



Department for  
Energy Security  
& Net Zero

# Green Gas Support Scheme Mid-Scheme Review Consultation

Closing date: 18 May 2023

March 2023



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# Introduction

Biomethane can be produced via anaerobic digestion, a process whereby organic materials are broken down by bacteria in the absence of oxygen to produce biogas, which is then upgraded to make biomethane. Biomethane is chemically identical to natural gas and can be injected into the gas grid as a direct replacement for natural gas. Increasing the proportion of green gas in the grid is a practical, established, and cost-effective way to reduce carbon emissions and increase our energy security.

The UK government is committed to achieving its legally binding target of net zero greenhouse emissions by 2050. Heating our homes, buildings and industry is responsible for a third of the UK's greenhouse gas emissions and represents a major challenge to reaching net zero by 2050. This is why we are taking action to decarbonise heating.

The current political and economic context, with the associated impact on global energy supply, presents many challenges to businesses and households. The UK government has introduced several measures to mitigate the impacts of these disruptions and support our energy security and the economy through these challenges. The government is also pressing ahead with its plans to ensure growth in home-grown, secure renewable technologies and energy sources. The Heat and Building Strategy published in 2021 set out the foundations for the government's pathway to net zero buildings in 2050, bringing together work on energy efficiency and clean heat. As part of this, the government set out its commitment to increasing the production of biomethane for injection into the gas grid.

The Green Gas Support Scheme, launched on 30 November 2021, follows on from support for biomethane injection under the Non-Domestic Renewable Heat Incentive, which closed to new applicants on 31 March 2021. The scheme is open for four years and provides tariff-based support for biomethane produced via anaerobic digestion and injected into the gas grid. Producers of biomethane will receive tariff payments for a 15-year lifetime. The scheme is funded by the Green Gas Levy, which applies to all licensed fossil fuel gas suppliers. The scheme is expected to contribute 3.7 MtCO<sub>2</sub>e of carbon savings over Carbon Budgets 4 and 5, and 8.2 MtCO<sub>2</sub>e of carbon savings over its lifetime. It will also help to support high quality jobs, particularly in rural areas, by maintaining and building growth in the biomethane industry at a time when economic recovery is so important. The production of biomethane can also help to diversify UK supplies of CO<sub>2</sub> (a by-product of the process) across sectors such as the food and drink industry when produced and treated in line with the appropriate environmental regulations. This can also present an important revenue stream for plants and can support the continued growth of the AD sector.

In the [Future Support for Low Carbon Heat & The Green Gas Levy government response](#), we committed to a mid-scheme review of the Green Gas Support Scheme. The review will consider possible changes to the scheme's regulations and operations. We are seeking views on our proposals and aim to implement any amendments by the end of 2023. The areas for consideration include: the scheme's close date; how we will treat tariff guarantee and

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commissioning deadlines; the waste feedstock threshold; the scheme mitigation requirements for digestate emissions; the eligibility of Combined Heat and Power plant conversions to biomethane injection; heat deductions from total eligible biomethane; and fugitive methane emissions monitoring and mitigation. This consultation invites responses on these proposals from stakeholders to inform our final decisions on the recommendations for this mid-scheme review.

The UK government recognises that biomethane will continue to play an important role in the decarbonisation of heat. We are currently considering options for a post-GGSS policy framework for biomethane, and this consultation provides an opportunity to express views to inform our thinking on that framework. We intend to set out more detail on our thinking in these areas in due course.

The [Independent Review of Net Zero](#) published in January 2022 further emphasised the importance of delivering net zero, decarbonisation, and clean energy growth and sets out a comprehensive roadmap towards a net zero future. As part of this, the review notes the importance of delivering on the Heat and Building Strategy and suggests continued government support for biomethane beyond the current Green Gas Support Scheme as a measure to support this. The UK government will carefully consider the recommendations proposed and respond to the review later in the year.

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# General information

## Why we are consulting

To set out proposals and invite views relating to the mid-scheme review of the Green Gas Support Scheme. This will ensure that proposals can be fully tested and refined where appropriate.

## Consultation details

**Issued:** 23 March 2023

**Respond by:** 18 May 2023

Email: [greengassupport@beis.gov.uk](mailto:greengassupport@beis.gov.uk)

**Consultation reference:**

Green Gas Support Scheme Mid-Scheme Review Consultation

**Audiences:**

This consultation will be of particular interest to stakeholders in the biomethane industry, particularly those who have interacted or plan to interact with the Green Gas Support Scheme.

**Territorial extent:**

The consultation is for England, Scotland and Wales. It does not include Northern Ireland.

## How to respond

We encourage respondents to make use of the online e-Consultation platform, Citizen Space, to respond to this consultation wherever possible. This is the department's preferred method of receiving responses. However, responses submitted by email will be accepted. If responding by email, please use the template found on the GOV.UK consultation page.

**Respond online at:** <https://beisgovuk.citizenspace.com/clean-growth/green-gas-support-scheme-mid-scheme-review>

or

**Email to:** [greengassupport@beis.gov.uk](mailto:greengassupport@beis.gov.uk)

When responding, please state whether you are responding as an individual or representing the views of an organisation.

