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Economies of scale versus the learning curve in the heat sector

A presentation to the British Institute of Energy Economics Conference

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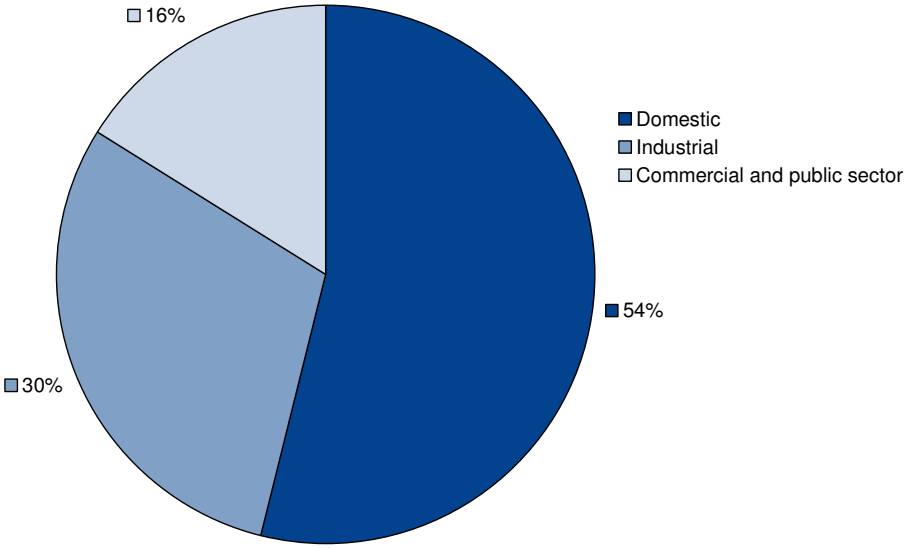
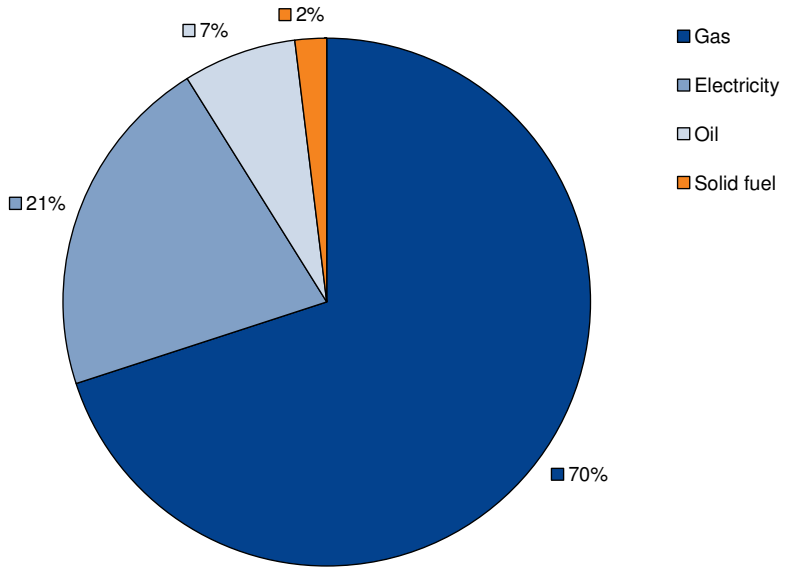
Tackling heat is vital to delivering a low-carbon future

- Heat production is responsible for 49% of the final energy consumed in the UK, and 47% of the carbon emissions.



