Is a Heat Pump for you?

Their role in decarbonising homes, the myths, the money & the implications of current government policy

January 2024

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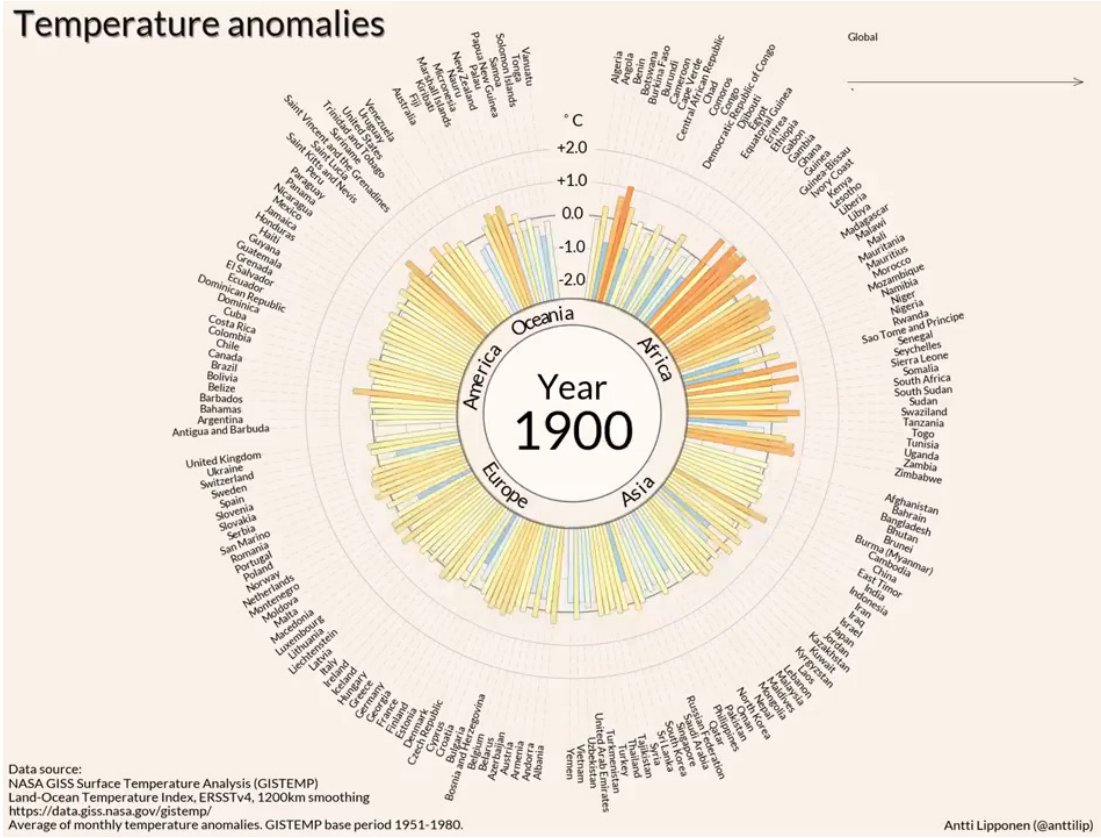
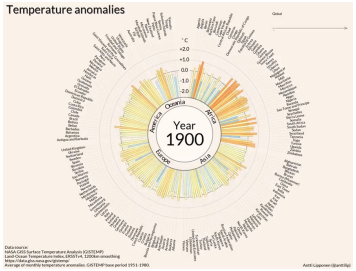
heat
HUNGERFORD ENVIRONMENTAL ACTION TEAM

Why decarbonise at all?



One hundred years of impact in 35 seconds using data from NASA observations



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Why is electrification carbon-efficient?

https://www.hpf.org.uk/carbonwatch

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Carbon dioxide emissions comparison

