Cadent
future
Your Gas Network

The scope for using hybrid systems in home heating

Recommendations for hybrid heating

April 2025

Executive summary

The difficulties experienced with the roll out of low carbon heating systems (e.g. heat pumps) has prompted a discussion about other routes to decarbonising home heating. This includes the use of hybrid systems, which typically combine an air source heat pump designed to cover the vast majority of a house's heating requirements, with a gas boiler used for winter peaks and hot water.

Such systems have been more widely deployed in mainland Europe particularly in the Netherlands and Italy where hybrid heat pumps account for around 50% of the overall heat pump market.

In the UK, however, Government support for hybrid heat pumps has been limited with no support under the current Boiler Upgrade Scheme (BUS) which offers grants for households buying full heat pump systems. The primary concern raised is that hybrid heat pumps do not provide a full decarbonisation solution, with policy instead preferring to wait until conditions exist for consumers to engage with new heat pump technology.

Hybrid heat pump systems can cut carbon emissions by up to 60% today, rising to c.80% by 2030. Europe is leading the way with support for hybrids.

Not taking advantage of these savings represents a missed opportunity for consumers providing them with a route to reduce carbon emissions today whilst also getting them comfortable with new heat pump technology.

Hybrid systems enable a more effective use of the electricity network by not requiring networks to have to meet high peak heat demands on the system and provides a route to flexibility and capacity management.

Our analysis shows that a strategy of 'waiting' is leaving significantly more emissions in the atmosphere (11 tonnes of CO2 per household) than would be achieved by delivering what is perceived by policy makers to be an imperfect solution sooner, saving households 25 tonnes of CO2. Waiting for a perfect solution could require more drastic action to be taken later to quickly reduce emissions, perhaps leading to measures that are less popular such as mandating specific heating solutions or banning gas boilers.

Including hybrid heat pumps in the BUS with an upfront grant of £2,500 - delivering three hybrids for every one heat pump - would maximise carbon savings per pound of public spending.

Supporting hybrid heating solutions now does not preclude a full electrification solution in the future and opens other decarbonisation avenues such as utilising the gas network with smaller volumes of green gases including biomethane and hydrogen to provide the 'top-up' for these systems.

With the slow and low uptake of heat pumps and the increasing gap to achieve the UK carbon budgets, the Government should be looking for solutions to bridge this gap and create optionality should full heat pump solutions continue to be installed at a slower rate than hoped.

Recommendations

We have three recommendations for Government in support of hybrid heat pumps:

1

Include hybrid heat pumps in the Boiler Upgrade Scheme with an upfront grant of £2,500.

2

Include hybrid heat pumps as part of the UK's overall heat pump strategy, including annual targets, providing manufacturers with the certainty and impetus to invest and innovate.

3

Mandate smart controllers on all hybrids to limit manual intervention.

Introduction

In 2024, Cadent published a report on The Future of the Gas Network[1] which set out the crucial role that the gas network will play in delivering net zero. This report outlined three key roles that the gas network can play as we transition to net zero – 1) enabling energy solutions, 2) driving reductions in emissions and 3) converting and developing the network.

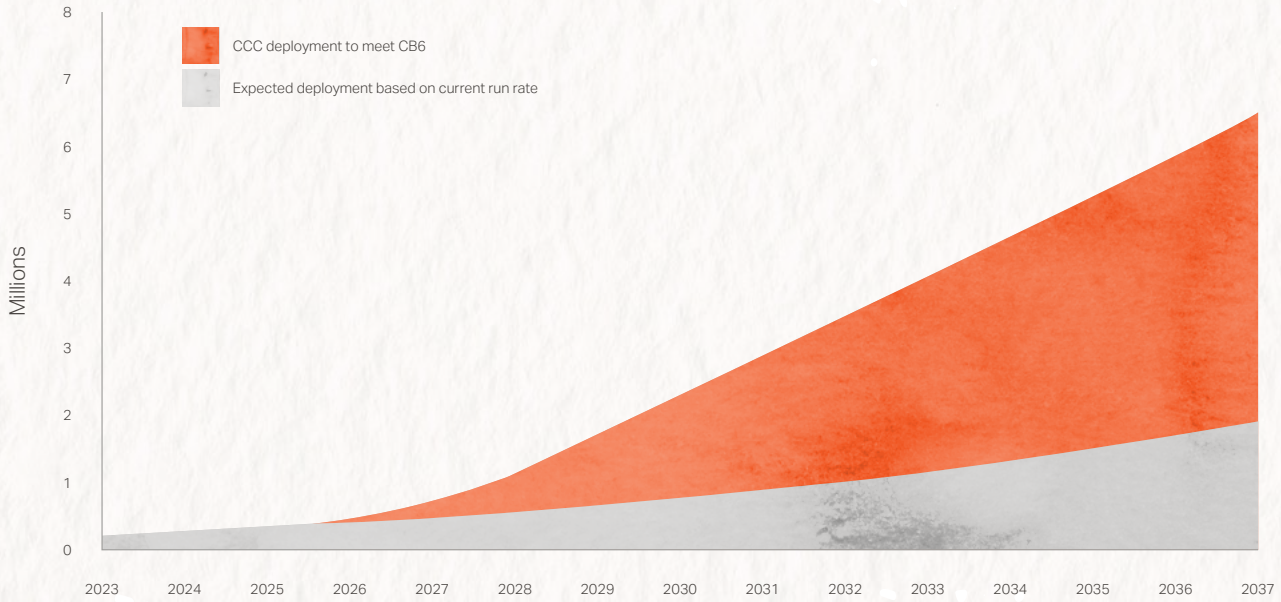
We subsequently published an annex[2] that looked at the benefit to carbon budgets of delivering these key roles which including specific actions such as boosting biomethane, enabling the adoptions of other heating solutions such as hybrid heating and reducing methane leakage from our network. This paper provides additional detail specifically on the role that hybrid heating systems could play in supporting the decarbonisation of home heating in delivering net zero with a number of policy recommendations of how this could be enabled.