Majority of heat is used in the domestic sector



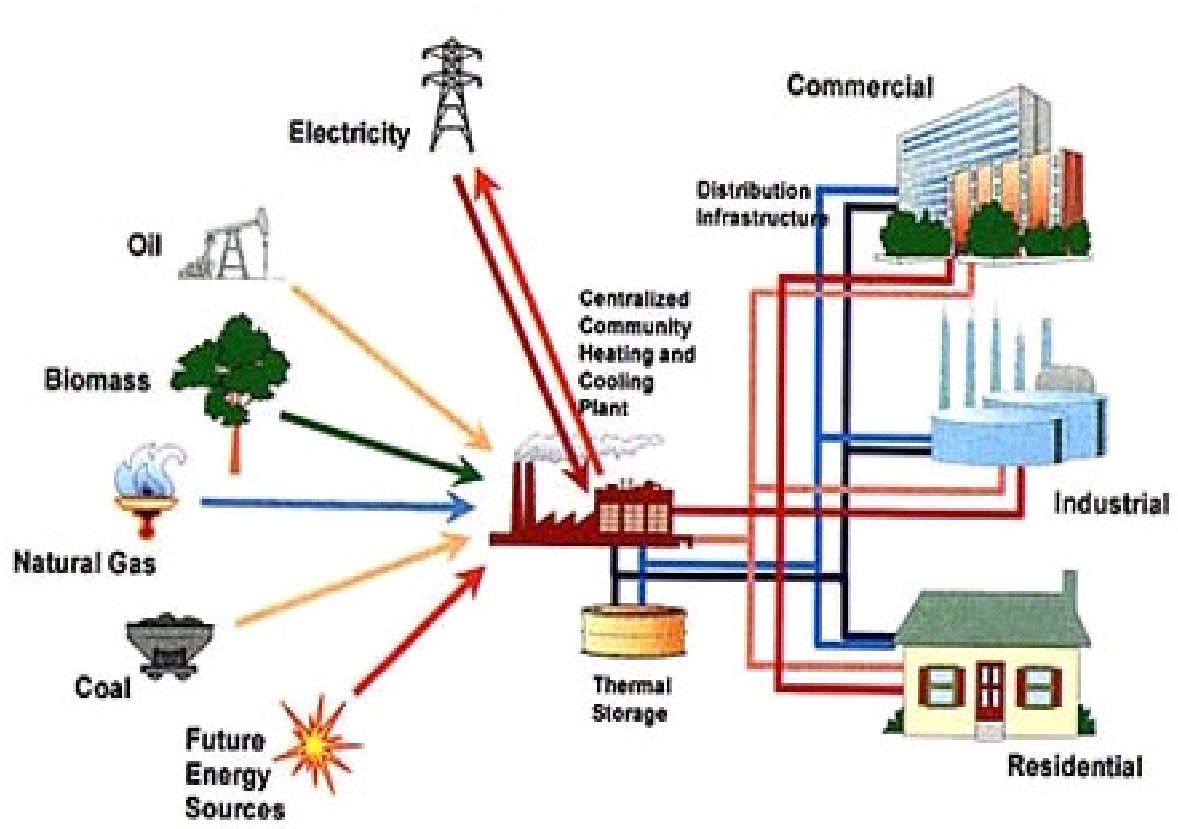
Majority of domestic heat comes from gas heating

Is scale an issue for heat?

- conventional heating systems are already small-scale
  - rely on provision of fuel to the building with heat production on-site
  - large-scale (network) solutions have achieved very low penetration in the UK

- main policy development is around incentivising stand-alone renewable technologies
  - ground and air source heat pumps
  - biomass boilers
  - solar thermal water heating
  - micro-CHP

Can bigger be better?