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

## Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our [privacy policy](#).

We will summarise all responses and publish this summary on [GOV.UK](#). The summary will include a list of names or organisations that responded, but not people's personal names, addresses or other contact details.

## Quality assurance

This consultation has been carried out in accordance with the government's [consultation principles](#).

If you have any complaints about the way this consultation has been conducted, please email: [beis.bru@beis.gov.uk](mailto:beis.bru@beis.gov.uk).

## Executive Summary

In this consultation, we set out proposals for policy amendments to the Green Gas Support Scheme as part of the mid-scheme review that we committed to in our [Future Support for Low Carbon Heat & The Green Gas Levy government response](#). The scheme launched in November 2021 to support increased production of biomethane, with producers receiving tariff support for biomethane that is produced from anaerobic digestion (AD) and injected into the gas grid. With the scheme now in operation, we are reviewing a number of key areas and inviting views from stakeholders on potential changes to regulations. Areas under review include issues we previously committed to reviewing in the government response as well as aspects of the scheme we are aware may need revisiting. Our proposals for the Green Gas Support Scheme continue to be focussed on providing support for biomethane injection, as per the original intent of the scheme. We would like to invite views on the following recommendations:

- Extending the GGSS closure date to 31 March 2026, to help address delays resulting from challenges securing waste feedstocks.
- Maintaining current tariff guarantee deadlines, whilst continuing to closely monitor the impact of supply chain disruptions.
- Maintaining current commissioning deadlines, whilst continuing to engage with potential applicants to monitor the impact of supply chain disruption on investment decisions.
- Maintaining the current waste feedstock threshold, as there is less waste feedstock available at the point of this mid-scheme review than anticipated.
- Maintaining GGSS regulations around digestate mitigation requirements, following the outcome of our techno-economic study into ammonia reduction technologies, which support current requirements.
- Maintaining the eligibility criteria of the GGSS to exclude CHP plant conversions to biomethane injection, due to value for money and operational considerations.
- Amending regulations related to heat deductions to eligible biomethane, to exempt heat produced from heat pumps.
- Collecting further evidence on methane leakage monitoring and mitigation practices, to further our understanding of greenhouse gas emission savings associated with AD and biomethane and incentivise sustainable production practices.

Additionally, we are gathering initial views on a future biomethane policy framework which would follow the GGSS.

In addition to this mid-scheme review, the Department for Energy Security and Net Zero (DESNZ) and Ofgem will continue to review the operational workings of the GGSS and consider whether any further legislative amendments are required. Operational changes are considered to include aspects relating to administration and delivery of the GGSS, which could include streamlining processes for applicants and/or Ofgem, tightening or closing loopholes, or



correcting errors or inconsistencies. Depending on their scope, these amendments will not necessarily be the subject of further consultation.

The Green Gas Levy, which funds the GGSS, is not in scope of the mid-scheme review. The annual levy rate and scheme expenditure are reviewed each financial year through the annual tariff review and budget cap processes. We will continue to monitor levy operations and any amendments will be subject to further consultation.

# The proposals

## Green Gas Support Scheme

### GGSS deadline extension

In our [Final Stage Impact Assessment for the Green Gas Support Scheme](#), published in September 2021, we estimated that the scheme could deliver an annual generation of 2.8TWh of renewable heat. These forecasts were based on the expectation of increased food waste availability during the application period of the scheme to 30 November 2025 resulting from the requirement introduced under the Environment Act 2021 for all businesses and households in England to have a separate food waste collection. Defra's [Consultation on Consistency in Household and Business Recycling in England](#) proposed that Local Authorities should implement separated food waste collections from households and businesses from 2023/24.

Market disruption following the coronavirus (COVID-19) pandemic and Russia's invasion of Ukraine have led to exceptional supply chain challenges for local authorities in procuring food waste collection infrastructure. This has led to the unavoidable delays for local authorities setting up or expanding food waste collection services, reducing feedstock availability for AD plants. It is expected that Defra will set out further details on their plans for food waste collections in their forthcoming Recycling Consistency Government Response.

In our [Future Support for Low Carbon Heat & The Green Gas Levy government response](#), it was noted that a commonly cited barrier to AD deployment was the availability of quality waste feedstocks at an affordable gate fee, with some AD plants currently having to transport feedstock from other locations, which is environmentally and financially costly. It was felt that the only way to address this was through the expectation of increased food waste availability from Defra's Recycling Consistency Policy coming into effect.

As a result of the challenges to securing waste feedstocks, and with the GGSS due to close to new applications on 30 November 2025, there is now a risk that GGSS deployment targets will not be met. There is also a concern that prospective AD plants might struggle to meet the required 50% waste threshold due to lack of food waste supply and may therefore decide not to apply for the GGSS. This would have a significant impact on AD deployment and the GGSS and could lead to renewable investment being diverted elsewhere, as well as a reduction in carbon savings in the waste sector.

As signposted in a [bulletin](#) on 16 December 2022, we are proposing an extension to the GGSS closure date to address the potential impacts on GGSS deployment resulting from the delays in food waste collections, pushing that date back from 30 November 2025 to 31 March 2026. We welcome views on a four-month extension.