This paper discusses how hybrid heating can help to deliver the decarbonisation of home heating with the support of the gas infrastructure, aligning with our commitment to lower emissions and support growth in green gas supply. We discuss how hybrids offer advantages that fills the gap left by the slow deployment of heat pumps.

The Government currently supports standalone heat pumps as the primary technology for heat decarbonisation, targeting 600,000 installations annually by 2028, rising to over 1 million from 2030 onwards. However, with only 60,000 installations in 2023 and 98,000 in 2024, the 2028 target is unlikely to be met. If this slow deployment continues to the end of the 6th Carbon Budget, there will be a shortfall of between 5 to 6 million heat pumps. Taking the midpoint, this yields a total emission gap of 69 mtCO2e.

Given the slow progress, alternative decarbonisation solutions may be needed, or changes to legislated carbon budgets. Hybrid heat pumps offer a possible mitigation. This has been recognised in Europe, where policy support for hybrids is growing following public resistance to heat pump-only policies.

Figure 1: Total UK heat pump installs actual vs target *(Cadent analysis of CCC)*



1. The Future of the Gas Network (2024) - Cadent. **2.** The Future of the Gas Network: delivering carbon savings (2024) - Cadent.

What is a hybrid heating system?

A hybrid heating system is a heating system that combines a heat pump with another heat source, such as a gas boiler to provide reliable heating all year.

The operation of a hybrid is managed by a central controller which can vary the operation mode to optimise heat pump share, either, minimising running costs or optimising carbon savings. The heat pump can meet the bulk of demand with the boiler working to support demand in peak, cold winter conditions. Hybrids can be offered to consumers in a number of different ways[3]:

1

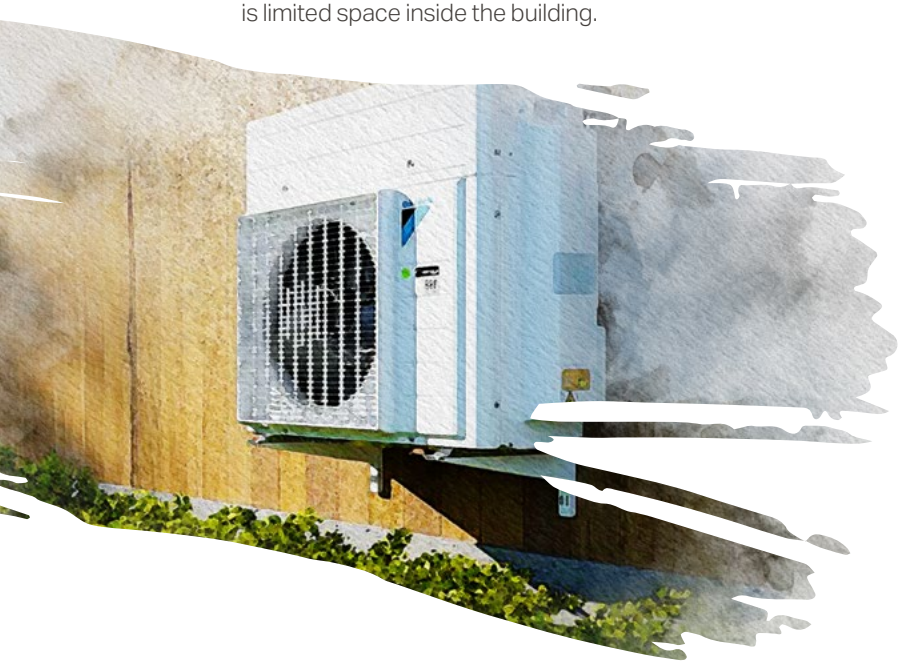
Regular system

A regular hybrid heat pump system – with a boiler, hot water cylinder and electric heat pump – provide space and hot water heating. The single control prioritises the fuel source, operating temperatures and demand priority to the radiators and hot water store.

2

Combination system

A combination hybrid heat pump uses the gas boiler and heat pump to optimise only the space heating with the control. The boiler then provides all the instantaneous hot water on demand. This approach avoids the additional expense and space needed to install a new hot water storage tank, especially for those combination boiler installations where there is limited space inside the building.



