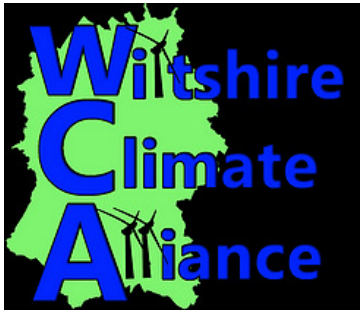


# Domestic Heat Pumps – Myths & Legends What's Held Deployment Back?

16th March 2021

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# The ultimate renewable energy source

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## Why act now?

- The IPCC report gives us limited time to stop irreversible damage
- Current Building Regulations permit development that is adding to the problem by embedding yet more fossil fuel dependency
- Public awareness is shifting rapidly
- Generational pressure
- The Greta and Attenborough effect
- We have technologies available now that are tried and tested
- All industry watchers anticipate a much more regional and distributed energy (CCC and National Grid, etc.)
- The very rapid development of the electric vehicle market is transforming the power generation and distribution sector and plays to growth in the electrification of heat

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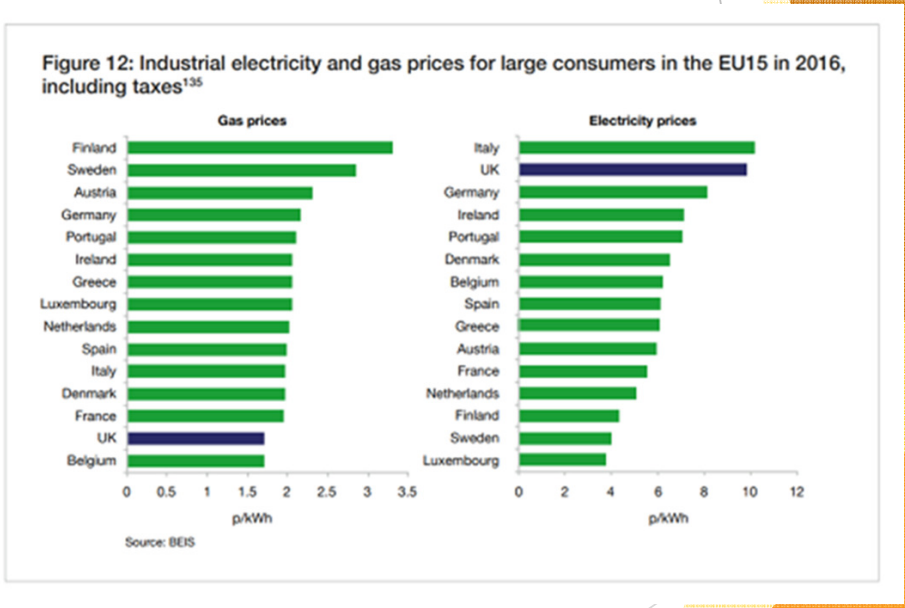
# What has held heat pump deployment back?

- Building Regulations grid carbon factor
- UK raw fuel spark gap favours gas
- Fossil fuel subsidies, “green” levies are applied to electricity only – 18% or so inflationary result
- Lack of robust fossil fuel standards environment
- Poor renewables subsidy strategy
- The interests of the incumbents
- Consumer awareness
- Heating industry skills and knowledge