Total Heating (+ DHW) Demand	**10,800**	kWh/annum	Note :						
SPF	3.20								
Electricity Consumed By Heat Pump	**3,375**	kWh/annum	Note :						
Fuel/Carbon Emissions		Boiler Efficiency %	Carbon Dioxide Factor		Demand kWh/annum	Carbon Dioxide Emissions kg	Heat Pump CO2 Saving Against Fuel	% CO2 Saving With Heat Pump	Average no. of family cars displaced
Electricity (National Grid)		100	**0.193**	kgCO2/kWh	10,800	**2,084**	**1,433**	**69%**	0.8
Oil		89	**0.268**	kgCO2/kWh	12,135	**3,252**	**2,601**	**80%**	1.5
LPG Gas		90	**0.215**	kgCO2/kWh	12,000	**2,580**	**1,929**	**75%**	1.1
Mains Gas		92	**0.184**	kgCO2/kWh	11,739	**2,160**	**1,509**	**70%**	0.9
Coal		80	**0.333**	kgCO2/kWh	13,500	**4,496**	**3,844**	**86%**	2.2
Biomass (High Quality Pellets)		85	**0.040**	kgCO2/kWh	12,706	**508**	**-143**	**-28%**	-0.1
Electricity - Heat Pump		320	**0.193**	kgCO2/kWh	3,375	**651**			
Assumes that electricity is purchased from a standard supply. Purchasing from a green energy tariff will significantly increase CO2 emissions savings.									
			Carbon factors taken from Defra figures for 2022.						
	Average family car :		Ford B-MAX 2017 1.4 Petrol						
	Emissions (DVLA Vehicle Certification Agency) :					0.139	kg/km		
	Average annual mileage (RAC Foundation) :					12,560	km		
	Average annual emissions :					1,746	kgCO2e		

Electricity vs oil vs LPG vs Gas

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From the top table

- "There is no long-term prosperity without action on climate change”
- “There is no energy security without investing in renewables“
- "Climate and energy security go hand-in-hand“
- "We can bequeath our children a greener planet and a more prosperous future”
- “There really is room for hope"

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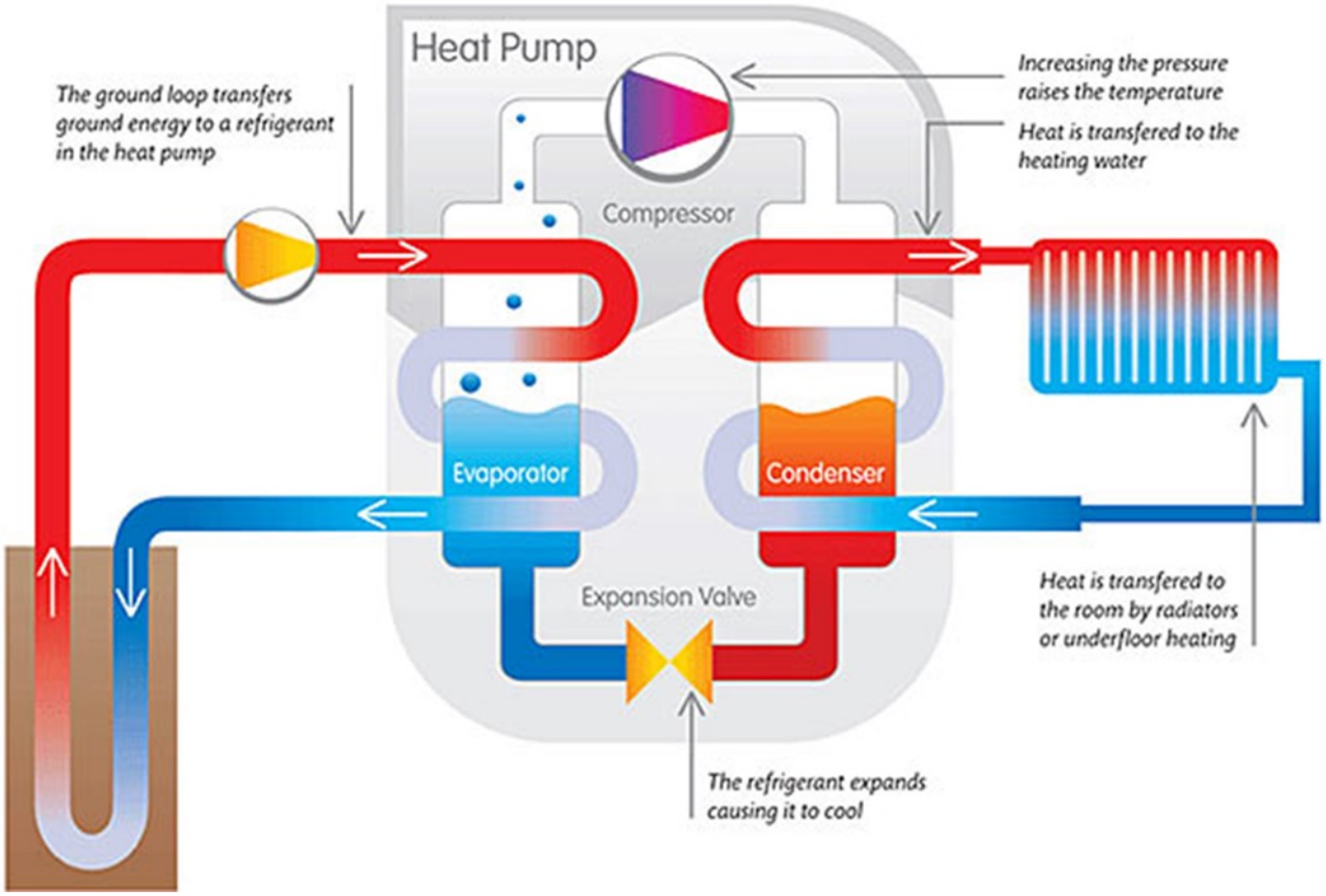
Heat pumps 101