3

Integrated or non-integrated

Integrated hybrid heat pumps are when the boiler and all, or part, of the heat pump indoor unit is combined into a single main unit. A non-integrated setup fits the boiler and heat pump as separate units. When the heat pump is installed with an existing boiler, it typically becomes a non-integrated system.

Hybrids come in different configurations to suit both the property and consumer needs. While this approach offers more flexibility, the type of configuration and control strategy will have an impact on the carbon savings potential. Any forthcoming policy support for hybrids must ensure it supports the delivery of a range of carbon savings whilst also enabling the flexibility of customer solutions on offer.

While government believe that hybrid heat pumps can play an important role in heat decarbonisation[4], this can only materialise where there is a clear definition and clarity on the circumstances under which a hybrid heat pump installation would be compliant with the standard certified by MCS as the designated certification body in the UK. The timely publication of the Heat Pump Design Standard[5] (MIS 3005-D) provides much needed clarity to facilitate this.

3. Hybrid heat pumps: a flexible route to decarbonise heat (2022) - HHIC. **4.** Raising product standards for space heating (2024) - DESNZ. **5.** The Heat Pump Standard (2024) - MCS

Europe is leading the way in hybrid sales

Hybrid heating systems are gaining traction in Europe, particularly in the Netherlands and Italy, where gas networks are extensive.

In the Netherlands, hybrids account for c.50% of the heat pump market with around 55,000 units installed in 2023, up from 26,000 installations in 2022[6]. This growth has been aided by direct policy from the Dutch government who amended the Buildings Living Environment Decree (in 2022) to pave the way for hybrid heating systems to become the new standard for home heating from 2026[7]. Dubbed a 'minimum heating standard', from 2026, households would be required to replace their current heating system with a hybrid heating system. To facilitate this, the Dutch government allocated €150 million per year to support purchases, equivalent to a subsidy worth up to 30% of the cost of installation.

However, in May 2024, the three-party coalition agreed to remove the requirement to install a hybrid heating system when replacing an existing heating system from 2026[8]. This move aims to end the requirement of forcing a single technology on homeowners. Instead, it paves the way for Dutch homeowners to choose any heating solution that provides tangible savings over existing heating systems, provided the new technology has a performance assurance that delivers the running cost and carbon savings.

While the impact of this policy change is uncertain, it will inevitably create a degree of uncertainty in the heating market. However, if the Dutch government can establish a standardised approach which enables households to choose from different low-carbon heating technologies, this could serve as a model for other countries, including the UK.

In Italy, hybrids constitute 40%[3] of the heat pump market, making it another mass market for hybrid heating systems. This has been largely due to strong financial incentives (see table 1) and their ability to adapt to Italy's variable climate conditions.

In other markets, such as France and Germany, hybrids are increasingly in popularity with annual sales reaching 4,000 - 6,000 units, largely due to supportive financial policies.

Table 1: Examples of EU support schemes for hybrid heating systems.

Country	HHP annual sales	Cost of HHP	Support scheme name	Measure	Conditions to be eligible
Netherlands	55,000 *2023*	n.a.	ISDE[9] and National Heat Fund	30% of upfront cost subsidised	n.a.
Italy	130,000 *2022*	n.a.	Superbonus	Tax rebate up to 90% of home renovation cost	Applicant must own their own home and have an income of <€15,000
Germany	5,500 *2021*	n.a.	KfW[10] (Grant No. 458)	Financial grant of up to 70% of cost of installation	n.a.
France	4,000 *2022*	€12,000	Coup de pouche Chauffage *White Certificate*	Subsidy offered between €2,500 - €4,000	HHP must achieve 111% efficiency and meet at least 70% of annual heat demand

6. Heating market report (2023) - EHI. **7.** Hybrid heat pump the new standard from 2026 (2022) - Rijksoverheid. **8.** Outline agreement between the PVV, VVD, NSC and BBB (2024) - Kabinetsformatie. **9.** Investerings subsidie duurzame energie. **10.** KfW, KfW Bankengruppe, is a German state-owned investment and development bank.

The EU's shared ownership of gas and electricity networks in municipalities has facilitated more collaborative approaches to planning and policy development.

Dutch municipalities were mandated to develop a Transition Vision for Heating[11] by 2021 to phase out natural gas heating by 2050. Decarbonisation options include hydrogen, biomethane, renewable electricity, and hybrid systems.

In the Netherlands, both electricity and gas networks are being upgraded to integrate low carbon heating sources, aligning with the government's policy framework. They offer favourable tariffs for buildings connecting to low-carbon heating sources. The 2018 amendment to the Gas Act transformed the obligation to connect new buildings to the gas network into a ban on new gas connections not meeting stringent carbon intensity levels. This also facilitated the transition from gas boilers to hybrid heating systems.

The Dutch experience of installing hybrids:

Milieu Centraal, an independent Dutch organisation providing advice and insight on sustainable living, conducted a survey of 995 people who switched to a hybrid heating system and full heat pump. Four out of five owners said they were often (42%) or always (39%) warm in the living room. Households with hybrids installed were satisfied that the setup didn't impede on their space, whilst full heat pump households thought their heat pump took up too much space[12].