A District Heating Network

- improved energy efficiency
- CO_2 reductions
- (potential) low cost solution
- flexibility to utilise a range of heat sources

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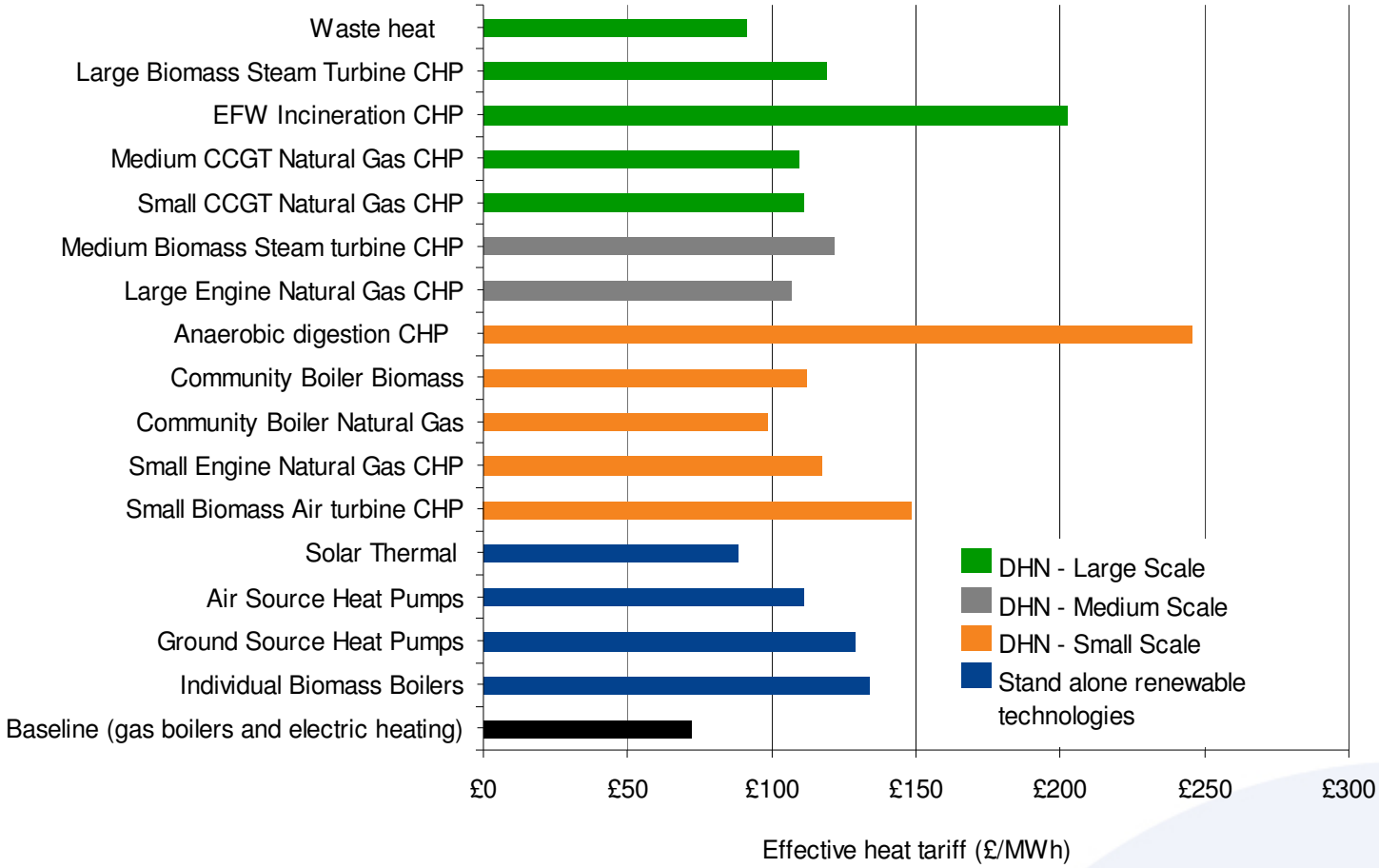
Conventional heating is hard to compete with on cost...