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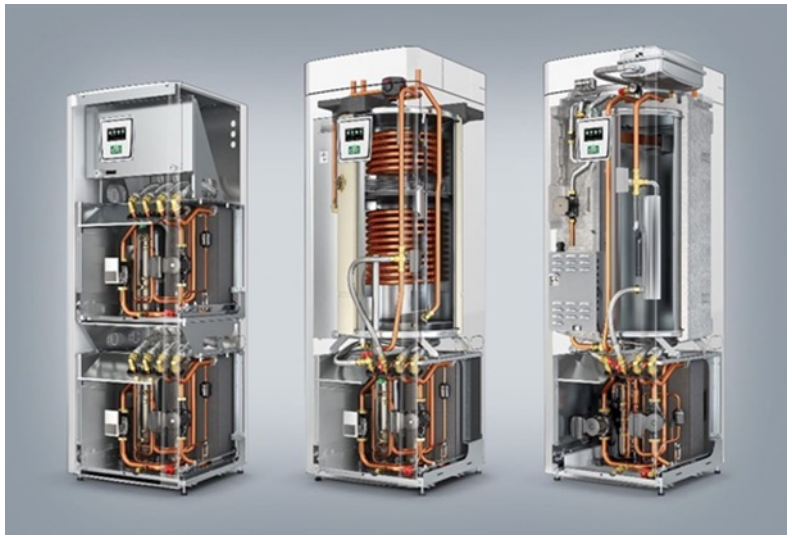
Heat pumps 101 – what do they look like?



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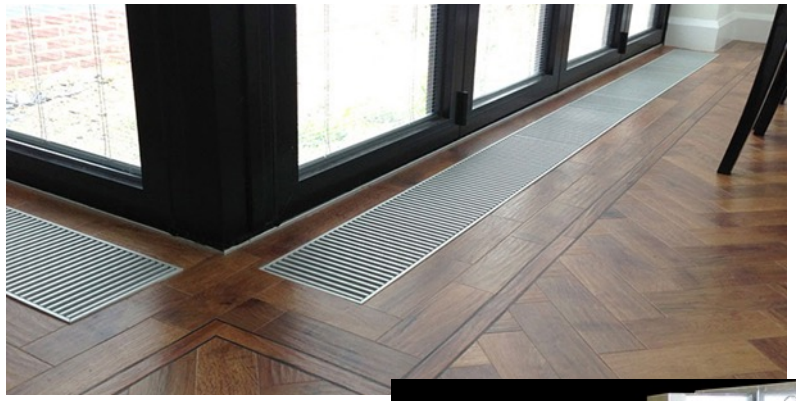
Heat pumps 101 – any emitter type



