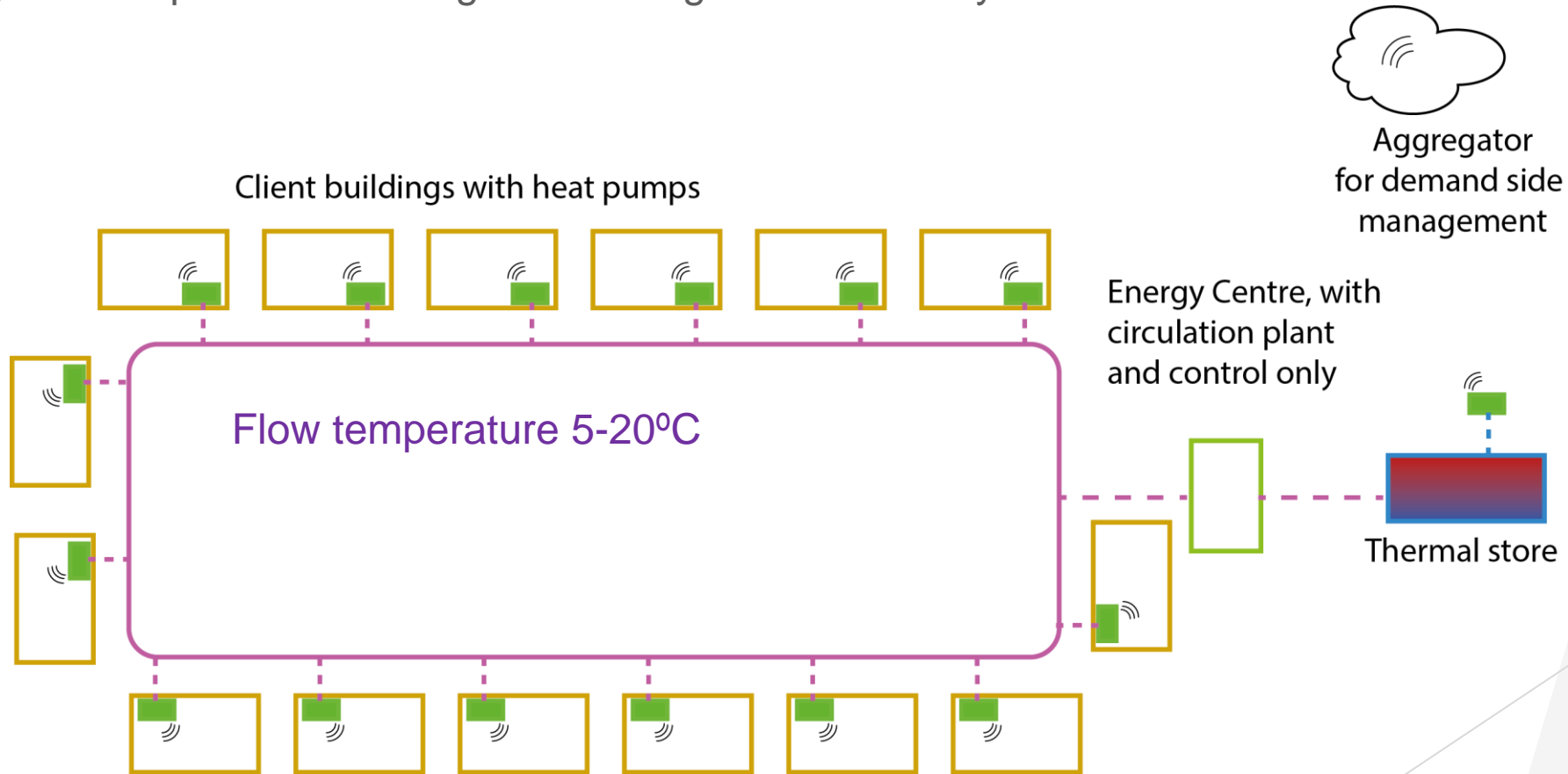


Fifth Generation District Heating - Balanced Energy Network

provides the lowest possible carbon emissions

allows heat sharing between customers, increasing energy efficiency

single circuit provides heating and cooling simultaneously