- District heating is more competitive against electric heating in areas of high heat density
- Renewable solutions more competitive against oil (off gas grid) and electric

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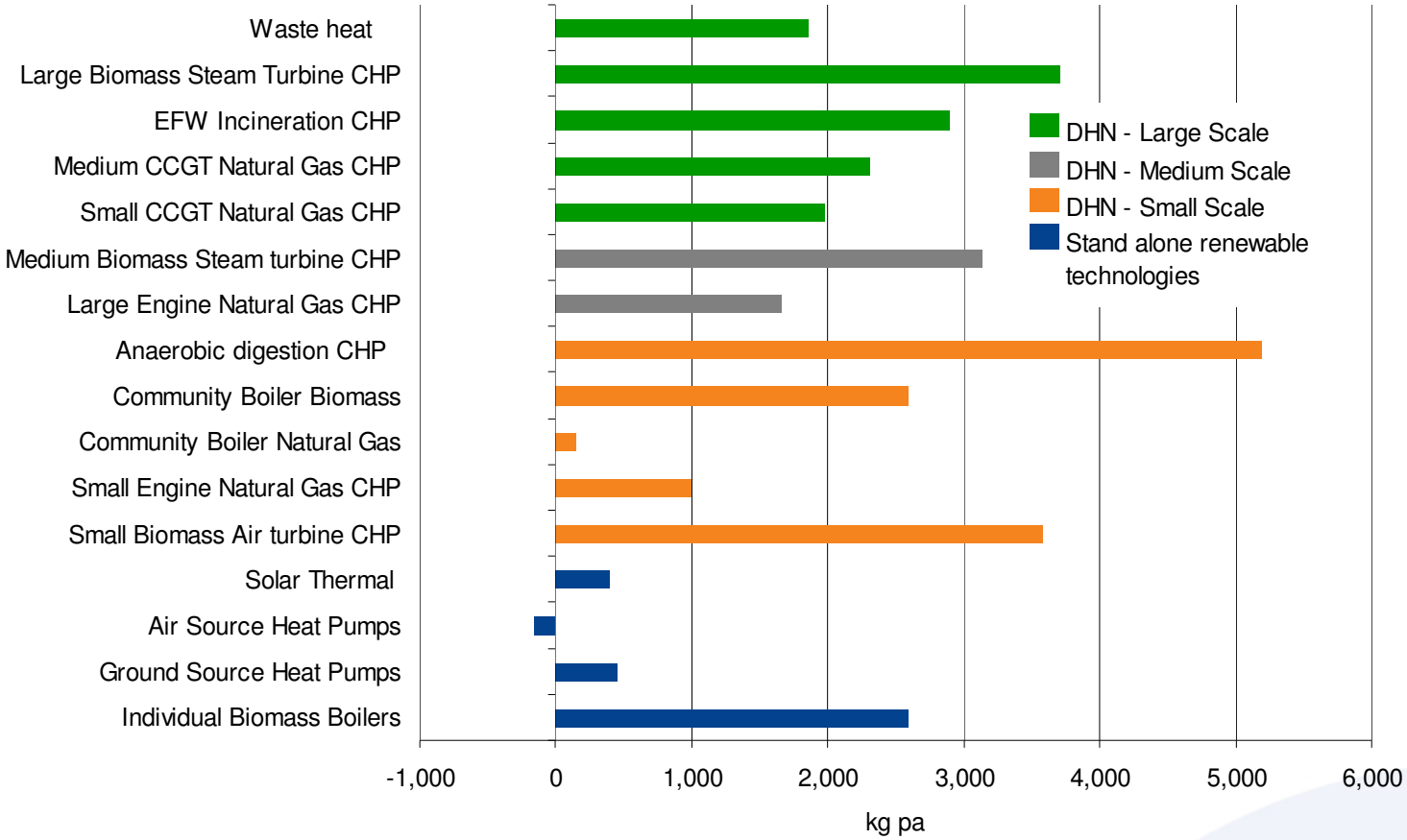
...though carbon savings can be substantive



- We calculate that a district heating network covering 250,000 households may save between 0.25 Mt CO2 and 1.25 Mt CO2 relative to conventional heating systems annually

