

Heat pump v gas boiler. An investment appraisal of the decision.

In March 2022 we launched a short research paper “Domestic heating appliances: A critical investment appraisal”, which examined the decision of replacing a gas boiler with a heat pump strictly as a financial one. It used accepted capital investment appraisal techniques common in the accountancy profession. It concluded that replacing a gas boiler (on the gas network) with a heat pump was financially irrational.

Two years later, following the increase of the Boiler Upgrade Scheme (BUS) subsidy to £7500 we revisited the decision to see what impact this had. Certainly, more heat pumps were being sold across the UK and heat pump suppliers had become more competitive but report concluded that although the financial landscape had improved since 2022, in the vast majority of cases it remains a financially irrational decision.

Following the Budget 2025 decision to reduce energy bills by £150 a year from April 2026, it is time to look again to see if installing a heat pump versus a replacement gas boiler has become a rational financial act.



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This short paper replicates the approach taken in 2022 and 2024, assessing the choice of replacing a gas boiler with another or with a heat pump. It combines both the initial capital outlay and annual running cost differentials over an appliance lifetime. The study uses a range of techniques, from “traditional payback”, a simple to understand approach that examines how long it takes for an outflow of cash to be paid back, to more sophisticated discounting techniques which recognise there is a time value to money i.e. £1 today is worth more than £1 in ten years’ time.

The paper also considers a range of sensitivities around the core assumptions to test at what levels the decision outcomes may change. Given the conclusions of the previous two reports, some decisions are so obvious that there is no need to undertake any financial appraisal.

So this paper excludes replacing a functioning boiler with a heat pump (even though a planned replacement may be less disruptive); it ignores the installing of Solid Wall Insulation, the upfront cost of which dwarfs any savings; it ignores any decision to install a heat pump without access to the BUS given the loss of subsidy will automatically signal financial irrationality; and it ignores the impact of cooking, even though 50 per cent of UK households still use gas.

The paper will examine the following options:-

- Replacing a boiler at the end of life with a heat pump.
- The impact of the Boiler upgrade Scheme.
- Variation in the Seasonal Coefficient of Performance.
- Variation of Spark-Gap (unit price differential between electricity and gas).

Financial indicators

Traditional payback method – the shorter the payback period the better. Individuals will have their own benchmark, but anything over three years may be an obstacle to investing.

Net Present Value (NPV) – only a positive number suggests the investment is justifiable on financial grounds.

Assumptions

Any modelling of this nature is only as good as the assumptions made. To ensure total transparency, these are listed below and sourced accordingly. Because the modelling uses accepted investment appraisal techniques, the analysis can be replicated and alternative assumptions tested.

Boiler replacement cost £2300¹, lifetime 15 years (straight swap plus some remedial work).

Boiler efficiency 92% as per ErP regulations.

Heat pump installation cost £13431², lifetime 15 years.

Heat pump sCOP efficiency 2.8³

Unit energy prices Ofgem Price Cap (April - June 2026)

Average consumption Ofgem TDCV gas 11500 kWh

Cost of capital 5%

Impact of cooking is accounted for by reducing TDCV by 3 per cent.

Additional power requirements, such as three-phase or network upgrading, all excluded.

Maintenance, servicing and insurance costs are all excluded.

No costs have been considered for disruption/redecoration as part of any installation.

¹ BoilerGuide accessed 17.3.2026

² BUS median costs October - December 2025

³ Mean average, Electrification of Heat Trials; minimum MCS level for BUS

Conclusions

The financial decision rests upon any financial savings generated from the higher efficiency of a heat pump, and units of energy consumed set against the difference in unit price of gas v electricity, aka the Spark Gap.

In total, forty-nine scenarios were modelled and a table generated to show the outcomes in annual savings/(costs) arising from a hypothetical swap of technology.

Although the ‘payback method’ of appraisal is used, its simplicity ignores the crucial financial consideration of discounting the value of any future returns, so the Net Present Value (NPV) is the primary consideration for this study. Payback expectations are based around an individual household’s perception, so difficult to address using any meaningful “average”.

For an example of the calculation, with a SCOP of 2.8, Spark Gap 3.5, and annual bill saving of £17.51 suggests a 207 year payback.

With a fixed assumption around the initial sum to be invested upfront (BUS median cost – BUS grant – cost of boiler replacement) of £3631 and a fixed cost of capital of 5 per cent, assuming a steady financial return over the appliance lifetime, enables a target annual cost saving to be calculated (£349.90). How this is arrived at is the interaction of the SCOP with the SG, as seen in the outcome table.⁴

SG\SCOP	2.5	2.8	3	3.5	4	4.5	5
4.5	-282	-177	-119	-1.97	85.59	153.5	208
4.3	-238	-138	-82.1	29.12	113.1	178	230
4	-173	-79.7	-28	75.77	153.6	214	262.4
3.5	-64.3	17.51	62.72	153.5	221.6	274.5	316.9
3	44.61	114.7	153.4	231.3	289.7	334.9	371.3
2.5	153.5	211.9	244.2	309	357.7	395.4	425.7
2	262.3	309.1	334.9	386.8	425.7	455.9	480.1

⁴ Yellow highlighted outcome meets the current BUS criteria for SCOP at current price cap Spark Gap.