This extension should provide more time for food waste focused AD plants to secure feedstocks. This aims to ensure that the original deployment estimates of the GGSS are met, maximising the benefits of the scheme. We therefore do not expect that this will lead to

significant increases to overall GGSS expenditure, beyond the amount associated with our original deployment estimates, as set out in our GGSS Final Stage Impact Assessment.

In practice, the proposed extension could lead to a moderate increase in the operational activity of the GGSS and GGL. An extra four months of resourcing and administration will be required, both at the end of the 2025/26 scheme year, and the 2040/41 scheme year for final periodic support payments. It is expected that the additional administrative costs associated with the extension will be recovered through the GGL, as set out in the regulations. The estimated additional administrative costs would have a minimal impact on the levy rate.

- 1. Do you agree that extending the GGSS closure date would be beneficial? Yes/No. We would welcome views on a four-month extension (to 31 March 2026). Please provide evidence to support your response.**

## Supply chain issues and tariff guarantee extensions

Tariff guarantees are a compulsory stage of the application process for the GGSS and are designed to provide increased certainty to investors. They allow prospective participants to secure a tariff rate before their installation is commissioned and fully registered onto the scheme. Tariff guarantees also operate as a budget management mechanism.

At present on the GGSS, if a tariff guarantee is issued, the applicant will have a limited period in which to fully commission their installation and register on the scheme. The tariff guarantee will only be valid until the date on which the applicant stated they expect the injection of biomethane to commence in their Stage 1 application, plus a 182-day grace period. After this grace period has expired, the tariff guarantee will be revoked, and the participant would need to reapply to the scheme.

Some applicants who have secured tariff guarantees under the GGSS have raised concerns that they may struggle to meet the current commissioning deadline due to supply chain issues and delays. To address the potential impacts of these delays on deployment, we have heard suggestions that an extension to the tariff guarantee commissioning window/Stage 3 submission deadline would be advantageous, as it would give sufficient time for projects experiencing disruption to be able to successfully commission.

We recognise the difficulties industry face with supply chain issues and delays. We believe that current scheme design, including the existing commissioning deadline having a 182-day grace period, already addresses the need to mitigate against unforeseen circumstances. Due to various factors which could contribute to delays, it would be difficult to determine exactly how long would be feasible in terms of an extension. Too short an extension would not be helpful to applicants, and too long an extension could make the commissioning date less meaningful as a budget control mechanism. Furthermore, any tariff guarantee extension would apply to all applicants (a “flat extension”), which could have an impact on scheme budgeting. These unpredictable factors mean that extending the tariff guarantee deadline may not actually solve the problem, given that supply chain issues are not directly within the applicants’ control, and

are caused by international events that do not have a clear end-date. We want to ensure the GGSS continues to deliver value for money. Therefore, we do not propose granting an extension at this stage, as there is insufficient evidence to inform a robust policy decision on extending the six-month tariff guarantee deadline.

We propose that developers continue to monitor possible supply chains issues, taking all viable steps to mitigate impacts of potential delays and that applicants should seek to manage the supply chain issues within the timelines set in the current regulations. We would expect applicants to be realistic and timely in their nominated date as they will not be eligible for payment until they have commissioned. We will continue to work with industry to monitor supply chain issues closely to support developers and continued deployment on the scheme.

Although our proposal is not to grant a flat extension at this stage, we want to ensure projects that would have been able to commission, were it not for the supply chain delays, are not prevented from doing so. We therefore remain open to considering a flat extension as part of the mid-scheme review if robust evidence is collected as part of this consultation process that addresses the issues outlined above.

**2. Do you agree with the recommendation to maintain the current tariff guarantee deadline? Yes/No. Please explain your reasoning and include any evidence you think is relevant.**

### Supply chain issues and commissioning deadline extension

Separately, but based on the supply chain issues outlined in the previous section, we recognise the impact these disruptions have on timelines for developing new biomethane plants. This might affect potential applicants that are seeking or would have sought to lodge an application during the later stages of the GGSS application window. This could lead to a loss of expected deployment under the scheme.

Engagement with industry has shown that investors are concerned that they only have a few more months to prepare applications for the scheme so that their AD plants can commission before the scheme closes in November 2025, as the process of planning, permitting, building, and commissioning can take in excess of 24 months.

Some stakeholders have raised the possibility of repeating the flexibility seen at the end of the Non-Domestic Renewable Heat Incentive (NDRHI), to allow plants to commission after the GGSS closes if they have secured a tariff guarantee. For the NDRHI, a third allocation of flexible tariff guarantees was introduced in 2020 which required plants to have submitted Stage 2 information evidencing financial close prior to the closure of the NDRHI on 31 March 2021. As with the GGSS, NDRHI tariff guarantees included a deadline, by which point a plant must have commissioned to receive the secured tariff. Under the new allocation, plants were required to submit Stage 2 information prior to scheme close on 31 March 2021 but were able to set a date for submission of Stage 3 commissioning evidence up to 31 March 2022. NDRHI

payments then began from the point of commission, with an end-date 20 years after the properly made submission of the plant's Stage 2 information.