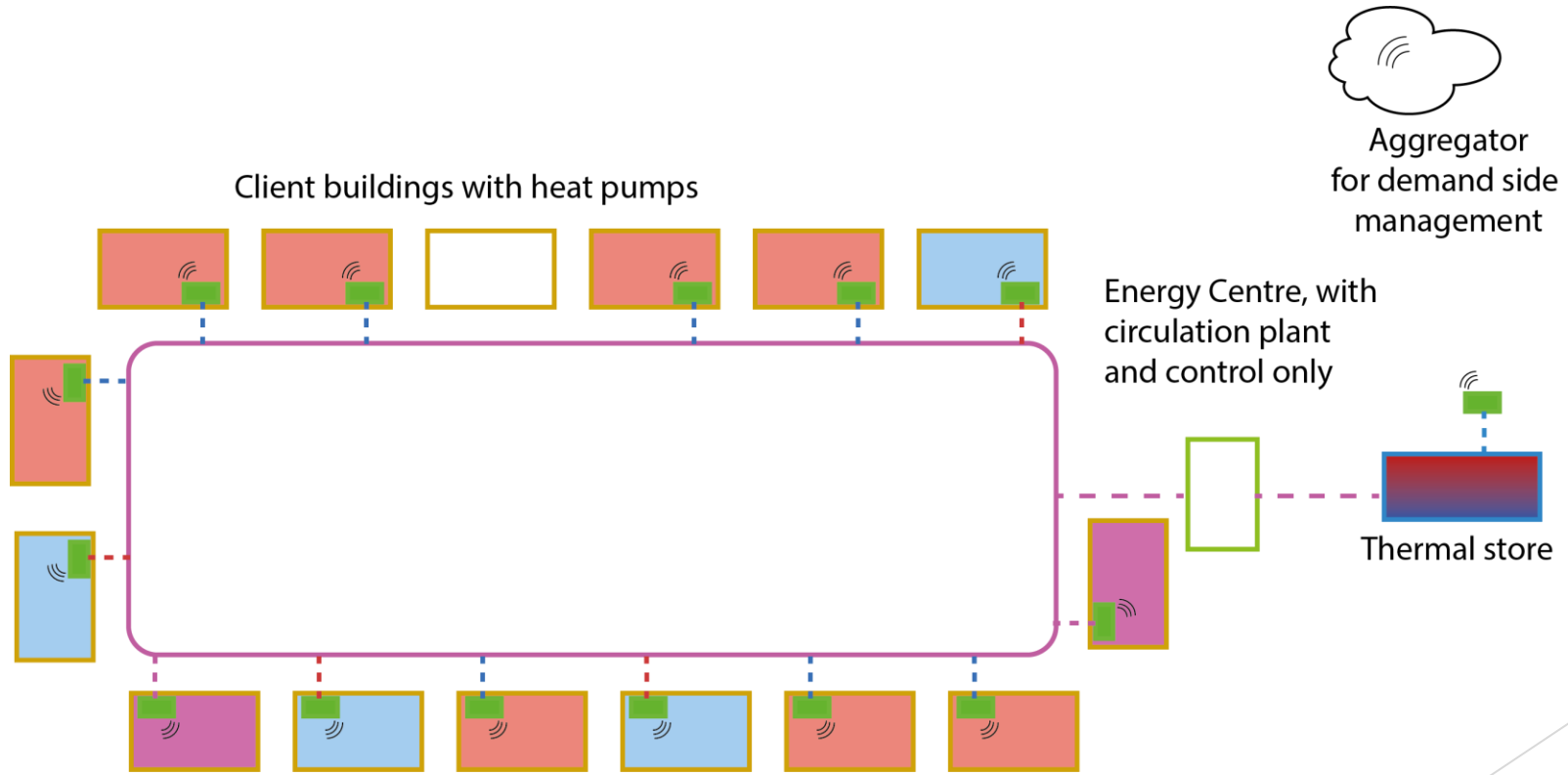
Balanced Energy Network

Ambient temperature network allows polymer pipework with limited insulation
Radically cheaper than installing heavily insulated (often steel) pipework
From 4th generation steel pipes to 5th generation polymer



