

Clean Heat 2040

Technical annex on cost reductions

Operational costs

Key assumptions

Modelling heat networks

Total heat network installed capacity is modelled as reaching 88TWh in 2050 (20% of UK demand) from 0.5TWh in 2024. This is in line with Government and industry ambitions for a cost-effective path to decarbonising heat.

The heat networks modelled use air-source heat pumps (ASHP) as their primary source of heat generation and that, after distribution losses, their Coefficient of Performance is 2.7.

This is a conservative assumption. In practice, we expect industry to maximise the use of sources of underused recoverable heat (such as Energy from Waste, industrial heat from data centres and others and ambient heat from water and ground sources). Making use of these sources would increase the Coefficient of Performance of the heat pumps used and so reduce the amount of input electricity required to generate the same amount of heating. Industry experience suggests, for example, that using relatively high temperature sources of recoverable heat could halve electricity costs. The use of recoverable heat will also be strongly encouraged, if not required, by Government policy within zones.

The estimate of losses is in line with industry best practice and will, from 2026, be supported by mandatory technical standards for heat networks that are brought in through the introduction of Ofgem's customer regulations and specifically the Heat Networks Technical Assurance Standard.

Finally, heat networks are modelled as having a capacity factor of 37% (i.e., how much the boiler runs over the course of a year compared to the total theoretical maximum of 8760 hours each year).

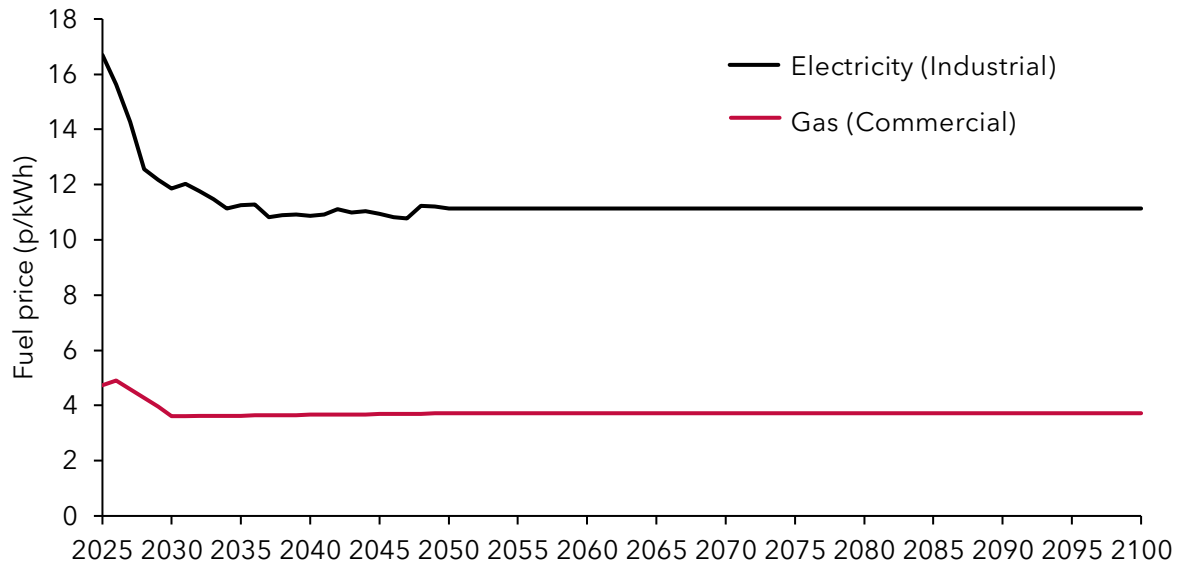
Broader assumptions – Gas and electricity prices

The spark spread, the difference between gas and electricity prices, is of crucial importance to understanding the current and future gap between existing gas boiler systems and low carbon forms of heating.

Changes in this spark spread over time are uncertain and do change regularly. For the modelling, we have used the Government's Green Book view of future gas and electricity prices for industrial and commercial (current as at time of modelling).

For both, this shows a reduction in prices over the period considered. However, the decrease in electricity prices is greater than that of gas – thereby, reducing the spark gap

and the difference in operational costs between high carbon and low carbon forms of infrastructure.



It is important to note that if the spark spread did not reduce as per these calculations, it would increase the gap and so increase the need for intervention by Government and industry.

Broader assumptions - Gas boilers

Gas boilers are modelled as 85% efficient and as having a capacity factor of 15%.

Areas of cost reduction - #1 Industry actions

Cost of input electricity

Given ASHPs are the primary source of heat generation, the input cost of electricity to heat networks is an important operating cost.