Whilst this is similar to the tariff guarantee extension proposal above, as both matters concern supply chain issues, they are being considered separately here as the purpose of the two proposals are different. While a tariff guarantee extension would apply to existing applicants, a commissioning deadline extension would instead apply to prospective applicants.

We recognise the difficulties in long-term planning faced by potential GGSS applicants. At this stage, however, we do not have sufficient evidence to support an extension to commissioning deadlines. We intend to continue engaging with potential applicants to monitor supply chain issues and gauge the usefulness of an extension. The extension to the NDRHI commissioning deadlines was granted due to exceptional circumstances related to the COVID-19 pandemic and demonstration of significant disruptions would be necessary to justify a comparable mechanism under the GGSS. Furthermore, as we are proposing to extend the GGSS closure date (and therefore the final date for commissioning) to 31 March 2026, prospective applicants will have additional time to commission before the scheme closes.

**3. Can supply chain issues be adequately managed within the current commissioning window? Yes/No. Please provide evidence on the impact of supply chain delays on AD plant development and how they can be addressed.**

### Waste feedstock threshold

Waste and residue feedstocks can offer significant carbon savings when compared with other feedstocks, such as energy crops. This is largely due to upstream savings, i.e. avoided emissions that would have occurred if the feedstock had been put to a different use. For example, sending food waste to AD rather than landfill avoids the associated release of methane from landfill. This is also due to the circular economy benefits of recycling food waste using AD, as this produces digestate (a bio-fertiliser), unlike when it is incinerated or sent to landfill.

As part of the GGSS' sustainability requirement, at least 50% of all biomethane (by energy content) must be produced using waste or residue feedstocks. This is in line with Non-Domestic Renewable Heat Incentive rules known as feedstock restrictions, introduced in 2018 to maximise the carbon cost effectiveness of the scheme.

In the Future Support for Low Carbon Heat consultation, we asked respondents for their views on increasing the minimum percentage of waste and residue feedstocks above 50%. We were particularly interested in whether the biomethane industry would be able to meet a higher threshold, given wider government policies coming into effect. This question received 73 responses, with no clear consensus. In our [Future Support for Low Carbon Heat & The Green Gas Levy government response](#), we announced that the minimum waste and residue threshold would remain at 50% of all biomethane produced (by energy content). We recognised the greater environmental benefits from using wastes rather than energy crops in AD but noted the

potential negative impacts that a higher threshold could have on biomethane plant deployment. Given uncertainty around the volumes of food waste available for AD at the start of the GGSS, it was felt that raising the threshold could intensify competition within the AD industry to access a fixed volume of waste feedstocks, creating potential distortions and deterring investment. We committed to review the waste feedstock threshold as part of the mid-scheme review, considering the wider food waste environment and AD industry.

An important development in the food waste environment is the requirement under the Environment Act 2021, that local authorities and businesses in England must arrange for the separate collection of food waste. Originally, Defra's public [consultation](#), published in February 2019, on recycling consistency reforms proposed that mandatory food waste collections would have to be in place to meet the requirements from 2023/24. This would be within the application period of the GGSS. However, delays in publishing the government response to Defra's [second consultation](#) on Recycling Consistency (conducted in 2021) have in turn delayed the announcement of the final food waste collection dates for England. This means that the availability of waste feedstock will be impacted during the existing GGSS application window. Given this, increasing the threshold is not viable as this could impact the ability of the scheme to achieve its objectives and may encourage unwanted competition for waste feedstocks. It may also result in undesirable business practices such as transporting feedstocks over long distances. We will continue to monitor waste feedstock availability.

In a later section of this consultation (see 'Future policy framework for biomethane production'), we have asked for views on long-term challenges affecting the availability and use of feedstocks, and how future policy could mitigate these. Waste feedstock availability is expected to increase once Defra's food waste collection policies have been fully implemented. It may be appropriate in the future to consider further feedstock regulations aimed at incentivising waste feedstock uptake in AD.

- 4. Do you agree that the minimum waste threshold should be maintained at 50% of all biomethane (by energy content)? Yes/No. Please provide evidence to support your response.**

## Digestate mitigation technologies

It is important that the negative environmental impacts of AD deployment are mitigated, including those arising from digestate use, particularly ammonia emissions.

Digestate is a by-product of AD that can be used as a fertiliser due to its nutrient rich content. However, it releases ammonia when it is stored or spread on agricultural land, or when digestate nutrients are not fully recovered, which can also result in methane loss in storage. Emissions of ammonia react to form particulate matter, which is harmful to human health. Ammonia emissions also cause direct ecosystem impacts, particularly to vegetation. If not managed correctly, digestate can also cause pollution to water courses, through run-off and leaching of nutrients in the digestate. This has the potential to damage local ecosystems and habitats. However, industry standards such as the Environment Agency's (EA) [Quality](#)

[Protocols](#) and the [British Standard Institution's Publicly Available Specification \(BSI PAS 110\)](#) ensure that digestate is managed and used appropriately to mitigate these environmental impacts.

