

Response ID ANON-HVE2-CENV-1

Submitted to Phasing out fossil fuel heating in homes off the gas grid
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About you

What is your name?

Name:
Dr Tim Fox

What is your email address?

Email:
tim.fox@bennamann.com

What is your organisation?

Organisation:
Bennamann Limited

Are you happy for your response to be published?

Yes

Would you like to be contacted when the consultation response is published?

Yes

An end to new fossil fuel heating installations in homes off the gas grid from 2026.

1 Do you agree with the principle of working with the natural boiler replacement cycle as the key trigger to deploy low carbon heat?

Yes

Please provide evidence to support your response. :

2 Would a 2026 end date for new fossil fuel heating installations in homes off the gas grid give industry and consumers sufficient time to prepare for the regulations?

Yes

Please provide evidence to support your response. :

Yes, in the case of Bennamann Limited and our potential customers, but no comment regarding the broader industry.

A 'heat pump first' approach to replacement heating systems from 2026

3 Do you agree with a heat pump first approach to replacement heating systems in fossil fuel heated homes off the gas grid that can reasonably practicably accommodate a heat pump?

No

Please provide evidence to support your response. :

In principle we do not agree with a "heat pump first approach" as it does not allow for competitive low carbon, zero carbon or better-than-zero carbon technologies and innovative commercial developments that may emerge in the coming years and represent better value in terms of costs, sustainability and achieving net-zero. Constraining innovation and the marketplace by effectively "backing a winner" does not make economic or policy sense.

4 Do you have any views on the design or content of guidance that will help households and installers determine whether it is reasonably practicable to install a heat pump?

Please provide your answer in this space. :

No comment.

5 Do you have any additional evidence on the size and characteristics of the cohort of homes off the gas grid that have the greatest deployment potential for ground source heat pumps?

Please provide your evidence in this space. :

No comment.

Require high performing replacement heating systems where heat pumps cannot reasonably practicably be installed

6 Do you agree that the performance of replacement heating systems in homes off the gas grid that cannot reasonably practicably accommodate a heat pump should reflect the current high standards of performance that can be delivered through high temperature heat pumps and solid biomass systems?

No

Please provide evidence to support your answer. :

In principle we do not agree with a "heat pump first approach", as stated in our answer to question 3, and the performance requirements of any low carbon, zero carbon, or better-than-zero-carbon replacement heating system to be installed in homes off the gas grid should be set through consideration of the lifecycle analysis and overall sustainability of the available suite of solution candidates.

7 Do you agree that future use of solid biomass to decarbonise heat in homes off the gas grid should be limited to rural, off-gas grid areas where air quality can be better controlled, and in 'hard to treat' properties that are not suitable for other low carbon heating technologies?

Yes

Please provide evidence to support your response. :

8 Do you have any views on the development of heating fuels and systems which will be consistent with wider government objectives on net zero emissions, environmental sustainability and air quality, and offer a secure and affordable fuel supply to consumers, from 2026?

Please provide evidence to support your answer. :

The combustion of biomethane in compressed gas or liquid fuel form to produce heat for use in space and/or water heating offers a 'market ready' viable alternative option to heat pumps and if locally sourced from farm manures, delivers a better-than-zero carbon outcome as well as a range of environmental, sustainability and air quality benefits. For example, under REDII the biomethane default value for manure is associated with a large methane credit of 206%; this significantly lowers the carbon intensity of biomethane production to -85gCO₂e/MJ (https://bennamann.com/downloads/LowCVP-WTT_GHG_Emission_Factors-Review_and_recommendations.pdf). If produced efficiently and distributed effectively, it can also be commercially viable and affordable, thereby reducing fuel poverty and increasing the energy security and resilience of rural communities.

Across the UK, rural communities have within them a considerable untapped resource of energy in the form of the biomethane that can be derived from the fugitive methane emitted by livestock manures. In many cases these sources of energy are relatively small, being at the small farm scale, but when used on-site and aggregated and distributed locally to meet local rural energy demand, they represent a considerable opportunity for decarbonisation of heat.