As highlighted, only eight of the forty-nine outcomes meet the criteria of a rational financial decision in securing a positive NPV after a 15-year lifetime.

Key findings and recommendations

As identified in previous reports, replacing a boiler at the end of its life is financially more rational than replacing a functioning appliance. This poses delivery challenges for those who advocate a planned street-by-street conversion. But the unpredictability of when the boiler reaches the end of its useful life poses challenges around logistics of installing a new system in a timely manner. Ideally, a sweet spot can be found for the timely replacement prior to the point of distress being reached. **Mandatory annual servicing for all central heating appliances could help identify this point in the product life cycle.**

As stated earlier, replacing a gas boiler with a heat pump for homes with solid wall insulation requirements is financially irrational, under all previously tested conditions. **This should be ruled out now to allow policymakers to consider how best to decarbonise these homes and to examine if this has wider heat policy implications.**

Relying on changes to the SCOP or reductions in the Spark Gap alone will not achieve a positive financial outcome, it requires a combination of lower spark gap and high SCOPs to achieve a positive net present value outcome. The spark gap is outside the control of the householder, although special tariffs can be purchased. Financial rationality requires a product lifetime with a low spark gap, something the market currently does not offer. **It is recommended that the government advise households of the need to switch to special heat pump tariffs to optimise the likelihood of achieving a financial saving. But government also need to be aware that cheap heat pump tariffs need to be sustainable and not cross-subsidies from other bill payers.**

The SCOP of the heating system is a key determinant of the financial viability of a heat pump. Again, it requires a high SCOP to be maintained throughout the product lifetime and households seeing performance drop will suffer financially. **A mandatory annual service of**

all central heating systems would allow for system efficiency to be maintained across a product lifetime.

The BUS subsidy of £7500 is essential to achieve any hope of financial payback for the decision to switch from a gas boiler to a heat pump. BUS subsidised heat pumps are currently the biggest single determinant of UK heat pump sales. However, the qualification requirements are lax regarding financial outcomes for the householder. The minimum SCOP of 2.8 required to obtain the subsidy does not achieve a positive financial return, even with a low spark gap **(it requires a 1.6 spark gap to achieve financial rationality with a 2.8 SCOP)**. **To prevent a publicly funded subsidy being paid to make a household financially worse off, which is a questionable use of resources, the minimum SCOP required should be increased.**

Given the data highlights the desirability to switch from a boiler to a heat pump near the end of boiler life combined with the fact that without the BUS buying a heat pump is always financially irrational, the long-term future of the BUS needs to be agreed and funded. This allows fair decisions across product lifetimes to be made, so the subsidy can be accessed in ten-years' time with equal chance of qualifying to one o ten-days' time. **Government needs to assign the required resources for this, securing commitment to an estimated £7.5 billion pa by 2030, with over £200 billion by 2045.**

Further considerations

- These figures are based on the Ofgem Price Cap effective April – June 2026, which include the impact of the Budget 2025. This switched some policy costs onto general taxation from energy bills. As a result, it enabled the spark gap to reduce from 4.6 to 4.3. Future spark gaps cannot be predicted with certainty by householders, or arguably even by government. **There are strong arguments against artificially increasing the unit price of gas to fund a lower spark gap, especially around fairness and fuel poverty.**
- Previous work has not considered LPG, oil or hydrogen fuels. **However, the decision table matching spark gap against SCOP allows for all fuels to be considered.**
- Hybrid heating systems have been excluded in this study partly because they currently do not qualify for the BUS, which means the household would have to pay the full upfront cost. Hybrid systems, combining a smaller unit heat pump with a gas combi boiler reduces the upfront costs substantially. How the system is controlled depends upon the technology installed by trials conducted at the Salford University energy home have suggested lower annual running costs for a hybrid compared to both a heat pump only and a gas boiler only system. **DESNZ should look to stimulate the hybrid heating market by inclusion in the BUS.**
- The life of a heat pump may be longer than 15 years, the data is not yet clear on this compared to the well-established figure for a gas boiler. Previous evidence given to the Energy Security Select Committee suggests 15 years is a figure that industry recognises, something confirmed by the UK's largest heat pump manufacturer. The replacement heat pump market is not yet mature enough to estimate likely costs. **Government needs to recognise a 15-year product lifetime in its advice to avoid the risk of providing consumers with misleading information.**
- **Given the recommendation of mandatory annual servicing of all central heating systems, to ensure optimal efficiency and identification of product lifetime, DESNZ should work with the UK heating industry to determine the requirements of a service and how this can be recorded digitally.**