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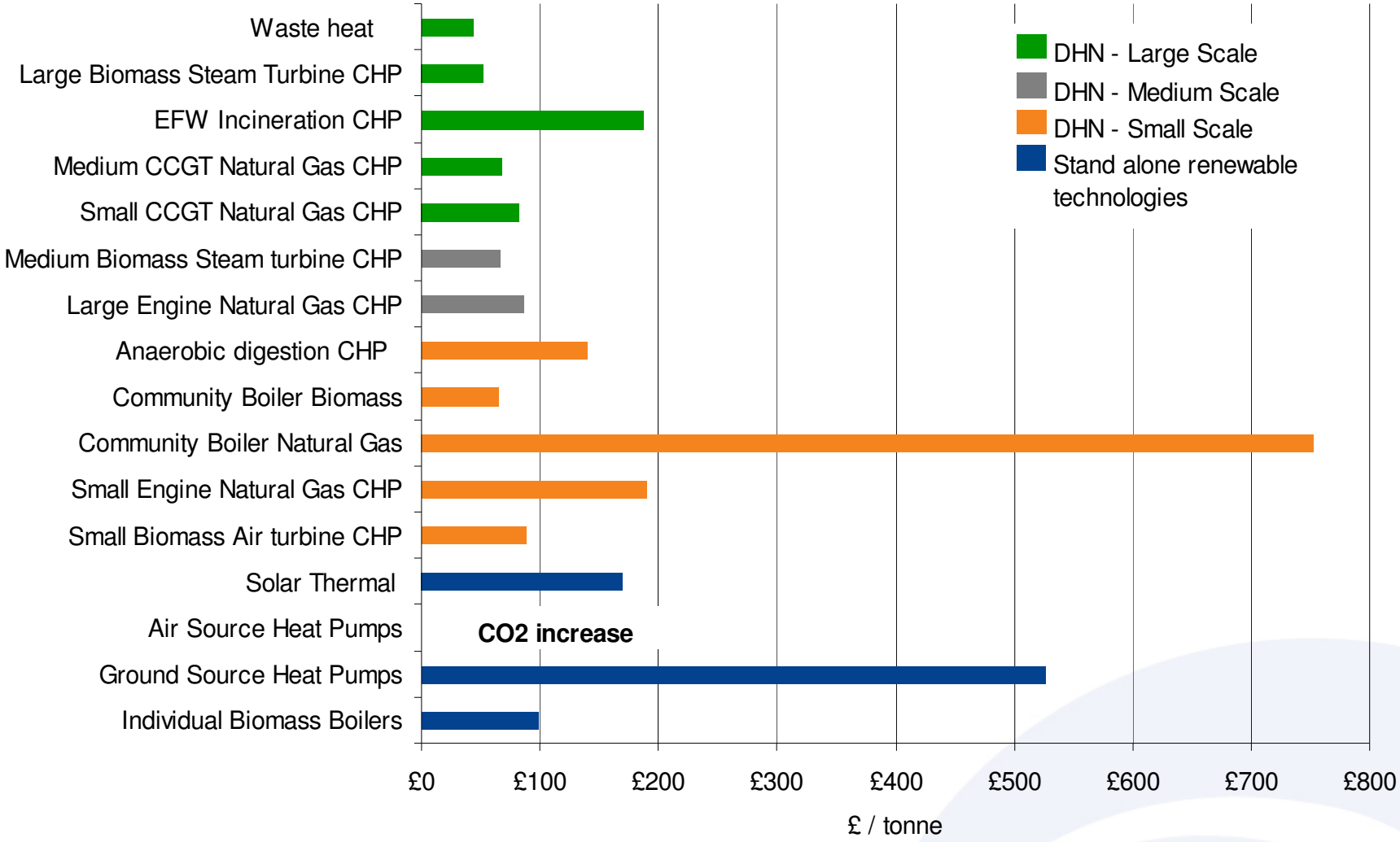