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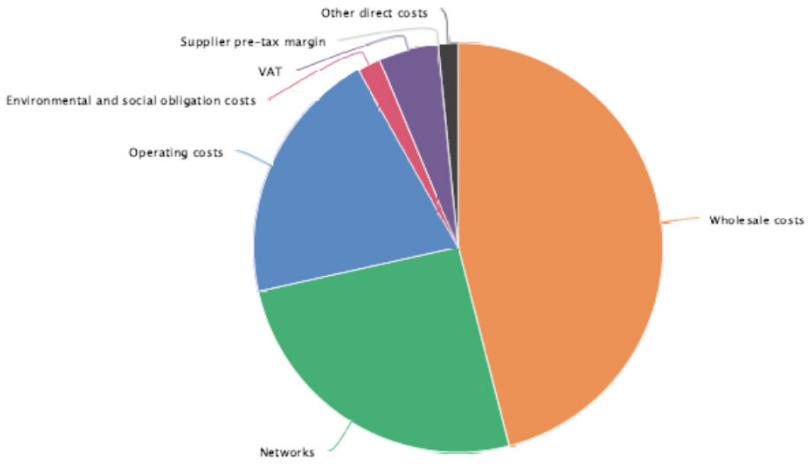
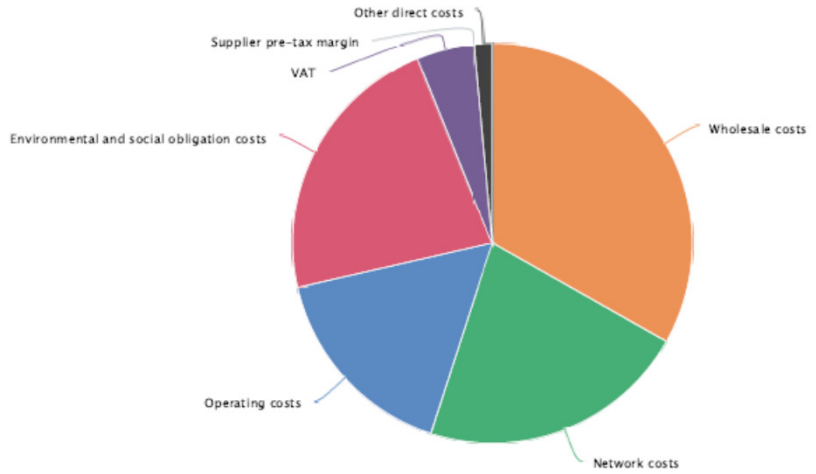
# The “Spark Gap”

Breakdown of a gas bill




Breakdown of an electricity bill




https://www.ofgem.gov.uk/data-portal/all-charts?search_api_views_fulltext=bill

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# What drives the electrification of heat?

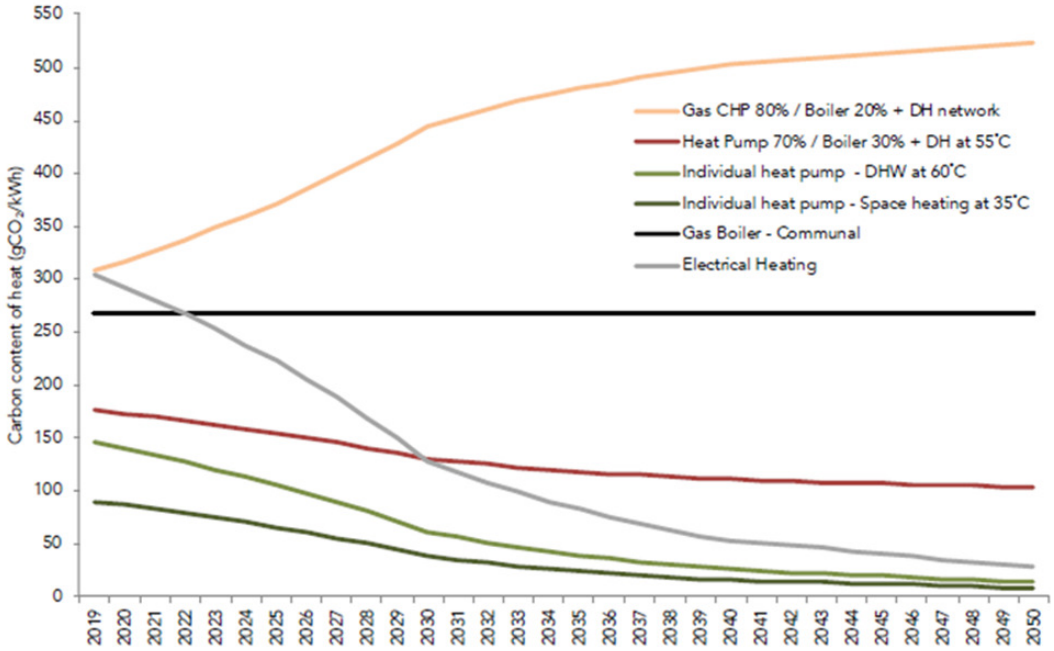
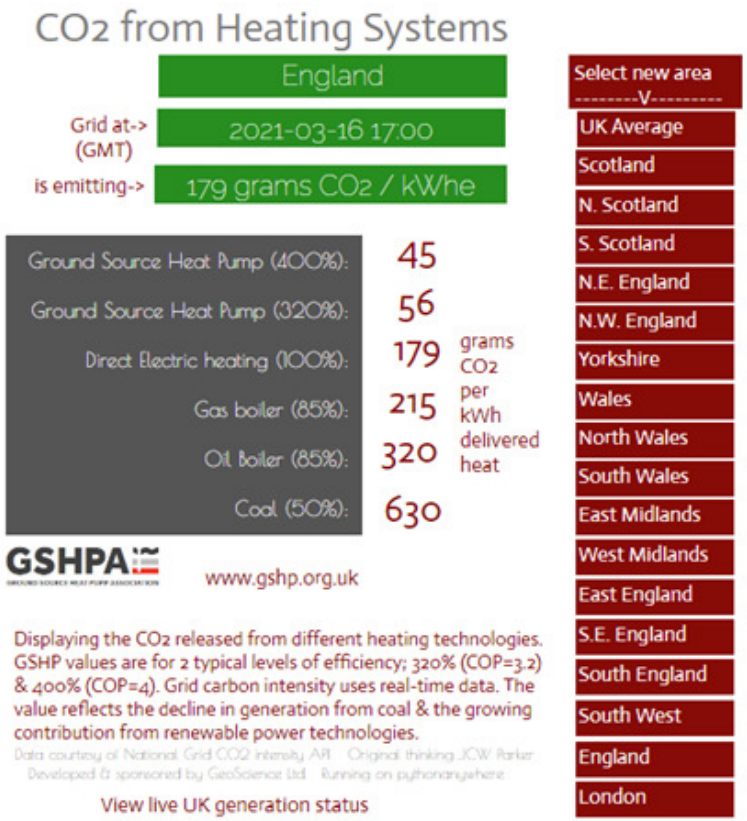