Balanced Energy Network - heat sharing network

some buildings need heating
some buildings need cooling
some buildings need both



Fifth Generation Heat Network

- ▶ **A Fifth Generation Heat Network employs**
 - an ambient ground temperature distribution loop
 - a heat pump in each building to transfer heat into the building (or out of it)
 - Demand Side Response to avoid peak loads on the Grid (and earn income)
 - thermal energy storage to exploit heat pumps and Demand Side Response

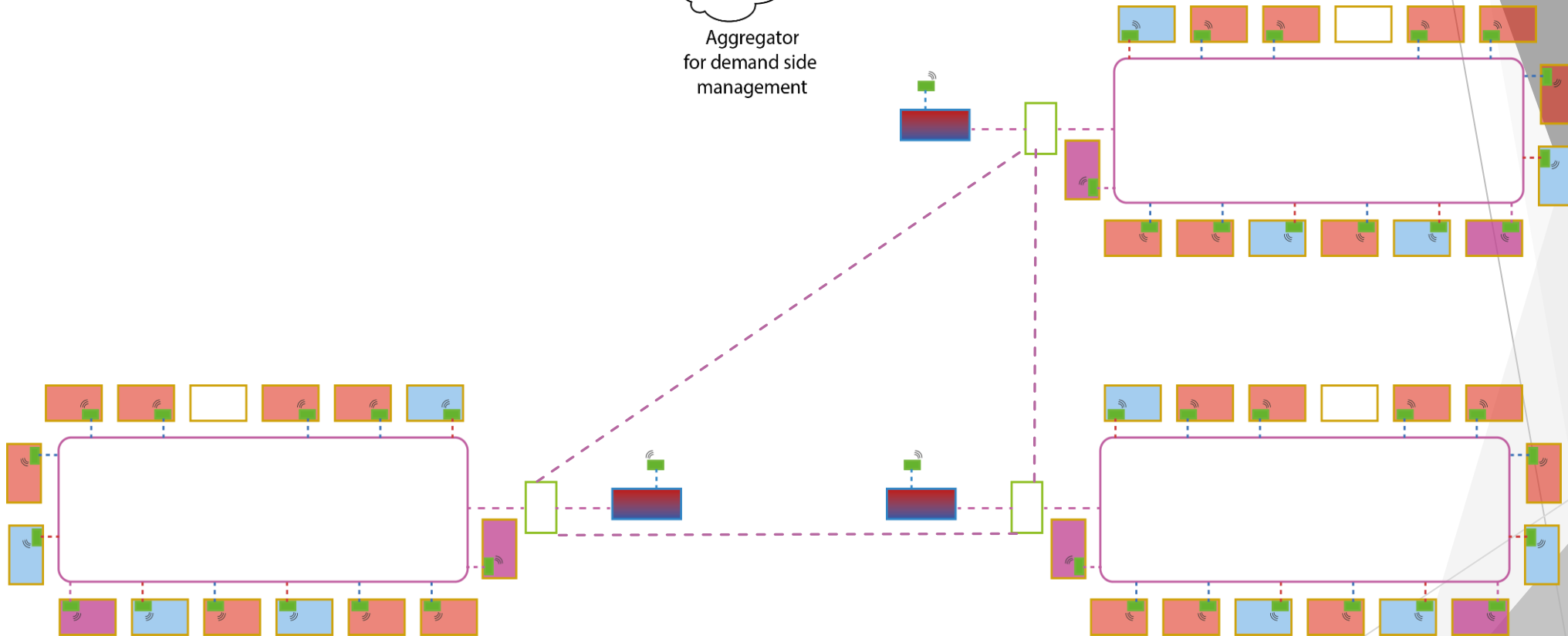
- ▶ **A Fifth Generation Heat Network does *not* employ combustion**
 - and therefore issues no on-site CO₂
 - and no on-site NO₂
 - and no particulates