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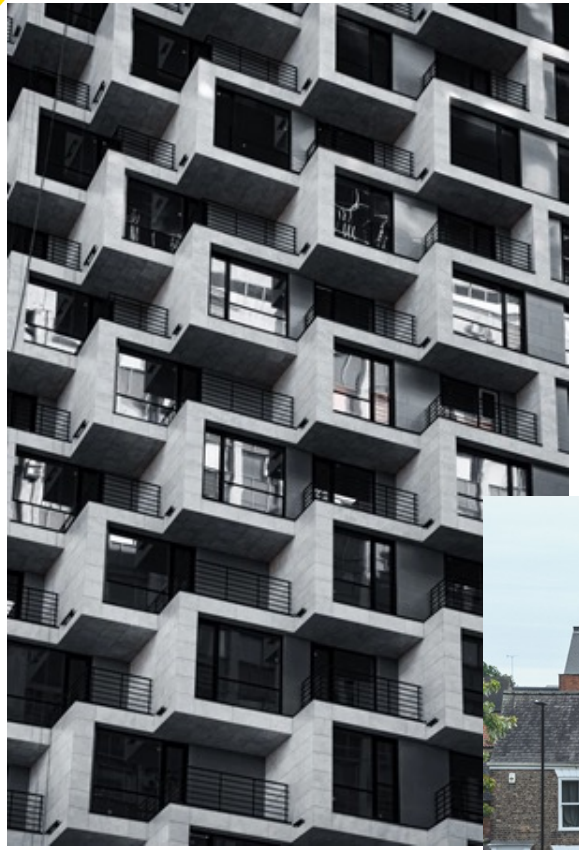
Heat pumps 101 – all house & development types



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Heat pumps 101 – The Visuals

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Heat pumps 101 – Listed Buildings

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Urban air-quality

- Burning fossil fuels for heat generates CO2, CO, NOx, SOx & particulates (PM2.5)
- Approximately 25% (location specific) of urban air pollutants are derived from heating
- Condensing mode operation reduces levels of pollutant emissions
- 25,000 – 35,000 premature deaths per annum are attributed to poor air-quality
- Heat pumps are zero-emissions devices at the point of use

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Waste heat

- 2,860TWh waste heat in the EU, almost enough to heat the EU
- Enough waste heat in London for 790,000 homes
- Waste heat & coolth to be designated a pollutant
- Would Local Authorities benefit from a statutory duty to identify & use waste heat?

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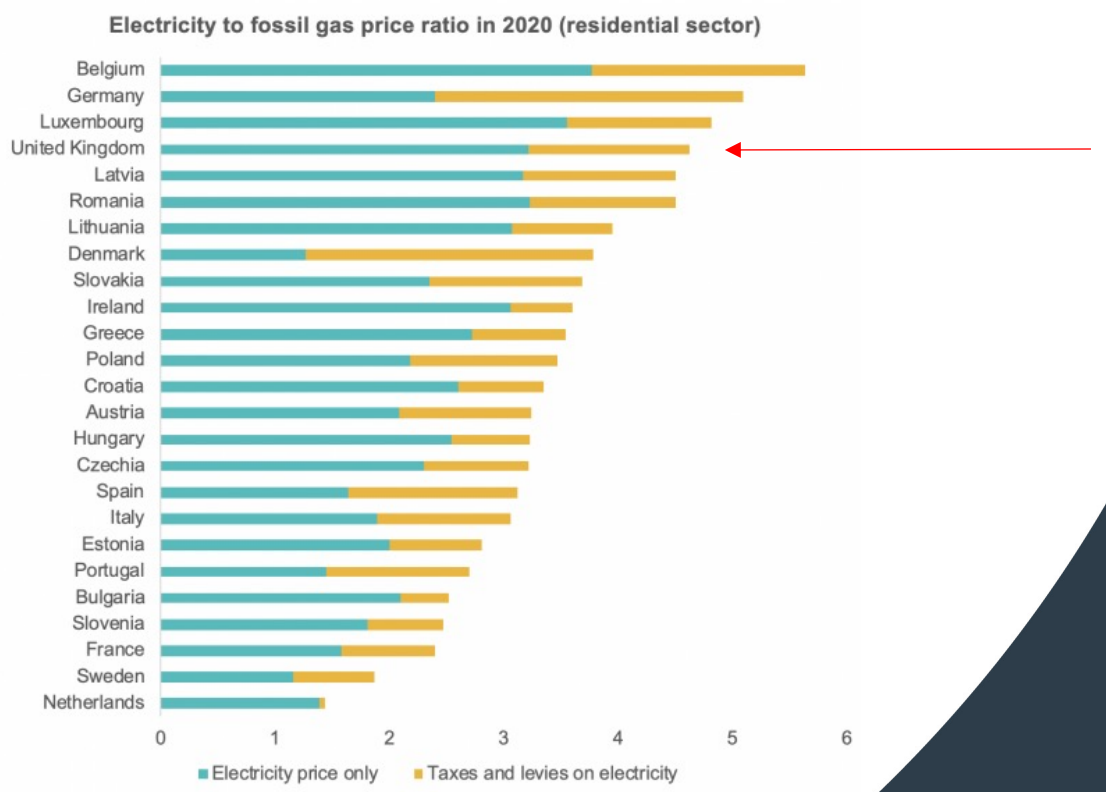
UK status & comparisons in graphs – electricity