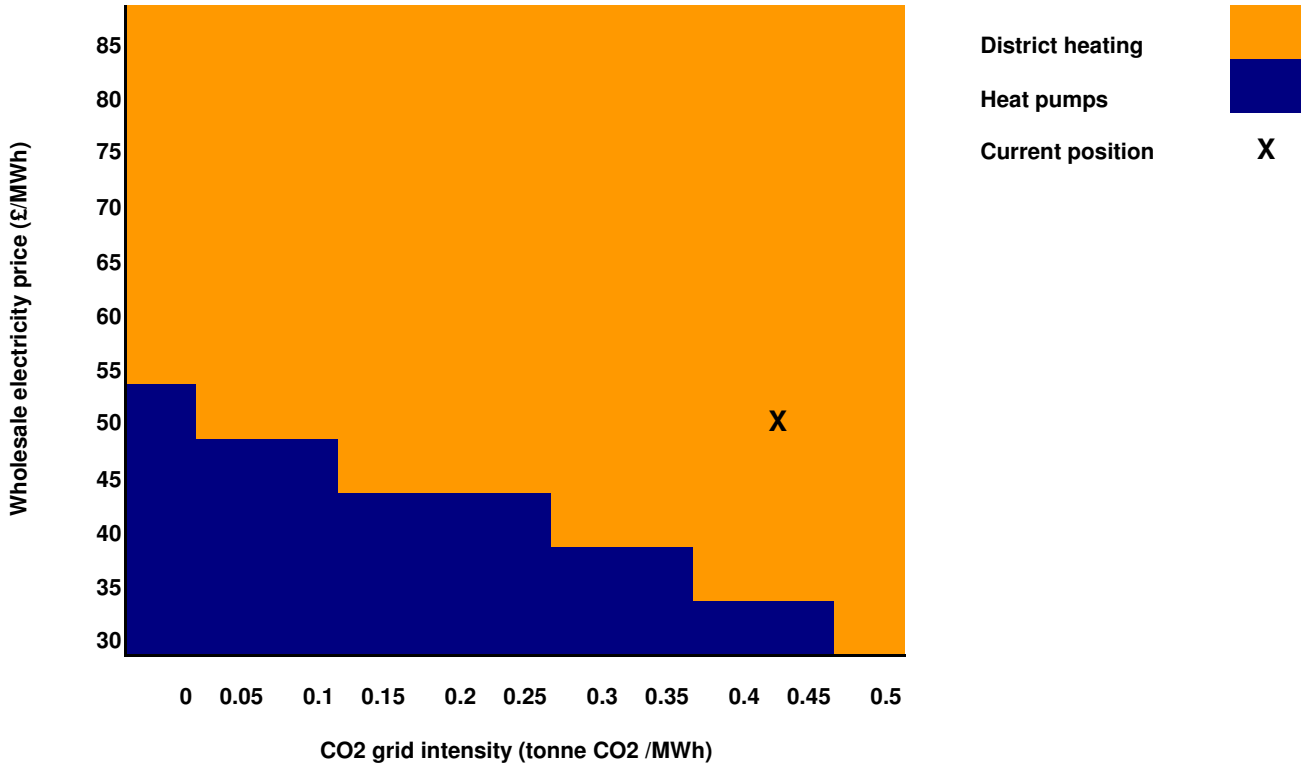
Carbon abatement costs make interesting reading