- ▶ **A Fifth Generation Heat Network offers**
 - radically cheaper installation cost
 - ability to recycle heat between buildings
 - the flexibility to expand or contract without major cost implications
 - ability to use waste heat at any temperature above 25°C
 - lower maintenance cost than combustion boilers

A BEN can grow in a modular fashion

- reflects real world development patterns
- benefits shared between segments
- infrastructure costs are minimised


Aggregator
for demand side
management



High Temperature Heat Pump

Designed by ICAX and J&E Hall

Available in units from 300kW to 2MW

Available in ground or marine versions

Temperature output up to 80°C

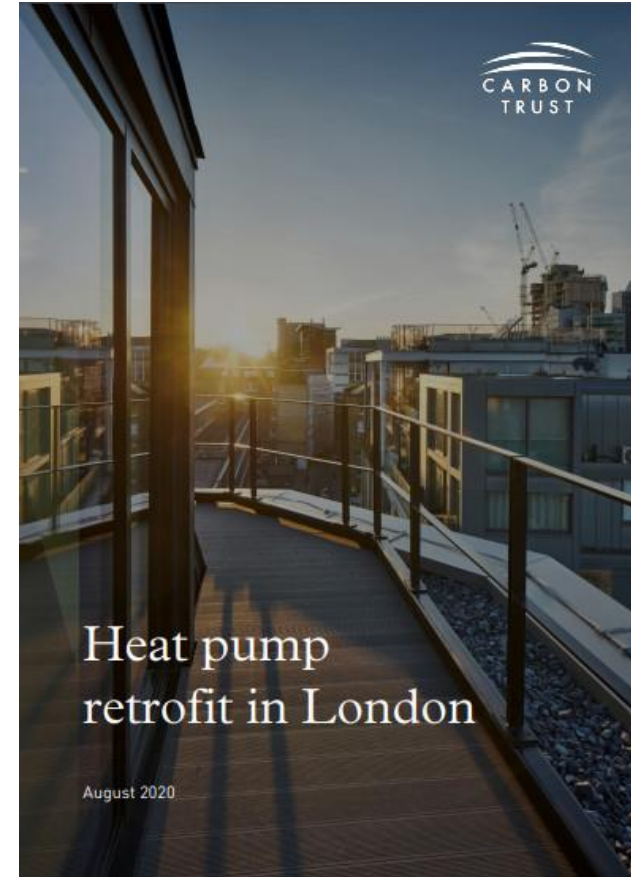
Allows retrofit without changing heat distribution system in existing buildings



Heat Pump Retrofit in London

London aims to be a net zero carbon city by 2030 and to have the best air quality of any major city.

28 London Boroughs have declared climate emergencies with over half committed to achieving net zero by **2030**.



Heat Pump Retrofit in Southwark

- Experience with Balanced Energy Network
- Working with Southwark
- London Aquifer
- Hydrogeology experience
- Working with Environmental Agency
- Lower heat distribution temperatures
- High temperature heat pumps
- Controls in an integrated environment



Three community heated housing estates in Southwark:
Consort, Newington, Wyndham

Fourth Generation district heating with High Temperature Heat Pumps

Newington is predicted to save over 25,000 tonnes of CO_{2e} over 25 years

Water Source Heat Pump Retrofits elsewhere

- ▶ ICAX is well placed to advise on other large scale projects to save on carbon emissions in London or elsewhere
- ▶ And to deliver the retrofit installations
- ▶ Including high temperature heat pumps



Questions....

www.gshp.org.uk

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