- UK electricity prices are historically high compared to EU
- Operational costs are key to market growth – reference the UK EV market
- Tax on petrol & diesel is very high, tax on electricity is high, tax on gas is…



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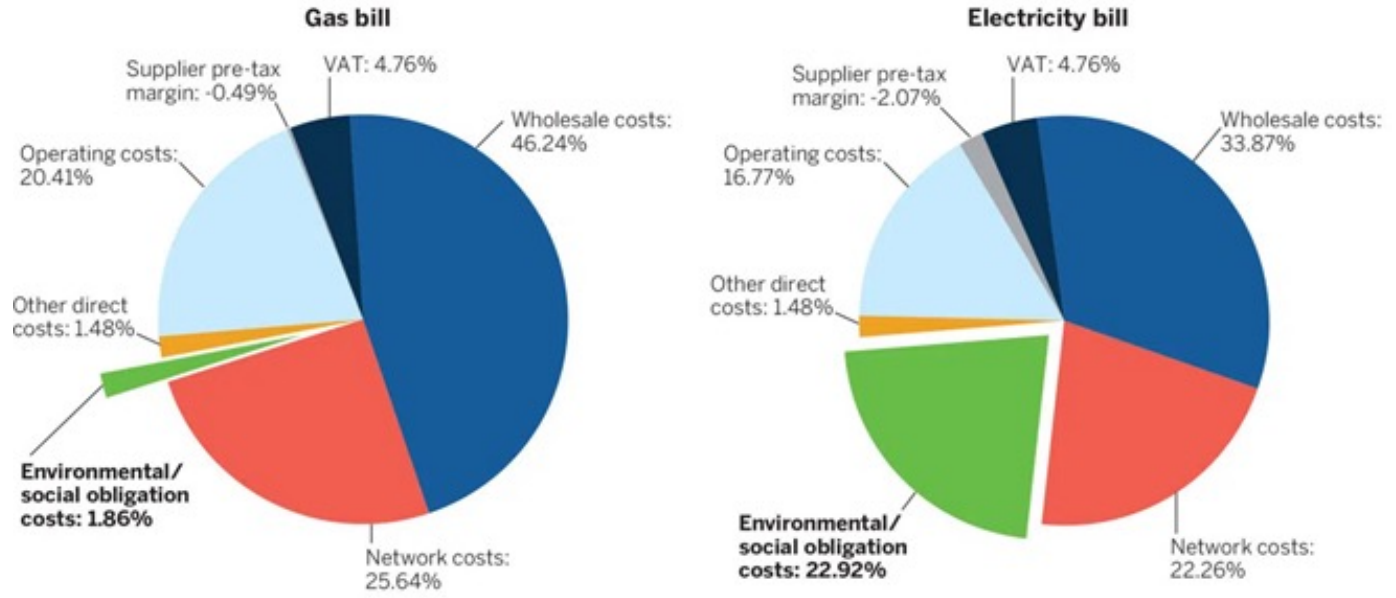
UK environmental and social levies

- UK primary fuel tax regime encourages gas consumption
- Increasingly low carbon electricity is penalised
- Work on rebalancing is ongoing, a consultation is awaiting sign-off by No.10