To further ensure digestate is managed appropriately, in the [Green Gas Support Scheme: Digestate Management consultation](#) published in December 2020, we consulted on how ammonia emissions could be mitigated by scheme participants. Three main methods that could help reduce ammonia emissions were identified, including storage and covers, low emission spreading equipment, and techniques for stabilising or reducing nitrogen in the digestate. For plants operating under the GGSS, there are two key requirements to mitigate emissions from digestate. First, in line with The Environmental Permitting (England and Wales) Regulations 2016, participants must cover stores of digestate derived from waste feedstocks by 2025 to reduce ammonia emissions. Given this, GGSS plants operating in line with the waste feedstock threshold are required to cover the resulting digestate. Second, participants must comply with the Code of Good Agricultural Practice when carrying out low emission spreading techniques. When contracting others to spread the digestate, these groups must comply with the National Association of Agricultural Contractors standards or equivalent. The Scottish Environmental Protection Agency has produced [further guidance documents](#) for the prevention of environmental pollution from agricultural activity (PEPFAA Code) which indicates best practice guidance for farmers on the storage, handling, and application of organic fertilisers.

During the development stages of the GGSS, limited information was available on further technologies to mitigate ammonia emissions and reduce nitrogen in the digestate. The lack of information meant that additional requirements regarding such technologies could not be introduced under the GGSS. In the government response to the GGSS consultation, we committed to funding a technoeconomic study into ammonia reduction technologies to understand their commercial availability and feasibility of implementation. This information would be used to understand the impact that additional requirements would have on industry and inform new requirements surrounding digestate under the GGSS.

The study, [Identifying Impacts from Food and Farm Digestates](#), undertaken by the Waste Resources and Action Programme (WRAP), has identified a range of technologies in development to reduce ammonia emissions and capture residual emissions, and concludes that gas-tight covers are one of the cheapest and most cost-effective ways of mitigating ammonia emissions. As gas storage covers are a commercially available technology, they appear to be the best available option for installation at new plants to mitigate ammonia losses. While other technologies are shown to have advantages, the detailed costs and benefits of these cannot be measured with any certainty.

Additionally, the different requirements in Scotland for digestate – particularly relating to plastic contamination levels since 2019 – have required AD operators to invest significantly in this area, meaning that imposing further requirements could disproportionately affect AD plants in Scotland. The Environment Agency will look to introduce tighter controls on plastic contamination of digestate used on agricultural land in the near future in England and Wales.

We do not, at this stage, recommend that any additional technologies should be required under the GGSS, beyond gas-tight covers and low emissions spreading techniques, both of which are already required. We will continue to monitor the development of these ammonia reduction technologies with a view to consider their role in future policy decisions.

We will maintain the current GGSS regulations on mitigating ammonia emissions from digestate, including the digestate spreading requirements, and applicants should also continue to operate in line with all Environmental Permitting requirements including the appropriate storage and covers of the digestate. While further ammonia reduction technologies are not yet widely in use, we would encourage all AD operators to continue to maintain the highest standards possible in mitigating environmental impacts in line with regulations and utilising other technologies, where possible.

The EA has published the [‘Appropriate measures for the biological treatment of waste’](#) guidance document to support necessary practices in mitigating the environmental impacts of digestate which includes details on the requirements to provide covering for digestate. Plants in Scotland should also continue to utilise the guidance as produced by the Scottish Environmental Protection Agency to adhere to best practice under the PEPFAA code in addition to the GGSS standard requirements.

We anticipate that environmental rules around ammonia emissions will tighten over time, and the AD industry will be required to comply with these. For example, Defra’s recently published [Environmental Improvement Plan](#) sets out their intentions to consult on measures to reduce ammonia from the storage and spreading of organic manures, including digestate, as well as considering how to best reduce ammonia by processing digestate.

The WRAP study also recommended further engagement with regulators and operators to develop end of waste positions for specific digestate-derived materials, particularly for farm digestates. While this is not being specifically considered within the scope of the mid-scheme review, the Environment Agency are currently revising the [Quality Protocol for Anaerobic Digestate](#) as part of a [wider review](#) of their waste quality protocols. We will work closely with the EA on this issue and encourage interested parties to engage with the EA.

Additionally, Defra intends to reform fertilisers regulations and put in place a conformity assessment framework for fertilisers. The framework will smooth the route to market for new and innovative products. This will provide farmers with a wider choice of more sustainable fertilisers. It will valorise fertilisers made from organic materials, opening the market to products that re-use nutrients. Consultation on the new framework is planned for 2023.

**5. Do you agree with the proposal to maintain digestate mitigation regulations under the GGSS? Yes/No. Please provide evidence to support your response.**



## CHP conversions

Only new AD plants producing biomethane for injection into the gas grid are eligible for the GGSS. AD Combined Heat and Power (CHP) plants seeking to convert to biomethane-to-grid plants are currently ineligible, as the regulations state that all equipment used to produce biomethane must not previously have been used to produce biogas or biomethane. This is because tariffs available for the GGSS are calculated to compensate the cost of new AD plants and associated equipment and infrastructure.

Stakeholders have directly engaged with the Department for Energy Security and Net Zero on the need to support CHP conversions to biomethane injection. They have cited greater carbon savings from biomethane, compared to CHP, and the need for policy certainty in advance of their current renewable electricity and heat subsidies ending (from 2027 onwards). Following this engagement, the Department committed to reviewing the costs and benefits associated with CHP conversions as part of the GGSS mid-scheme review, with a view to deciding whether to incentivise CHP conversions with a tariff under the GGSS.