The challenge is how to access this unused better-than-zero carbon source of energy when the rural production site is small-scale; is not served by an injection point to the gas grid; and, as in many cases, suffers power grid connectivity constraints preventing biogas processing and/or export as generated electricity. To meet this challenge, Bennamann (www.bennamann.com) has been developing and proving a suite of technical solutions and business models that enable commercially viable off-gas and off-power grid utilisation of these local rural energy resources, in the form of compressed biomethane gas and liquid fuel, for the affordable decarbonisation of space and water heating in homes and buildings (ie farms, community halls, schools, businesses etc). For example, the company recently secured £668,577 of European Regional Development Fund (ERDF) funding under Priority Axis 4 to support a truly ground-breaking development project in which farm sourced fugitive methane is being used to power mobile off-grid electric vehicle (EV) charging units, with waste heat recovery for use locally in space and water heating (<https://bennamann.com/mobile-off-grid-ev-charger-with-bioheat/>). This pioneering integrated energy-transport-heat project will demonstrate the application of the technology in a rural home, a rural car park with adjacent community (Women's Institute) hall, and in a rural business setting on a working farm. Post-project, the development will deliver a step change to the roll-out of EV charging infrastructure, particularly in off-power-grid or power grid constrained rural locations, as well as help support a transition to more sustainable livestock farming, a green recovery led economic growth and levelling up, through the creation of clean energy jobs and business activity.

On the biomethane supply side, Bennamann has been commercially proving the efficient and optimised local, small-scale, capture, processing, storing, aggregation and distribution of fugitive methane in rural Cornwall (<https://vimeo.com/663327514/26d642b959>). For example, the company's £1.22 million "Energy Independent Farming" project, which is part-funded by the ERDF (<https://www.cornwallislesofscillygrowthprogramme.org.uk/projects/energy-independent-farming/>); (<https://bennamann.com/energy-independent-farming/>), is demonstrating the use of livestock manure to establish energy independent dairy farming (including self-sufficiency in power, heat and fuel for farm machinery such as tractors [<https://www.bbc.co.uk/sounds/play/p0bfx7ym>]) and simultaneously generate farm business income through local sales of surplus fugitive methane, either as compressed gas or liquid fuel (<https://www.fginsight.com/news/income-from-slurry-gas-110928>); (<https://bennamann.com/wp-content/uploads/2022/01/Farmers-Weekly-Bennamann.pdf>).

Through the use of a low-cost sealed slurry lagoon, this approach can effectively take the farm off-grid from an energy perspective and provide the farm businesses with an additional revenue that can fully fund the investment through reduced energy costs. It also provides the opportunity to improve soil health, remediate compaction, underpin regenerative practices, and deliver improved soil carbon sequestration without the need for artificial fertilisers,

resulting in further cost savings (<https://vimeo.com/458903162>). By using a sealed lagoon rain ingress is minimised resulting in significant savings in fuel, vehicle and manpower costs through the reduced need for slurry movement and spreading. Data gathered by Bennamann at Chynoweth Farm in Cornwall, which has our proprietary sealed slurry lagoon installed and captures and utilises the fugitive methane generated by the anaerobic digestion of the manure, indicates a return-on-investment period of between 4-6 years for such a system.

The commercial roll-out of rural off-gas-grid heat provision based on fugitive methane locally sourced from livestock manure slurry and processed to biomethane in small-scale upgrading plants, is scalable and viable in the UK. For example, there are circa 600 dairy farmers alone in the rural county of Cornwall (131,000 dairy cattle – 6% of the national herd), many of whom are off-gas-grid and subject to power grid constraints. Of these, there are an estimated 120 farmers in a position to adopt Bennamann's technologies and business models in the short-term, including the 58 dairy farms in Cornwall Council's own Council Farm Estate. Indeed, in the case of the latter, the Council has already begun a pilot installation on 6 of the dairy farms in the Estate which, if successful, is intended to lead to a wider roll-out across the county (<https://bennamann.com/6-farm-pilot-with-cormac-biomethane-supply/>).

In terms of scalability across the UK, there are circa 2,000 dairy farms in the South-West and around 35 – 40,000 cattle farms across the UK, of which approximately 71% (29,000 holdings) have herds with less than 150 cattle. With current farming practices, costs of traditional Anaerobic Digestion (AD) plant, and levels of low-carbon energy incentives, modelling has shown that only 3.5% of UK dairy livestock could be linked to economically viable on-farm plants for biomethane production (<https://www.sciencedirect.com/science/article/abs/pii/S0301421513006162>). For example, there is a total of only 45 small scale AD plants in the UK (ADBA, 2015). Alternatively, Bennamann's farm-scale biogas sourcing, biomethane processing, storage and distribution technology would enable 71% of UK dairy farms to become economically viable 'better than zero-carbon' energy producers. This would potentially result in an emissions saving of circa 34 Million tonnes CO₂e annually for the UK, or 7.5% of total UK CO₂e emissions, just from the mitigation of the manure slurry fugitive emissions, before accounting for the emissions savings that will accrue through the use of the derived biomethane for off-gas-grid heat energy provision.