The Smart Energy Foundation (SEF) carried out a demonstration project of 200 hybrid heating systems over two winters[13] 'Twee winters met tweehonderd Hybrides', to establish how much less gas was used by installing a hybrid, and the impact of costs on residents. The study found that households reduced their actual gas consumption by 75%, much higher than the 55% calculated gas savings. With energy cost savings of up to €950, residents were able to recover the cost of switching to a hybrid within 5 years. In the Climate and Energy Outlook of the Netherlands for 2023[14], hybrids were estimated to achieve a saving of 1.7 million tonnes of CO2e if installed in a third of homes. The higher gas savings demonstrated in this project would equate to an emission reduction of 6.3 million tonnes of CO2e[13].

11. The Netherlands (2019) - OECD. **12.** How satisfied are people with their heat pump (2021) – Milieu Centraal. **13.** Twee winters met tweehonderd Hybrides (2024) - VDW.
14. Climate and Energy Outlook (2023) – Netherlands Environmental Assessment Agency (PBL).

The benefits of hybrid heating systems

Hybrids offer a versatile approach to decarbonising home heating, particular for hard-to-electrify homes. Their design allows for flexibility, automatically adjusting to use the most efficient energy source based on weather and energy prices. For households and policymakers alike, hybrid heating systems represent a practical solution in the transition to low-carbon heating.

They deliver a reduction in gas consumption

In a hybrid set up, the heat pump unit can meet most of the annual energy demand with the boiler required to meet demand during peak times and during periods of cold weather, where the heat pump could struggle to provide the necessary thermal comfort. Hybrid heating system manufacturers recommend the ideal share of the overall heat demand met by the heat pump versus the boiler to range between 70:30 and 85:15[15,16]. Research undertaken by Imperial College London, for the Climate Change Committee, found hybrid heating systems can operate in heat pump mode up to 80% of the time[17]. Therefore, the heat pump in a hybrid setup can meet up to 80% of annual demand with the boiler meeting the remaining demand, thereby reducing gas consumption by up to 80% after one year of operation.

They enable decarbonisation of 'hard-to-electrify' homes

Various studies have sought to estimate the number of homes where heat pumps will, either, not be effective due to space or technical constraints or unaffordable. From these studies, 20-40%[18] of homes in the UK (c.6-11 million homes) could be considered as 'hard to electrify' and are currently unsuitable for a standalone heat pump. There are a broad range of technical, practical and financial reasons why this may be the case, such as where extensive fabric refurbishment is impracticable, where lack of space makes it impossible to house the heat pump unit and where the high upfront cost of installing a heat pump exceeds the financial capability of a household. For these homes, installing a hybrid can help avoid these issues and provide immediate - emission savings[19].

They familiarise customers to heat pump technology

Gas boilers are the most familiar and widely used heating system in the UK, providing warmth to over 70% of households[20]. With a hybrid heating system, users can become accustomed to how heat pumps work while still relying on their familiar gas boiler, all while contributing to a reduction in carbon emissions. This is essential for increasing consumer awareness towards new low-carbon technologies which lowers the resistance to switch, supporting a smoother transition.

There is less disruption in the home

Hybrid heating systems avoid the need for potentially costly thermal insulation retrofit. This means they can be fitted more quickly – potentially within a day – compared to standalone air source heat pumps, which can take several days. Hybrids also have a lower requirement to replace pipes and radiators, making the installation like a gas boiler and significantly less disruptive and less costly for the consumer. In the HyCompact[21] study, over 8 in 10 households found the low disruption of installing hybrids appealing. Therefore, whilst energy efficiency upgrades are important, it's also important to examine all routes to low-carbon heating, especially those that offer the most practical support to consumers and installers. Of these, hybrids offer the greatest flexibility and least disruption when retrofitting existing properties.

They cost less than standalone heat pumps

Analysis for the Department of Energy Security and Net Zero (DESNZ) found that hybrid installations typically cost 30-40%[21] less than standalone air-source heat pumps. Average costs are £8,000 - £9,000 which is two thirds the cost of a typical stand-alone heat pump install (at £13,000)[22]. The lower cost is typically driven by using a lower capacity heat pump and a reduced need for in-home upgrades. Additional savings can be achieved by opting for a combi boiler for domestic hot water, avoiding the expense of a hot water cylinder. Due to this significant cost premium over standalone heat pumps, hybrids can offer large lifetime cost savings[23].

Whilst cheaper than standalone heat pumps, hybrid heating systems still cost 3-4 times more than gas boilers. Therefore, to increase accessibility for households investing in hybrids, a subsidy would be required to lower the upfront cost. Discussions with industry suggest a hybrid heating system subsidy of £2,500 to be included in the BUS. This level of subsidy would deliver three hybrid heating systems for every one standalone heat pump, maximising carbon saving per pound of public spending.

The BUS initially supported 90,000 standalone heat pumps over 3 years at a cost of £450 million. We envisage something similar where 90,000 hybrid heating systems are supported initially at a cost of £225 million.