Source: Ofgem. (2021). Infographic: *Bills, prices and profits.*

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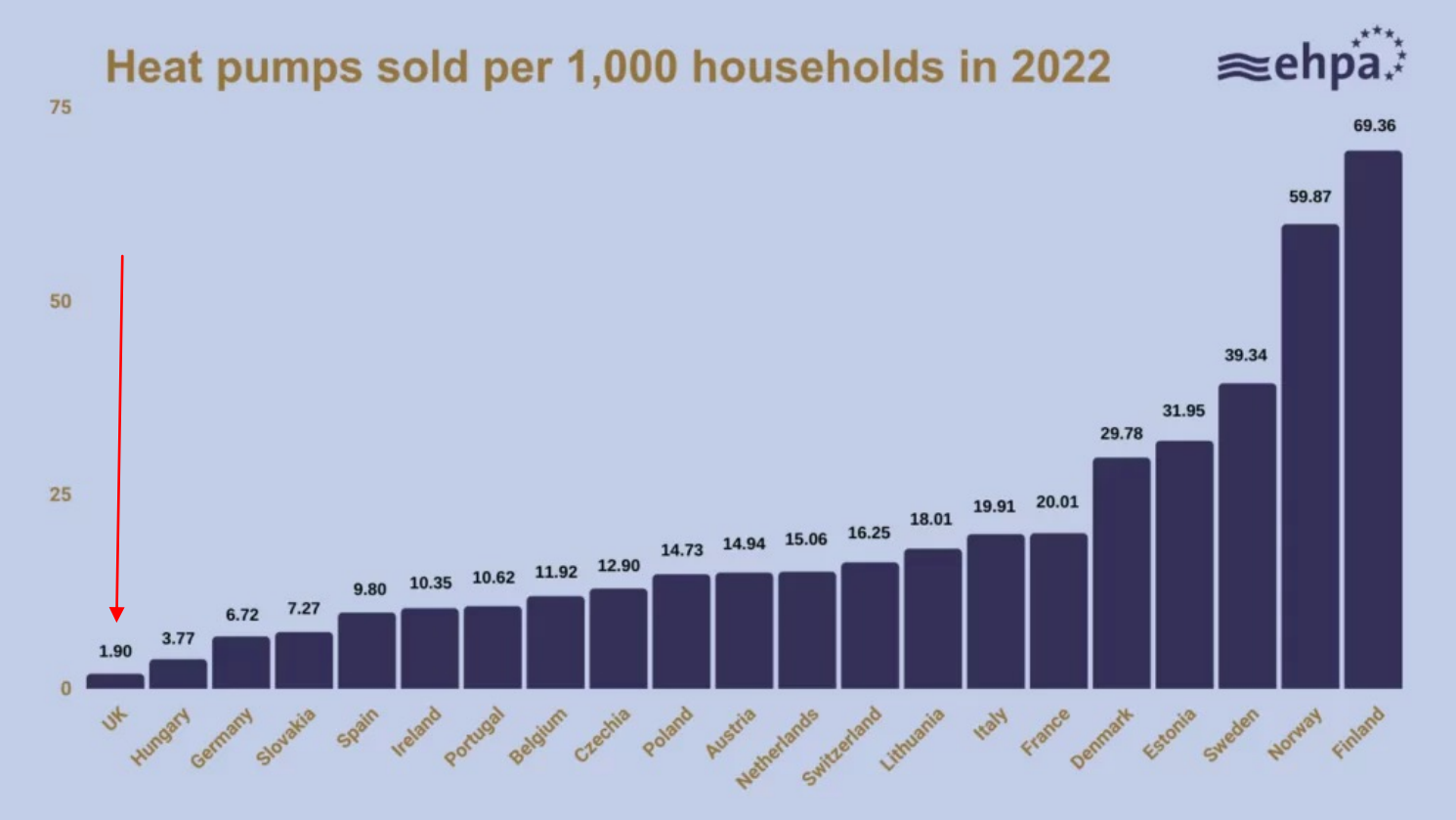
UK status & comparisons in graphs – deployment

- The result of years of poor electrification policy compared to the EU



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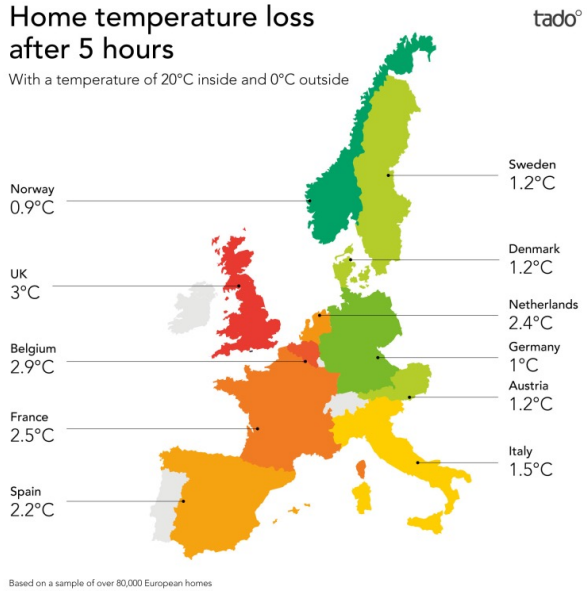
Why is “heat” hard, and how to fix it?