The Department has undertaken analysis of the costs and benefits associated with CHP conversions across two scenarios, alongside counterfactuals. The cost-benefit analysis considered the environmental costs and benefits of conversions (e.g. carbon savings, fertiliser savings, air quality costs) and the capital and operational costs associated with plant conversion and biomethane production. The first scenario relates to supporting 'early conversions', where plants would convert before the GGSS closure date and hence before the end of their existing subsidies. The second scenario relates to supporting 'end of subsidy conversions', where plants would convert once their renewable electricity subsidies ended.

The analysis suggests that 'early' CHP conversions to biomethane before the GGSS closure date would not represent value for money. Tentatively, under central assumptions, supporting 'end of subsidy conversions' could deliver greater value for money than supporting 'early conversions'. This is primarily due to the greater value placed on later carbon savings, as we approach the target of net zero emissions in 2050. However, there is significant uncertainty over whether CHP plants would continue operating without renewable electricity subsidies, which the value for money analysis is very sensitive to. More detail on our value for money assessment can be found in Annex 1. We will continue to review evidence of the value for money associated with CHP conversions to biomethane injection once their renewable electricity subsidies end.

A major consideration associated with the 'end of subsidy conversions' scenario is the mismatch in timings between the end of the renewable electricity subsidies and the GGSS scheme closure. As existing subsidies are due to end between 2027 and 2038, supporting CHP conversions under this scenario would require a long-term extension to the GGSS application and/or commissioning deadlines, which is not deemed feasible. The alternative option of allowing 'early conversions' of CHP plants within current GGSS timelines, as well as not representing value for money, is associated with increased operational risk. This includes the increased complexity and risk of setting tariff rates for different conversion scenarios, and corresponding increased complexity of setting and monitoring budget spend and Green Gas

Levy rates. It also increases the risk of plants receiving double subsidies (from schemes such as the Renewables Obligations, the Feed-in Tariffs, and/or the NDRHI). Consequently, we are proposing not to expand the GGSS eligibility criteria to allow CHP conversions to biomethane injection under the scheme.

The rationale for supporting CHP conversions through a post-GGSS policy may be stronger due to more appropriate timings, as existing renewable electricity subsidies will end between 2027 and 2038. Additionally, our initial analysis has indicated that incentivising plant conversions at the end of their subsidy could potentially deliver greater value for money. Hence, we are proposing to consider CHP conversions to biomethane within the development of a post-GGSS future biomethane policy framework. As part of this we expect to work closely with Defra to consider options to safeguard existing AD capacity to treat increasing levels of food waste.

- 6. Do you agree with the recommendation not to expand the GGSS eligibility criteria to allow CHP conversions to biomethane injection under the scheme? Yes/No. If not, please provide evidence on capital costs, operating costs, and post-tax nominal rates of return of CHP plants, biomethane plants, and conversions.**
- 7. How could post-GGSS biomethane policy best support CHP conversions to biomethane?**

## Heat pump exemptions for heat deduction calculations

The GGSS regulations currently state that heat supplied to produce biogas and biomethane must be deducted from the total amount of biomethane eligible to receive tariff payments. This means that the proportion of biomethane in receipt of payment is smaller than the total amount injected into the grid. The only exceptions to this are for the use of heat contained in feedstock to produce biogas or heat derived from the biogas' combustion. Through this, the scheme aimed to incentivise efficient use of heat across the lifecycle of the production of biogas and biomethane and discourage the use of fossil fuel derived heat.

Since scheme launch, stakeholders have informed us that they are considering the use of renewable heat technologies, such as heat pumps, to supply heat for biomethane production. They have asked that government considers removing the requirement to deduct heat supplied through heat pumps from total eligible biomethane. Therefore, to recognise the carbon savings and other additional benefits, we are proposing that heat supplied by heat pumps, to produce biogas and biomethane will not be deducted from the total amount of eligible biomethane to receive payments, except in the case of Non-Domestic Renewable Heat Incentive (NDRHI) heat pumps.

The focus on heat pumps stems from engagement with industry, which has highlighted that they are likely to be the main renewable technology used to supply heat to an AD plant. There may be interest from industry in using other low carbon or renewable technologies or heat sources, however, we do not currently have robust evidence of the practices associated with

these, costing information, or evidence of their environmental impacts to inform a policy position at this point. In response to question 9 in this consultation, we would welcome further evidence from stakeholders on other technologies or approaches they believe should also be eligible as part of this proposed amendment.

Heat pumps are an efficient method of producing heat and using one to supply heat to produce biogas and biomethane may represent an innovative way to increase lifecycle carbon savings. This means that were amended regulations to come into force, heat to produce biomethane from heat pumps would be exempt from the deductions towards 'eligible biomethane'. In practice, an additional level of administration will be required from participants to provide data showing the energy input to the heat pump so that it can be deducted from eligible biomethane, rather than the heat produced being deducted. This means that efficient heat pumps using less energy would result in a larger proportion of eligible biomethane receiving payments.