15. Hybrid heat pumps (2018) - BEIS. **16.** Comparative assessment of hybrid heat pumps vs condensing gas boilers (2021) - UCL. **17.** Development of trajectories for residential heat decarbonisation (2020) – Element Energy. **18.** Delta EE, Element Energy for the Climate Change Committee, The Energy Utilities Alliance and Aurora for the National Infrastructure Commission. **19.** One foot in the past: the role of hybrid heat pumps in Europe (2024) - RAP. **20.** Constituency data: central heating (2024) – House of Commons Library. **21.** Cost of domestic and commercial heating appliances (2024) - Eunomia. **22.** Boiler Upgrade Scheme statistics: July 2024 - DESNZ. **23.** Hybrid heat pumps (2017) – Element Energy.

Recommendation one:

Include hybrid heating systems in the Boiler Upgrade Scheme with an upfront grant of £2,500.

They deliver immediate carbon savings

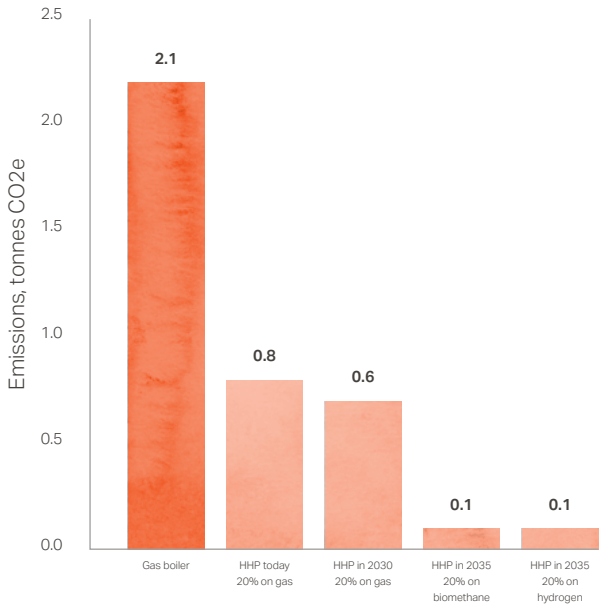
Hybrids installed today are c.60% less carbon-intensive than gas heating. While hybrids can reduce gas consumption by 80% this doesn't directly translate into an 80% carbon reduction due to the requirement to account for current electricity emissions.

This 60% reduction is broadly in line with results from the HyCompact study which found hybrids delivered up to 48% emission reduction vs gas heating[24].

For households, this means reducing emissions by more than 1.3 tonnes CO2e per year immediately, without requiring major change and disruption.

If the electricity grid continues to decarbonise at the pace currently projected, emission savings increase to c.80% by 2030. This would be consistent with Clean Power 2030 where the grid reaches an average emission intensity of c.50gCO2e/kWh[25]. Over the longer term, the remaining 20% of methane demand could be substituted with green gases such as biomethane and/or hydrogen, enabling up to 94% emission reduction, making hybrids an enduring decarbonisation solution.

Figure 2: Carbon intensity of a gas boiler vs hybrid heating system today for a typical home (11,500 kWh/yr)



Lower investment needed is required in the electricity network

Hybrids reduce peak electricity demand, a key driver of network reinforcement costs. A study by Guidehouse found a pathway with hybrid heating reduces the additional peak load from electrification of heating by 54% in 2050 in comparison to a scenario with a higher electrification of heating[26]. Analysis by Imperial College London also concluded a similar result, finding that additional peak electrical capacity could be reduced by 50% with hybrids. Imperial went a step further to quantify that this would save an additional 30 GW of distribution network capacity, resulting in savings of £30-40 billion[27], equivalent to a saving of between c.£1,100 and c.£1,400 per household. Similar whole system analysis for France[28] found that deploying hybrid heating systems leads to annual system costs that are 18% lower than a system with full heat pump due to reduced investment in peak electricity production capacities and lower use of transmission and distribution networks during periods of congestion.

Increased security of supply is delivered through demand flexibility

Hybrid heating systems are beneficial for the energy system, as they enable system integration and smoother transition away from fossil fuels towards a decarbonised energy system. During windless winter peaks when the demand for heat is at its peak, and the supply of renewables is at its lowest, a hybrid system can switch to gas, facilitating system stability and reducing the risk of power outages[29].

The FREEDOM project – a collaboration between National Grid, Wales and West Utilities, Western Power Distribution and PassivSystems - found that hybrid heating systems could provide fully flexible demand that is able to respond dynamically to network, price and carbon signals. The benefits of energy system balancing services from responsive hybrid heating systems were estimated to range from £0.9 billion per year (on current grid intensity levels) to as high as £13 billion per year when the power grid is nearly decarbonised[30].

In the Equinox heat pump trial[31], more than half of participants (52%) reported feeling discomfort after turning down their heat pump for two-hours to help balance the electricity grid. Under a hybrid setup, the system would switch automatically to gas boiler mode enabling households to maintain their heating comfort whilst also helping to provide grid-balancing services. This is more likely to result in successful grid balancing than the reliance on full heat pump systems. Further research is needed in this space to validate the potential.