**Figure 4.05 – Projected carbon factor of heat based on HM Treasury Green Book marginal emission factors**

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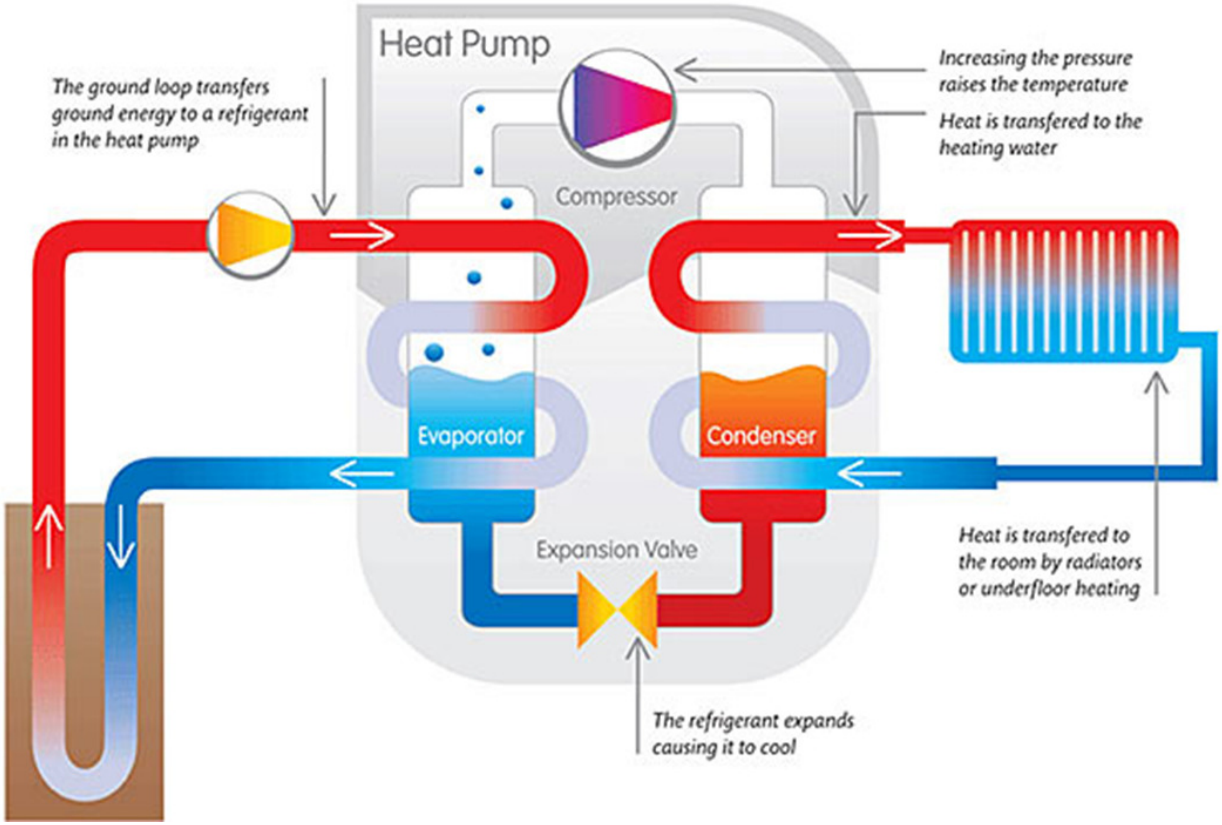
# Heat pumps 101