With the scheme aiming to incentivise efficient use of renewable heat across the production of biomethane, we would also require a minimum level of efficiency from the heat pump design to be eligible. Evidence of this would be required during eligibility checks for the heat pumps, possibly using methods such as a minimum seasonal co-efficient of performance (SCOP) rating during the initial application or following application stages, continued electrical metering. We will work with stakeholders to ensure these eligibility requirements reflect the appropriate standards and efficiency of heat pumps in the production of biomethane. We would welcome evidence in response to question 10 on efficient heat pump designs used in the production of biomethane and the administration required as part of this exemption.

We anticipate that the impact on scheme expenditure and budget will be minimal. We are aware that some heat pumps may be in receipt of Non-Domestic Renewable Heat Incentive tariffs, and to ensure both the NDRHI and GGSS schemes continue to deliver value for money, we are proposing that these heat pumps will not be eligible for the renewable heat exemption. If producers use NDRHI heat pumps in the production of biomethane that receives payments under the GGSS, we are proposing that the heat will continue to be deducted from eligible biomethane. GGSS plants already registered and using a heat pump on site would also be eligible to apply for this exemption provided their heat pump meets the required efficiency standards.

We believe that this approach aligns with the scheme aims of providing value for money and contributing to carbon savings. We will keep this under review to ensure the focus of the scheme budget remains on incentivising AD deployment.

- 8. Do you agree that heat from heat pumps should be exempt from heat deductions for eligible biomethane? Yes/No.**
- 9. Are there additional non fossil fuel technologies or approaches that warrant consideration? Yes/No. Please provide evidence to support your response with particular attention to costing information and environmental impacts.**

**10. Do you agree with the approach of using energy input to calculate the deduction? Yes/No. We would welcome comments on the administration required. Please provide evidence to support your response.**

## Sustainability Practices

The UK government is committed to promoting the sustainable production of biomethane to contribute towards decarbonising energy and processing waste in a carbon efficient manner. The Department for Energy Security and Net Zero is undertaking studies into the greenhouse gas emission savings of AD and biomethane to further our understanding of the environmental impact of the sector and maximise its benefits.

In 2016, the Department commissioned a methodology for monitoring fugitive methane emissions from AD production processes, which resulted in the publication of a [report](#) by Ricardo Energy & Environment. This project developed and tested a method to assess the leakage of methane from AD biomethane plants. This is important because, if biogas production and biomethane injection is to fulfil its potential, we need to understand the levels of methane leakage from these systems with greater certainty.

The Department commissioned a further study on methane leakage, which is being carried out by the National Physical Laboratory (NPL). This project is focused on field testing by employing measurements in real production environments at different AD sites, which is the most reliable approach to validate fugitive methane emission levels. The methodology used for measurements was developed by NPL, building on evidence from several sources on best available technologies, including the 2016 Ricardo Energy & Environment report. The measurement campaign includes both a short-term and long-term monitoring phase. The results of the first phase (short-term monitoring) will be published in due course. The overall aim of the project is to determine the extent of methane emissions from the sector to inform the Environment Agency's measurements and its associated reporting guidance and regulation.

In parallel to these studies, we are keen to gather evidence from industry on current and potential methane leakage prevention, monitoring and mitigation practices. This will inform cross-departmental work, including with Defra, DfT, and the Environment Agency, to incentivise sustainable practices to maximise the environmental benefits of AD and biomethane, while ensuring that any unintended consequences are mitigated.

**11. How effective are current methane leakage prevention, monitoring and mitigation practices? Please provide evidence to support your response, including examples of good practice.**

## Future policy framework for biomethane production

As referenced in Chris Skidmore MP's recently published [Independent Review of Net Zero](#), biomethane will continue to play an important role in achieving the government's Net Zero

ambitions. As such, we are working to develop a future policy framework to follow the GGSS. To inform this, we are taking a holistic approach to identify the barriers to the growth of the biomethane market and understand how best to address these. As part of this work, we are considering - among others - these key areas:

- How best to support the growth of the biomethane market. A range of soft levers and regulations will be considered to achieve this, including assessing whether a market-based mechanism is required and what form this could take.
- The technical potential for biomethane and its end uses to ensure that it is best utilised across the economy.
- Long-term challenges affecting the availability and use of waste and non-waste feedstocks for AD, and how future policy could mitigate these.
- Commercial viability of biomethane production, and the potential for plants to generate additional revenue, including from CO<sub>2</sub> capture and digestate valorisation. We will identify the barriers to maximising the value from these revenue streams, and how future policy could address these.

We intend to set out more detail on our thinking in these areas in due course.

**12. What are your views on how we can best address the areas listed above as part of our future policy design?**

## Next steps

This consultation will close on 18 May 2023, after which responses will be analysed. It is expected that the government response will be published later this year.

Following the government response, the introduction of regulations to deliver these policy proposals will be subject to a negative statutory instrument and are expected to come into force during the 2023/2024 financial year.

The government is currently considering options for a post-GGSS policy framework for biomethane and intends to follow this consultation with further engagement in this area.