24. HyCompact: exploring the benefits of compact hybrid boilers (2022) - Passiv. **25.** Clean Power 2030 Programme (2024) - NESO. **26.** Decarbonisation pathways for the European building sector (2022) - Guidehouse. **27.** Whole Energy System Modelling for Heat Decarbonisation – Imperial College. **28.** Externalites Positives Des Pac Hybrids (2022) – Artelys. **29.** Hybrid heat pumps: a no-regret solution for the decarbonisation of buildings (2023) - EHI. **30.** FREEDOM project (2018) – National Grid. **31.** Equinox trial two (2024) – National Grid.

Recommendation two:

Include hybrid heating systems as part of the UK's overall heat pump strategy, including in annual targets, providing manufacturers with the certainty and impetus to invest and innovate.

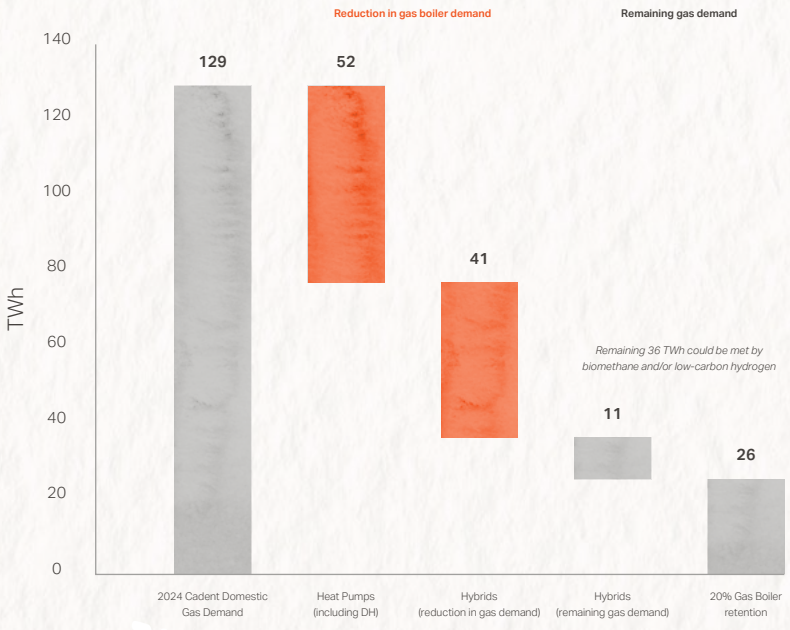
Challenges associated with hybrid heating systems

Not a 100% decarbonisation solution

While hybrids offer significant carbon reduction potential, they do not immediately fully eliminate emissions, making them a partial rather than full decarbonisation solution. Despite the heat pump element meeting up to 80% of demand, the remaining 20% of demand is met by methane which still has a carbon footprint, albeit much less than a standalone gas boiler.

Cadent currently supplies 129 TWh of methane annually to consumers, including 4 TWh of biomethane. Assuming that hybrids are rolled out to 40% of households in the Cadent region, a further 40% switch to heat pumps (including district heat) and the remaining 20% of Cadent households stay on gas (as per the previous government's commitment) - the residential methane demand would decrease from 129 TWh in 2024 to 36 TWh in the Cadent region. This is a 93 TWh reduction, resulting in a 72% reduction in carbon emissions from 24 to 7 million tonnes/year of CO2e.

Figure 3: Cadent's residential gas demand under a 'hybrid-led' scenario (Cadent internal analysis)



The remaining 36 TWh could either be supplied with biomethane, low-carbon hydrogen or a combination, further reducing methane consumption and increasing the decarbonisation potential, making a switch to hybrids an enduring decarbonisation solution. The Government's Biomass strategy found that around 30 – 40 TWh[32] of biomethane production would help the UK achieve net-zero cost-effectively. Similarly, the Government ambition to achieve 10 GW of hydrogen production capacity by 2030, as set out in the British Energy Security Strategy, suggests substituting the remaining gas demand under a hybrid-led scenario faces little supply constraint but would require political policy support to realise the potential of enabling and distributing low-carbon gases via the gas grid.

32. Future policy framework for biomethane production (2024) – DESNZ.

Same supply chain limitations

The deployment of hybrids could be impacted by the same supply chain issues limiting deployment in the heat pump market. A significant barrier to meeting heat pump installation targets is a lack of capacity in the supply chain, with two-thirds of heat pumps installed in the UK being manufactured abroad[33]. In addition to this, low consumer demand is another reason for slow heat pump deployment, currently at 10% of the 2028 target. This is having a knock-on effect on creating a shortage of trained installers to install heat pumps. However, higher heat pump demand as part of hybrid systems would also provide the market signals necessary for manufacturers to scale up production, and for heating companies to recruit and train more installers.

This is also creating a missed opportunity for hybrids. For those homes who practically cannot install or afford a full heat pump, they may be able to install a hybrid (or as an add-on to their existing system). By enabling hybrids to be deployed it would enable an immediate c.1.3 tonne reduction in emissions per household, with the savings increasing as more hybrids replace existing heating systems.