Incentivising a scalable roll-out through stimulating demand for biomethane use in off-gas-grid rural heating would not only help decarbonise heat in homes, it would also enable dairy farm businesses to generate an additional revenue stream that can provide them with income diversity and increased profitability. In addition, stimulating biomethane production at the farm-scale for local distribution and use in heat provision would help improve the overall sustainability of farming, through on-farm use of some of the resulting zero-carbon energy, as well as improved nutrient cycling and soil biology practices by use of the resulting digestate as a regenerative replacement for artificial fertiliser. Implementing the latter through Bennamann's proprietary digestate handling processes will substantially reduce the release of ammonia, thereby mitigating air quality degradation and helping to meet the policy objectives of Defra's Clean Air Strategy 2019. With the forthcoming introduction of the Environmental Land Management Scheme (ELMS) for farming to facilitate a post-Brexit phase-out of the EU's Basic Payment Scheme (BPS) under the Common Agricultural Policy (CAP), farm businesses need to find new sources of revenue based on environmentally beneficial practices to remain operational (typically the BPS provides around 50-80% of UK farms annual income, <https://www.parliament.uk/documents/commons-library/Brexit-UK-agriculture-policy-CBP-8218.pdf>) and Bennamann's approach offers one route to helping achieve such an outcome.

The successful incentivisation of biomethane combustion in homes through the approach discussed above will help UK Government to realise a myriad of BEIS and other department policies, including:

- an attractive non-electric affordable net zero heat option which is particularly beneficial for decarbonising off-gas-grid locations (where building owners/occupiers typically resort to bottled gas, e.g propane, or oil for heating), especially where power grid capacity and constraints are an issue in meeting electrical demand;
- decarbonisation of difficult to tackle sectors, including heat and agriculture, in the quest to achieve the UK's legally binding net zero target by 2050 as well as meet the nation's Paris Agreement commitments;
- meeting the targets of the Global Methane Pledge that aims to deliver at least a 30% reduction in fugitive methane emissions by 2030 on a 2020 baseline (<https://www.globalmethanepledge.org>).
- climate emergency and net zero-carbon aspirations of rural local authorities nationwide, while simultaneously delivering distributed local energy, reduced fuel poverty, improved local energy security and rural resilience;
- green recovery led local growth, rural economic development, and delivering the levelling up agenda, through creating sustainable low carbon farming and local energy sector related jobs that improve rural livelihoods and drive post-pandemic economic regeneration.
- the Clean Air Strategy 2019 through the reduction of ammonia emissions from livestock farming;
- the Agriculture Act and Environmental Land Management Scheme (ELMS) through sustainable and regenerative low carbon farming that enhances biodiversity, delivers environmental growth, and creates a circular economy model for livestock agriculture.

A potential end to the use of fossil fuel heating in all homes off the gas grid by the late-2030s

9 Do you agree with an end date for the use of remaining fossil fuel heating in homes off the gas grid by the late 2030s?

Not Answered

Please provide evidence to support your answer. :

No comment

10 Do you have any views on measures the Government could introduce to ensure that fossil fuel heating will no longer be used in homes off the gas grid by the late 2030s?

Please provide evidence to support your answer. :

No comment

Enforcement

11 Do you have any views on how best to ensure compliance with the proposed regulations laid out through this consultation?

Please provide evidence to support your answer. :

No comment

Running Costs

12 Do you have any views on what more could be done to address financial barriers to heat pump deployment?

Please provide evidence to support your answer. :

No comment.

13 Do you have any views on how we should encourage smart-enabled heating in homes off the gas grid?

Please provide evidence to support your response. :

No comment.

Non-financial Barriers

14 Do you have any views on what more could be done to galvanise supply chains for low carbon heating?

Please provide evidence to support your answer. :

The combustion of biomethane in off-gas-grid homes for heat decarbonisation is not incentivised through current policy and it is therefore critical to address this shortcoming to stimulate the growth of supply chains to deliver biomethane fuelled application technologies/systems suitable for use in domestic dwellings as well as the biomethane fuel itself. BEIS's current version of the Clean Heat Grant Scheme does not support biomethane combustion by households for heat decarbonisation and on the fuel supply side the Green Gas Support Scheme is only available to Anaerobic Digestate (AD) plant operators that have a gas grid injection point.