# Annex 1 - Initial value for money assessment of supporting CHP conversions

## Analytical approach:

Our initial analysis features two modelled 'central' scenarios for the timing of conversion from combined heat and power (CHP) biogas plants to biomethane-to-grid (BtG) plants:

- Conversion on to GGSS: CHP plants convert in 2023-2025, irrespective of electricity subsidy end dates.
- Conversion at end of electricity subsidies: CHP plants convert as RO/FITS support ends in the period 2027-2038 (referred to as 'end-of-subsidy' conversions).

We have also modelled two counterfactuals. The counterfactual is an alternative that could occur if CHP conversions are not supported. The costs and benefits of supporting CHP conversions are measured against the costs and benefits of the counterfactual:

- Counterfactual 1: CHP plants shutdown.
- Counterfactual 2: CHP plants invest in a new engine and continue operating.

Under counterfactual 1, we have modelled both CHP plants shutting down at the point they decide whether to convert and shutting down at the end of their electricity subsidies. Indicative results do not materially differ between either modelling approach.

The costs and benefits of CHP plants converting to biomethane-to-grid (BtG) considered are:

- **Carbon savings:** the net benefit of the carbon emissions created and avoided through plants converting to BtG compared with the baseline counterfactuals.
- **Capital expenditure (capex):** the cost of capital equipment required for conversion to BtG compared with the baseline counterfactuals.
- **Operating expenditure (opex):** the annual operating and feedstock costs for converted BtG plants compared to the baseline counterfactuals.
- **Other impacts:**
  - Air quality cost - the ammonia emissions from digestate (a by-product from AD) use compared with synthetic fertiliser.
  - Fertiliser savings - the resource benefit from digestate replacing synthetic fertiliser.

## Indicative results:

There remain significant uncertainties in modelling assumptions, resulting in large margins of confidence around social net present value (SNPV) estimates. As such, we are only able to provide indicative SNPV RAG ratings at this stage. These are provided in Table 1 and reflect the potential order-of-magnitude of the SNPV of supporting CHP conversions, across a range of possible scenarios.

To be considered a value for money intervention, we would expect a positive SNPV under 'central' assumptions. Sensitivity analysis is undertaken, where underlying assumptions are

changed to credible alternatives. Given the significant uncertainty in central assumptions, we would expect the SNPV to remain mostly positive across these alternative scenarios if CHP conversions represent a strong value for money intervention.

**Table 1: Indicative SNPV estimates**

	Timing of conversion	Conversion on to the GGSS		Conversion at the end of electricity subsidies	
		Counterfactual	CHPs continue running	CHPs shutdown	CHPs continue running
Scenario	Low deployment	*	*		
	Medium deployment			*	*
	High deployment				
	High carbon values				
	Low carbon values				
	Low capex for conversion				
	High methane slip				

SNPVs are estimated in 2022 prices, 2023 present value. \* denotes central assumptions.

**Table 2: RAG indicator key**

Colour	Order of magnitude for indicative SNPV
	Strongly negative
	Marginally negative
	Marginally positive
	Strongly positive

Our initial analysis suggests that supporting CHP conversions on to the GGSS does not clearly deliver value for money. Although there are strongly positive SNPVs under a counterfactual where CHPs shutdown, there are strongly negative SNPVs under a counterfactual where CHPs continue operating. The most likely counterfactual is highly uncertain. As such, we do not believe there is sufficient evidence that supporting CHP conversions on to the GGSS would deliver value for money.

However, supporting end-of-subsidy CHP conversions is much less likely to result in a strongly negative SNPV under a counterfactual where CHPs continue operating. It is also more likely to deliver a strongly positive SNPV under a counterfactual where CHPs shutdown. This is linked to the carbon intensity of the electricity grid and monetary carbon values:



- In future years the electricity grid is increasingly decarbonised. Therefore the decarbonisation benefits of CHPs continuing to use biogas to produce electricity for export to the grid are lower.
- Further, in future years, higher monetary values are placed on carbon savings as we approach Net Zero.
- This in turn means that the carbon savings and monetised value of using biogas to produce biomethane, rather than electricity, grow over time.
- The results are higher monetised benefits and higher indicative SNPVs where conversions occur further into the future, such as at the end of electricity subsidies.

The indicative SNPV of end-of-subsidy conversions strongly depends on the chosen counterfactual. There remains significant uncertainty around the appropriate counterfactual, preventing a clear recommendation at this stage on the value for money of supporting these conversions, through a post-GGSS policy. We are continuing to build evidence on the likelihood of different counterfactuals, and other underlying assumptions, to refine this value for money analysis. To support us with this work, we would welcome evidence on the following areas:

- Capex and opex of:
  - Continuing to operate existing CHP plants
  - Decommissioning CHP plants
  - Converting CHP plants to BtG and the ongoing operations of the converted plant
- Post-tax nominal rates of return on investing in:
  - A new CHP engine for a CHP plant with and without electricity subsidies
  - A conversion of CHP plant to a BtG plant

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This consultation is available from: [www.gov.uk/government/consultations/green-gas-support-scheme-mid-scheme-review](https://www.gov.uk/government/consultations/green-gas-support-scheme-mid-scheme-review)

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