Consumer appeal is unknown

There is limited information on whether hybrid heating systems are a proposition that consumers understand or find appealing. It may be confusing and complicated for a household to manage, in effect, two heating systems. This blind spot can be addressed by better understanding consumer appetite for hybrid heating and the types of consumer propositions that would enable uptake and address any barriers.

There is a risk of consumers over-riding the hybrid

Most households (73%) in the UK rely on gas boilers for central heating and hot water.

Since households are more familiar with how their gas boiler works, they may opt to override the hybrid system and run a higher share of heat demand using gas heating. This could potentially reduce the carbon benefit of hybrid heating. However, mitigation strategies exist and have been deployed in hybrid trials. In the HyCompact trial, Passiv UK's smart heating controls takes the user's heating needs and calculates the best strategy to meet the desired levels of thermal comfort, limiting the physical input of the homeowner. The homeowner can still input their heating set point and heating schedule, and the control system determines the best strategy for the hybrid.

33. New report highlights the need for hybrid heat pump solutions (2024) – Watt-Logic.

Recommendation three:

Mandate smart controllers on all hybrids to limit manual intervention.

They may not lower bills

At the current spark gap – where electricity prices are around 4 times more than gas prices – and assuming typical energy consumption, the cost to run a hybrid heating system could be c.10%[34] more compared to a standalone heat pump.

However, when you exclude standing charges then hybrid heating offers marginal running cost savings (c.2%) over a full heat pump (see figure 4). This is broadly in line with the HyCompact trial which reported a c.4% running cost saving with hybrids but also excluded standing charges from their calculations.

Successful and widespread deployment of hybrid heating will depend on the extent to which they reduce household energy running costs and deliver carbon savings. Flexibility benefits could be a significant component of this. Previous studies on hybrid heating systems have primarily focused on demonstrating high heat pump usage, and while these studies have been successful in this, they give limited coverage to running costs.

Energy suppliers currently offer time-of use and type-of-use tariffs in a bid to improve the economic case for running heat pumps, which are currently uncompetitive to run against gas heating. On time-of-use tariffs, several energy suppliers reward households when they shift their electricity consumption to times of low demand. This can be replicated to promote efficient use of the hybrid heating system. Energy suppliers could offer hybrid heat pump tariffs (either time/type-of-use) to encourage smarter energy use. This can help drive positive consumer behaviour and reward them with lower energy running costs.

34. Based on Q4 2024 Energy Price Cap unit rates and standing charges.

Why should hybrids be considered now?

It is important to understand why there is limited political and financial support for hybrid heating systems. The two main arguments put forward are that hybrids are a transitional solution only and, therefore, there is merit in waiting until full heat pump solutions are palatable for consumers.

1

Hybrids prepare consumers for change

While just 5% of UK households had central heating in 1960, today this is over 90%, of which the majority (over 70%) are fuelled by gas[35]. So, for over 50 years, households have been accustomed to gas boilers heating their homes.

To suddenly require households to replace their heating system with a new, unknown (to them) and expensive heating technology is a large ask. The evidence is clear, annual heat pump installations are 60,000 today compared to 1.7 million gas boilers[36]. This is why a bridging technology would be beneficial in gaining the support and confidence of consumers.

Hybrid heating allows homeowners to get accustomed to heat pumps and how they work, with the security of a boiler. Parralels with the transport market are useful. By offering a range of hybrid vehicles, consumers have been able to get the electric vehicle experience with the backup of their internal combustion engine. This has seen electric vehicles take a 18% market share by September 2024[37] compared to a 7% market share at the end of 2020[38]. Hybrids may be a transitional heating solution, but they get households using and getting familiar with heat pumps which enables a seamless switch to full heat pumps when the conditions are more favourable.

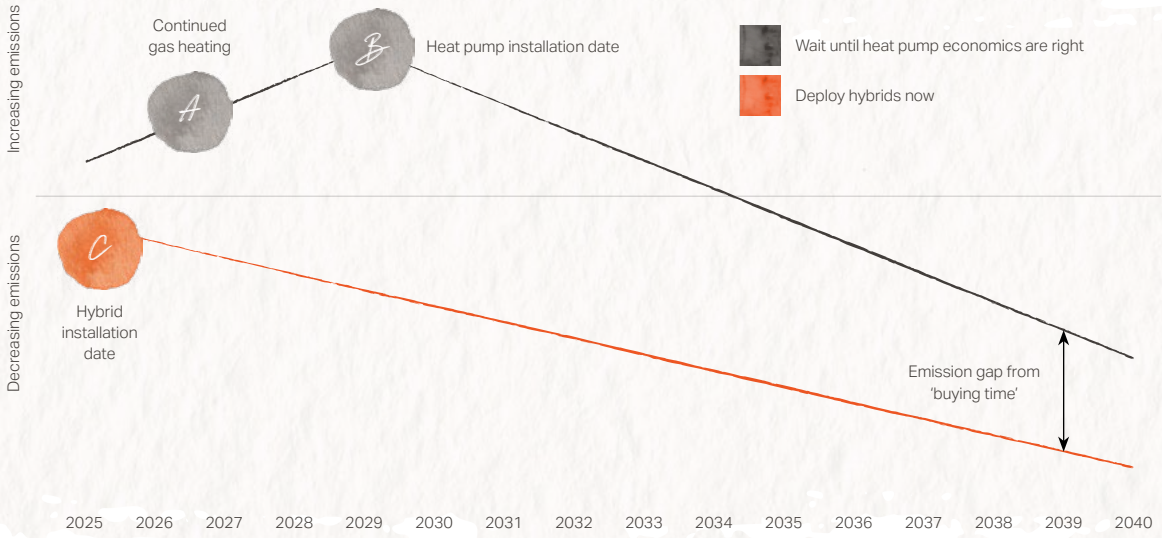
35. Lessons from a local history of domestic heating in the United Kingdom (2017) – Energy Research and Social Science.
36. Improving boiler standards and efficiency (2023) - DESNZ. **37.** Car registrations (2024) - SMMT. **38.** Car registrations December 2020 (2020) - SMMT.