To stimulate initial market uptake of off-gas-grid biomethane heating solutions and associated equipment supply chains, the combustion of biomethane in homes for heat decarbonisation needs to be supported through an appropriate financing mechanism such as a householder / property owner grant scheme that provides a partial contribution towards the capital cost of equipment purchase and installation. Such support would help incentivise the growth of off-gas-grid decarbonised heat applications and their supply chains to meet demand for the building-level technologies, as well as the production and distribution of locally sourced biomethane in the UK's rural off-gas-grid communities.

In parallel with financial incentivisation, BEIS can help further with market addressing actions including, for example, ensuring a supportive regulatory environment for the safe use of biomethane for space and water heating in homes. Although it is relatively straightforward to technically achieve this, existing gas regulations do not allow the use of biomethane as a substitute for natural gas or bottled LPG in homes and commercial buildings. Indeed, the current regulatory environment effectively restricts the deployment of replacement systems to Combined Heat and Power (CHP) applications where bioheat is provided into a building from outside and does not therefore recognise cases where oversupply of CHP based electricity will result or support potentially innovative solutions that would enable biomethane to be used directly in converted natural gas (or LPG etc) fuelled boilers.

On the biomethane supply side, as highlighted in our answer to question 8, across the UK, there are circa 35-40,000 cattle farms but with current farming practices, AD plant costs, and low-carbon energy production incentives, only 3.5% of UK dairy livestock would be linked to economically viable on-farm plants. This situation acts as a significant barrier to increasing the domestic supply of an underutilised and potentially energy rich heating fuel in the form of fugitive emissions captured from livestock manure, particularly in the case of small-scale farms.

Bennamann (www.bennamann.com) have developed a suite of technologies covering the entire biomethane supply chain from farm to consumer application that facilitate sustainable, commercially viable manure slurry fugitive emissions sourcing, processing/upgrading and storage, as well as distribution and consumer use, for livestock farms of any scale without the requirement of a gas or power grid connection (<https://vimeo.com/663327514/26d642b959>); (<https://bennamann.com/wp-content/uploads/2022/01/Farmers-Weekly-Bennamann.pdf>). However, current incentivisation schemes do not provide adequate rewards for smaller plants/operators and those without gas-grid access, and/or power grid connection/constraint issues, and the UK Government could galvanise equipment and fuel supply chains by addressing this deficit through appropriately structured support mechanisms. In this regard, BEIS, in partnership with other departments, particularly Defra, needs to put in place policy interventions, regulatory change, financial incentives, and investment-encouraging mechanisms that remove these barriers, along with a timebound roadmap for implementation. This should include support for the engineering development and commercially viable deployment of affordable, efficient equipment, including small-scale systems and options for biomethane production where proximity to a gas grid injection point is not available. Bennamann are researching, developing and demonstrating such plant and systems but does not see UK Government policy or regulatory support for their widespread development and/or deployment.

Bennamann regards as a missed opportunity the fact that the Green Gas Support Scheme is exclusively focussed on supporting biomethane injection into the gas grid and does not offer a support route for off-gas-grid sourcing, processing/upgrading, storage and distribution of biomethane, either in gaseous or liquid fuel form. The Committee on Climate Change (CCC) consider the production of biomethane from waste as a low-regrets option, recommending continued government support (UK Committee on Climate Change (2018)), Biomass in a low carbon economy). The lack of this support for the off-gas-grid and/or off-power-grid component of production is not only remiss, but also ignores the full low-regrets potential of biomethane to reduce greenhouse gas (helping to achieve the nation's Global Methane Pledge commitments - <https://www.globalmethanepledge.org>) and other emissions (including ammonia and N₂O) from waste and agriculture, as well as support jobs in rural areas, contribute to delivering a green recovery and the levelling up agenda, reduce fuel poverty and build rural energy security and resilience capacity, through its local sourcing from manure slurry fugitive emissions,

processing and distribution. Bennamann therefore recommends that BEIS explores more fully incentivisation of the use of biomethane sourced from livestock manure slurry fugitive emissions to heat the space and water in rural off gas grid homes.

Equality Act 2010

15 Do you have any additional evidence on how groups protected under the Public Sector Equality Duty may be affected by our proposals to phase out high carbon fossil fuel heating in homes off the gas grid?

Please provide evidence to support your answer.:

No comment

16 Do you have any views on what more could be done to ensure households, and communities, affected by our proposals experience a smooth transition to clean heat?

Please provide evidence to support your response. :

No comment.

17 Do you have any further comments to make on our proposals to phase out high carbon fossil fuel heating in homes off the gas grid?

Please provide evidence to support your answer. :

No.