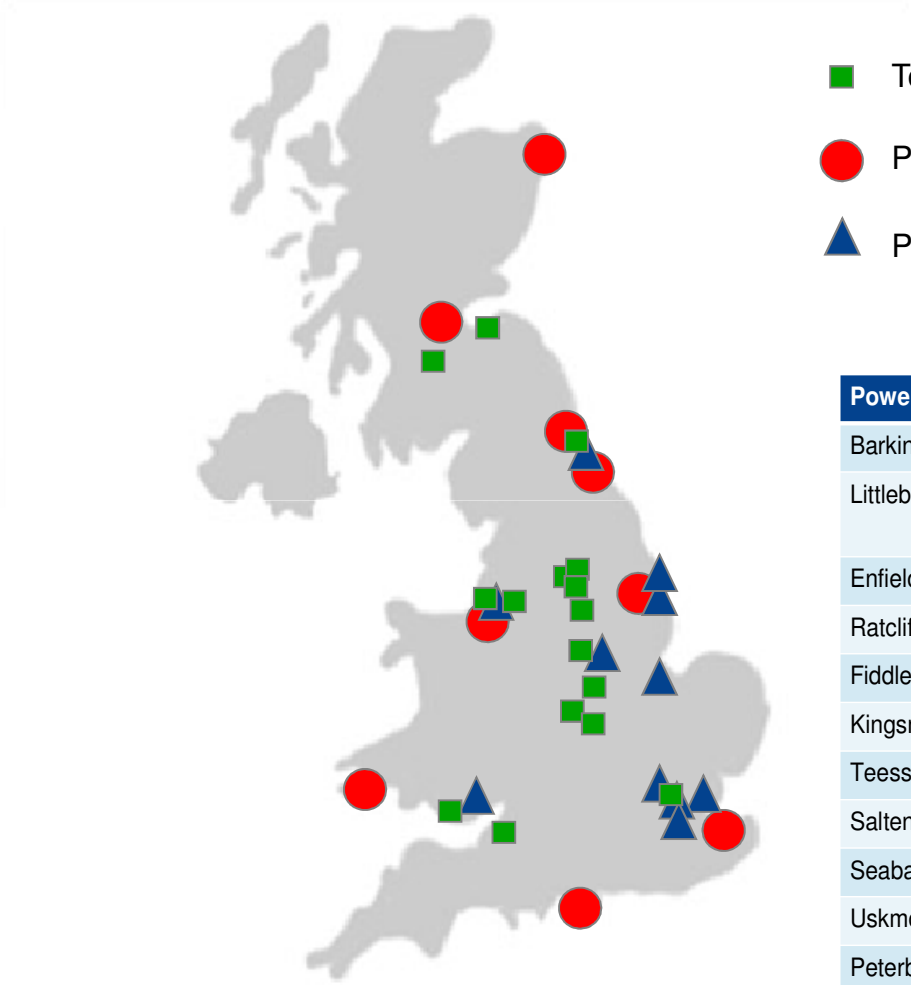


The tipping points between technologies



- Heat pumps – speed and cost of electricity decarbonisation
- District heating networks – speed of network deployment and building efficiency improvements

It is feasible to access waste heat at scale...



- Top 15 GB cities by population
- Potential for large scale industrial CHP
- Power stations within 15km of a city

Power Station Site	Nearest City	Distance	Population
Barking	East London	10km	c1m
Littlebrook	South-east London	15km	c1m
Enfield	North London	10km	c1m
Ratcliffe	Nottingham	6km	0.6m
Fiddlers Ferry	Liverpool	15km	0.8m
Kingsnorth	Medway Towns	10km	0.1m
Teesside	Middlesborough	2km	0.14m
Saltend	Hull	6km	0.3m
Seabank	Bristol	8km	0.5m
Uskmouth	Newport	5km	0.14m
Peterborough	Peterborough	2km	0.14m

...just not in the current institutional and commercial framework

- economic barriers
  - project risk (inexperience, coordination, revenue variability, access to capital and long term network utilization)
  - project cost (high civils costs, lack of standardised contracts, competition with existing networks, financing and inability to access full revenues).
- competition and liberalisation exacerbate the risk of heat network development
  - major coordination issues
  - vertical integration 'necessary' to establish networks
  - nature of relationship between provider and consumer
- inertia around the status quo is stronger for heat than power

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