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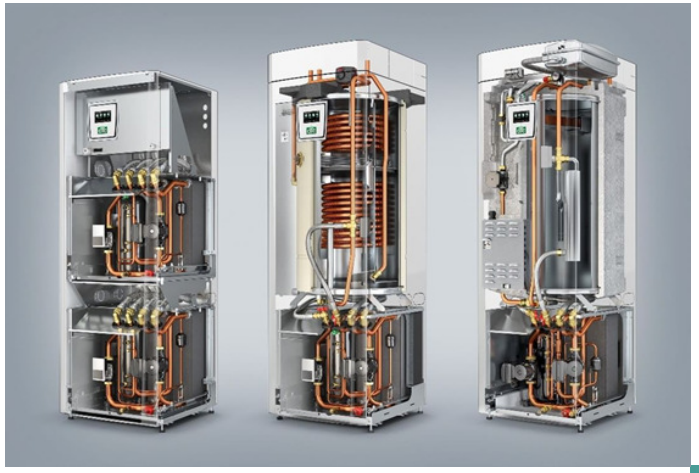
# Heat pumps 101 – what do they look like?



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# Heat pumps 101 – where can they go?

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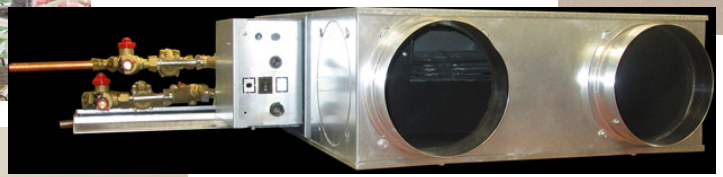
# Heat pumps 101 – any emitter type



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# Heat pumps 101 – all house types

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# Carbon emissions impact

| Carbon Dioxide Emissions Comparison - Electricity vs. Oil vs. LPG vs. Gas | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| (When considering a heat pump installation) | | | | | | | | | |
| | | | | | | | | | |
| Updated : | June | 2020 | | | | | | | |
| | | | | | | | | | |
| Total Heating (- DHW) Demand | 15,200 | kWh annum | Note : | | | | | | |
| SPF | 3.50 | | | | | | | | |
| Electricity Consumed By Heat Pump | 4,343 | 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 | |
| | | | | | | | | | |
| Electricity (National Grid) | | 100 | 0.233 | kgCO2 / kWh | 15,200 | 3,542 | 2,530 | 71% | |
| Oil | | 88 | 0.268 | kgCO2 / kWh | 17,078 | 4,577 | 3,565 | 78% | |
| LPG Gas | | 90 | 0.215 | kgCO2 / kWh | 16,888 | 3,631 | 2,619 | 72% | |
| Mains Gas | | 92 | 0.184 | kgCO2 / kWh | 16,522 | 3,040 | 2,028 | 67% | |
| Coal | | 80 | 0.333 | kgCO2 / kWh | 19,300 | 6,327 | 5,315 | 84% | |
| Biomass (High Quality Pellets) | | 95 | 0.040 | kgCO2 / kWh | 17,882 | 715 | -297 | -41% | |
| Electricity - Heat Pump | | 350 | 0.233 | kgCO2 / kWh | 4,343 | 1,012 | | | |
| | | | | | | | | | |
| 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 2020. | | | | | | |
| | | | | | | | | | |

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## The home owner is key – what factors matter?