The modelling assumes that a 20% reduction in cost and that this reduction is linear over a 3-year period.

The principal way in which this would be achieved is that heat networks would make use of thermal stores and the latent flexibility within their network to shift import from the grid to off-peak periods when electricity is cheaper.

This is a conservative estimate based on industry experience to date of operating thermal stores and the difference seen in the market between peak and off-peak tariffs.

Flexibility revenues

In addition to load-shifting to off-peak periods, heat networks can also participate in contracted flexibility markets. This could include, for example, the Capacity Market, the Balancing Mechanism or others. This would increase revenue for the heat network.

The modelling assumes £25,000/MW per year through flexibility services are able to be secured by 70% of the total installed capacity of heat networks in that year. This revenue increases from £0 at the start of the period considered to £25,000 four years later and is then held steady for the remainder of the time period.

This is an estimate based on discussions with flexibility aggregators.

Areas of cost reduction - #2 Government actions

Levy re-balancing

In addition to the wholesale costs of electricity, commercial electricity users also pay the costs of energy subsidies. This includes schemes such as the Renewable Obligation (RO) and others.

The modelling assumes that this is 4.76p/kWh, as calculated by assuming these levies constitute 27% of the retail electricity tariff for industrial electricity customers. The modelling assumes that this is removed in a single year as a result of policy change.

As has been seen through the Autumn Budget 2025, if levies were removed from electricity, there are a range of options for how those costs are managed instead. They may be recovered through taxation or gas bills. The schemes that generate those costs may be removed altogether (however noting that this would likely not remove the need to cover historic costs).

In addition to removing levies from electricity, the modelling also estimates what would happen if those levies were instead levied on gas use. This is modelled at 2.61p/kWh and the modelling assumes that this is removed in a single year as a result of policy change.

We do not expect the changes in the Autumn Budget to impact the levies faced by heat networks. The changes to the RO are explicitly only for RO costs that are levied on domestic customers; heat networks are treated as commercial electricity customers who then sell heat to domestic and non-domestic customers. Whilst technically at the discretion of suppliers, ECO costs are levied on domestic customers and therefore, the closure of this scheme is unlikely to impact commercial electricity customers.

Capital costs

Key assumptions

Modelling heat networks

Capital costs of heat network infrastructure differ significantly by geography. If zoning is introduced, this will increase the density of heat network connections and therefore, support more efficient use of capital.

The modelling has taken the conservative view that capital costs are £1.3m/GWh. This is based on the average seen to date in the Green Heat Network Fund.

Further assumptions are –

- Heat network lifetime of 25 years and equipment lifetime of 15 years (both of which, affect capex costs through impacting repex requirements).
- Heat network capacity factor of 37%.
- Gas boilers are modelled with a capacity factor of 15% and a lifetime of 15 years.
- Gas boiler capex and repex costs are held constant during this period which is considered a reasonable assumption given the maturity of that industry.

Areas of cost reduction

Capital costs

The modelling assumes that a 7.5% reduction in direct capital costs and that this reduction is linear over a 5-year period.

The principal way in which this would be achieved is that heat networks would use innovation and efficiency savings (including through building at greater scale than previously) to reduce costs.

It is important to note that both Government and industry are able to affect direct capital costs and industry considers that reducing these costs needs to be achieved in collaboration.

Regarding industry actions, this could, for example, include reducing civil construction costs through new methods, using recoverable heat to reduce ASHP and broader dedicated energy generation capacity required, and so its capex. Regarding Government actions, industry expects direct capital costs to reduce as the sector is given the same Statutory Undertaker Rights as other infrastructure as zoning is introduced.

This is a conservative estimate based on the literature to date on heat network capital costs and industry expectations.

Weighted Average Cost of Capital (WACC)

Heat networks in the UK tend to be seen as higher risk and so attract higher hurdle rates than heat networks in other jurisdictions or other forms of utility infrastructure in the UK. The total WACC comes from both the hurdle rate associated with equity that is invested in the project and the interest rate of debt. At present, heat network projects tend to be built through equity or using the balance sheet of a parent company. Given the relative immaturity of the sector, they are not currently financed through debt.

The modelling assumes that over a 5-year period, WACC can be reduced to 6.71% from the assumed base case of 10% and that it would then remain steady at this level for the remainder of the time period modelled. This is ambitious but still higher than other forms of utility infrastructure in the UK.

This could be achieved through Government and industry actions. In particular, stronger confidence that revenue from heat sales through the introduction of zoning and actions to reduce the spark spread would strongly support the reduction of hurdle rates. As risk in the sector reduces, it would also open up the opportunity to secure low-cost debt into projects which would also lower overall WACC.

ADE: Heat Networks, March 2026