2 Partial carbon savings now are better than waiting for a full solution

This is characterised by the idea that by waiting for a full solution, we buy time to avert these delayed emissions through learnings and cost reductions. The strength in this argument is highly dependent on the confidence in achieving the expected learning and cost reductions. On cost, full heat pump installations are more expensive to install compared to gas boilers, and this cost is increasing[39]. Despite government ambitions to reach cost parity with boilers by 2025[40], the independent National Audit Office (NAO) confirmed heat pump costs were not falling as the government had predicted.

As an example, if we assume that a consumer delays a purchase of a hybrid heating system today to wait for an economical solution of a full heat pump in the future. Assuming this delay is five years, an additional c.11 tonne of CO2 per household is emitted due to continued gas heating (point A). From 2030, if the switchover to heat pumps is deemed economic, emissions will begin to decrease (point B onwards). However, it takes a further five years just to eliminate the total emission increase during the delay period (2025 to 2030). By 2040, the heat pump reduces emissions by 12 tonnes.

Figure 4: Emission impact of deploying hybrids today or delaying emissions to 'buy time'



On the other hand, if hybrid heating systems are supported by policy, a household that installs a hybrid system can immediately reduce emissions by 1.3 tonne per year (point C). By 2040, the hybrid heating system would have saved 25 tonnes of CO2, more than double (13 tonnes of CO2) compared to the later purchase of a heat pump. Deploying hybrids today has a much larger impact in terms of avoided societal damage costs from carbon emission with over £3,500[41] saved in societal damage cost per hybrid heating system. This compares with only c.£1,700 saved (per heat pump) in societal damage cost by waiting and delaying emissions reductions. It is clear from this analysis that a hybrid system installed now is significantly more beneficial in terms of carbon savings than waiting for a heat pump solution.

The purpose of decarbonisation is not to only to reach net zero by 2050, it is to immediately reduce emissions as much as possible.

Because the lifetime of CO2 in the atmosphere is long and accumulates, delaying emission reduction increases CO2 concentrations which supercharges the natural greenhouse effect, causing global temperatures to rise. The impact of which is felt by future policy which must be more stringent and thus more costly in subsequent years, debilitating efforts to meet net zero. The UK is currently not on target meet carbon budgets 5 and 6 and therefore government cannot simply afford to wait to avert emissions in the future. If these targets are missed, this will put more pressure to meet subsequent carbon budgets which will impose huge cost on society as every tonne of CO2 not abated today will require more effort and cost to abate in the future. Continuing to focus on full electrification, when the economics are not there yet, means emissions will remain higher for longer. In either case, emissions saved today with a hybrid system are better and more valuable than emissions saved in the future.

39. Progress in reducing UK emissions (2023) – Climate Change Committee. **40.** Heat and Buildings Strategy (2021).
41. Uses US social cost of carbon and converts to £ using average exchange rate.

Policy recommendations and next steps

With the roll out of standalone heat pumps going slower than expected, there is an opportunity for hybrid heating systems to help close the carbon budget gap. Hybrids have scope for wide-scale deployment, contingent on forthcoming policy and financial support, due to their compatibility with existing heating systems, relatively lower upfront cost compared to standalone heat pumps and reduced impact on peak electricity demand. Critically, hybrids reduce emissions immediately and have the potential to continue decarbonising with the remaining share of gas demand being replaced by lower carbon alternatives such as biomethane and low-carbon hydrogen.

The policy recommendations put forward in this paper aim to build on the benefits of hybrid heating, leveraging learnings from similar countries and identifying levers to drive deployment. These recommendations range from no-regret actions such as mandating controls and standards, to adding hybrids to existing support schemes (i.e. Boiler Upgrade Scheme) and making hybrids a key part of the national heat pump strategy, giving industry the certainty to invest and the impetus to innovate. To achieve this, it will be necessary to devise compelling consumer propositions complemented by supportive policies and the strengthening of the supply chain.

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Your Gas Network

Cadent Gas Limited

@CadentGasLtd

@Cadent

0800 389 8000

insights@cadentgas.com

cadentgas.com