- Fossil fuels work, or do they?
- Resistance to, or fear of, change
- Very low valuation of energy (resistance to insulation)
- Capital cost of change
- Operational costs (spark gap)
- Knowledge & understanding
- Environmental attitudes (Sir David Attenborough, Greta) and increasing intergenerational pressure
- Regulations (MEES, Building Regulations)
- Government subsidy
- A better offer (controllability), transitional approaches (hybrids)

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# Incumbent fear & doubt

Massive radiators, probably not!

Garden a disaster, yes, but worth it, or drill!

Re-plumb the whole house and UFH, just not necessary!

Installing central heating was a disruption, but stay with coal, really?

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# Renewable Heat Incentive – worked example

- Average family home – 150m²
- Peak thermal load – 7.5kW
- Estimated annual energy demand for heating & potable hot water – 16,500kWh
- Air-source operating at a seasonal performance factor of 2.8
- Ground-source operating at an SPF of 3.4
- Air-source subsidy value – approximately £1,150/annum based on a tariff of 10.92p/kWh
- Ground-source subsidy value – approximately £2,465/annum based on a tariff of 21.29p/kWh
- Budget : air-source : £7,000-£10,000
- Budget : ground-source : £11,250-£22,500

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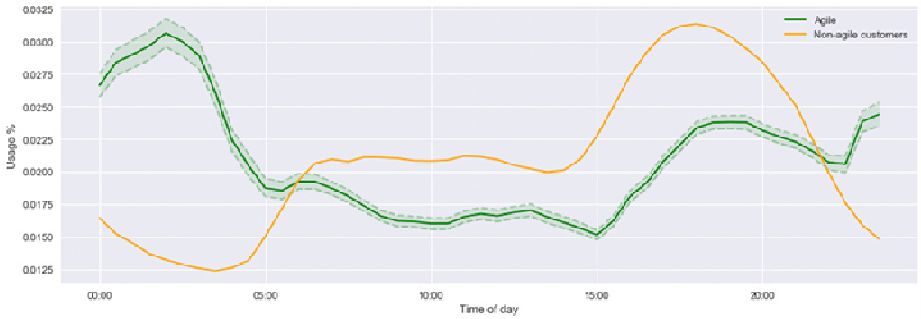
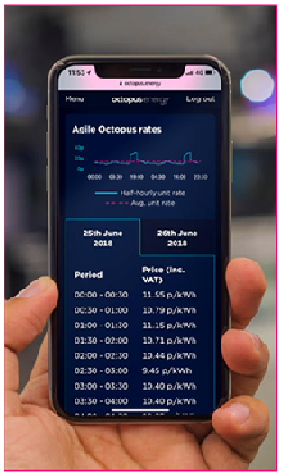
# A glimpse into the future

- Octopus Energy Agile Tariff consumers demonstrate significantly different consumption profiles compared to average non-agile consumers
- Low cost electricity is a proxy for low emissions
- Initial benefits for EV charging but progressing to heat pumps with thermal storage



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## New funding mechanisms required

- Improved application of “time of use” tariffs and thermal storage
- Government action on the spark gap – the polluter pays!
- Encouraged use of waste heat
- Active development of co-located heating and cooling demands
- Improved access to affordable capital
- Third party investment in in-ground assets
- Accessing the value of flexibility
  - Grid balancing
  - Dynamic Response, Primary Response, Secondary Response, Capacity Mechanism
- Co-location with low or zero emissions electricity generation & storage
- Long term government policy to enable all of the above

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## Government policy requirements

- Local government to lead by example – Public Building Decarbonisation Fund
- Local plans to proactively seek out waste heat opportunities and easy the planning pathway for heat networks
- Central government to start tackling the spark gap
- MHCLG to revise Part L urgently and to include an annual review mechanism for carbon factors
- Adoption of Low Temperature Heating qualification
- Consider voucher funding for PAS 2035 home assessments

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# Thank you

www.hpf.org.uk (coming very soon)

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