- UK property insulation levels the lowest in Europe
- To condense or not to condense? Efficiency levels up to 15% lower
- Condensing boiler mandate 2005, still no commissioning and controls mandate
- Around 80% satisfaction with heat pump installations (Nesta research)
- Almost identical to boiler installation satisfaction (after 60 years of trying)
- Workforce retraining. Low Carbon Heating Technician (level 3) Apprenticeship



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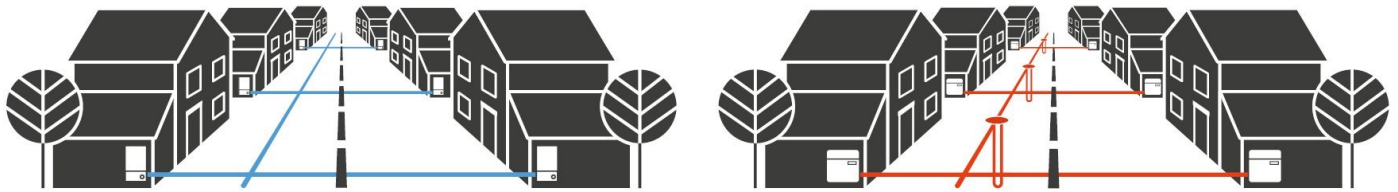
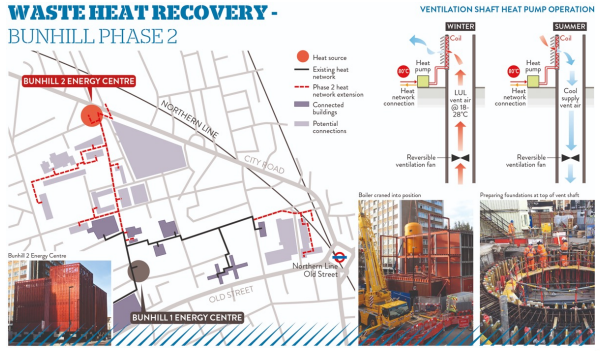
Where next?

- Future Homes Standard, air-source or ground-source with passive cooling & PV

- “Heat the streets” retrofit



- District heating with waste heat recovery & storage
- New PDR, SAP11, RdSAP11



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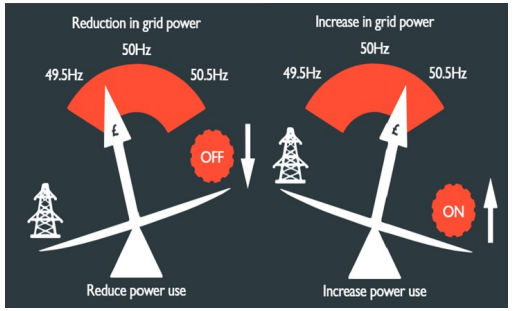
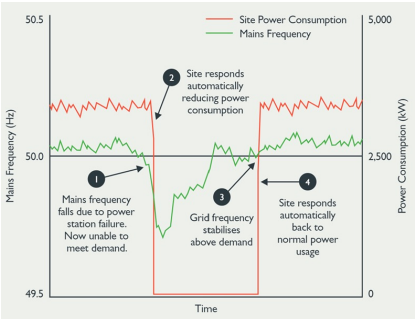
Flexibility

- National Grid ESO balances the grid
  - Peaking plant is the conventional mechanism for balancing
  - Grid scale battery deployment increasing
- Load demand management is more cost-effective
  - Reduces generation demand
  - Reduces cable capacity
- Payments for DSM & DSR
  - Thermal storage
- Grids are changing rapidly, with new opportunities to participate





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The ultimate renewable energy resource

"The stone age did not end because the world ran out of stones, and the oil age will not end because we run out of oil"
Don Huberts (Shell) 1999

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Thank you

www.hpf.org.uk

https://www.hpf.org.uk/advice/homeowners

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