Department for Energy Security & Net Zero

Green Gas Support Scheme and Green Gas Levy Evaluation

Second Annual Interim Report

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Acknowledgements

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Contents

Glossary

Anaerobic Digestion (AD) – AD is the process by which organic matter is decomposed to generate biogas.

Annual Tariff Review (ATR) – The Green Gas Support Scheme Regulations 2021 permit the Secretary of State to review and adjust GGSS tariffs and degression thresholds annually, with changes announced by 1 September and effective from 1 October. The ATR outlines these decisions.[1]

Application Budget (AB) – The AB cap is designed to provide a cap against which applications to the scheme will be checked to ensure that there is available budget for them to register and receive payments under the Green Gas Support Scheme based on their estimated production.

Biogas – Biogas is produced from organic matter (including plant or animal waste) through AD.

Biomethane – Biomethane is a renewable gas produced most commonly via AD from upgrading biogas and can be injected into the gas grid to directly displace fossil methane.

Carbon Credits – A carbon credit represents the reduction, removal, or prevented release of greenhouse gases by natural or technological processes. Businesses and individuals can purchase credits on the voluntary carbon market and may use them to offset their own emissions.

Carbon Capture, Usage and Storage (CCUS) – CCUS is the process of capturing carbon dioxide for usage or permanent storage deep underground, where it cannot enter the atmosphere.[2].

Combined heat and power (CHP) – CHP is a highly efficient process that captures and utilises the heat that is a by-product of the electricity generation process. CHP conversions to biomethane injection is scientifically possible, but, following the Mid-Scheme Review, the Department decided to maintain the current eligibility criteria for the GGSS and not allow CHP conversions (the role of converting AD biogas CHP sites to AD biomethane injection plants, or expanding those plants with biomethane injection capacity, as part of a future biomethane policy framework is being actively considered).

Contribution Analysis – Contribution analysis is a theory-based evaluation method used to understand whether an intervention has contributed to an outcome observed or not. Contribution analysis develops hypotheses of how interventions are expected to lead to impact, providing a structured approach to gather evidence to test the plausibility of each hypothesis and weigh the relative contribution claim of the intervention compared to other explanatory factors.

[1] DESNZ (2024). Green Gas Support Scheme (GGSS): Annual Tariff Review 2023. Available at: https://www.gov.uk/government/publications/green-gas-support-scheme-ggss-annual-tariff-reviews-and-tariff-change-notices/green-gas-support-scheme-ggss-annual-tariff-review-2023

[2] DESNZ (2024). Carbon Capture, Usage and Storage: a vision to establish a competitive market. Available at: https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-a-vision-to-establish-a-competitive-market/carbon-capture-usage-and-storage-a-vision-to-establish-a-competitive-market

Contribution Claim – A contribution claim, or contribution story, is a credible causal claim about how, why, and under what conditions an intervention contributed to the outcome or impact of that intervention. It is a component of the contribution analysis framework, which encompasses the evidence that is expected to be observed for each claim to be true.

Defra Simpler Recycling Policy – Defra introduced Simpler Recycling to help people recycle the same materials, and no longer need to check what their council will accept for recycling.[3] It will enable consistent, more streamlined collections from all households, businesses and relevant non-domestic premises. The preference is for food waste to be collected for treatment by AD.

Digestate – Digestate is a by-product of the AD process that is typically spread on agricultural land as a bio-fertiliser but also contains nitrogen which can be lost to the atmosphere as ammonia.

Gate Fee – A gate fee is the charge levied by a waste processing facility for a given quantity of waste that is received at the facility. The fee can be charged per load, per tonne or per item depending on the source and type of waste.

Grams of Carbon Dioxide equivalent (gCO_2e) – gCO_2e is a measure of greenhouse gas, expressed in units of carbon dioxide equivalent per gram.

Green Gas Support Scheme (GGSS) – The GGSS provides tariff support for plants producing biomethane via anaerobic digestion which is injected into the gas grid.[4]

Green Gas Support Scheme Regulations 2021 – The Green Gas Support Scheme Regulations 2021 introduces the GGSS.

Green Gas Levy (GGL) – The GGL applies to all licensed fossil fuel gas suppliers in Great Britain from 30 November 2021. It funds the GGSS[5].

Greenhouse Gas (GHG) – GHGs are gases that trap heat in the atmosphere, contributing to global warming and climate change.

Grid Injection – Biomethane can be injected directly into the gas grid, substituting the need for the equivalent natural gas required by the grid to meet customer demand.

Kilowatt (kW) – A kW is measure of energy that denotes one thousand watts.

Metering Data Collection – A meter is a data collection method of energy.

Mid-Scheme Review – The Department's mid-scheme review of the GGSS that considers the effectiveness of the scheme and reviews several areas for potential amendments. The consultation and government response were completed in 2023. The necessary regulatory changes were introduced in 2024.

Megajoule (MJ) – A unit of energy that denotes one million joules.

Megawatt (MW) – A MW is measure of energy that denotes one million watts.

[3] Department for Environment and Rural Affairs. (2023). https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response
[4] UK Government. (2023). https://www.gov.uk/government/publications/green-gas-support-scheme-ggss
[5] Suppliers who supply 95% or more certified green gas within a scheme year may be exempt from the levy.

Megawatt-hour (MWh) – A MWh is measure of energy that denotes one million watts per hour.

Net Zero – Net Zero refers to achieving a balance between the amount of greenhouse gas emissions produced and the amount removed from the atmosphere.

Non-Domestic Renewable Heat Incentive (ND RHI) – The ND RHI was a scheme that was designed to increase uptake of a range of renewable heat technologies, including biomethane generation from AD plants. It was closed to new applications in March 2021.

Ofgem – Ofgem refers to the Office of Gas and Electricity Markets and is the Great Britain energy regulator. Ofgem administer the Green Gas Support Scheme (GGSS) and the Green Gas Levy.

Overall Scheme Expenditure Budget (OSEB) – OSEB is a budget that is used to set the GGL rate.

Process Tracing – Process tracing is a practical method for testing causal hypotheses in 'real world' situations. It can be used to test the contribution of an intervention to an impact.

Provisional Tariff Guarantee Notice – A provisional tariff guarantee notice is issued by Ofgem to confirm the tariff rate that will apply to the applicant if full registration and all the stages of the tariff guarantee process are completed successfully. This is issued in Stage 1 of the application process.

Renewable Energy Assurance Limited (REA) – REA has been working with a range of partners since 2010 to deliver certification schemes in the areas of biogas and bioenergy.[6]

Renewable Gas Guarantee of Origin (RGGO) – RGGOs are the name given to the certificates issued by the Green Gas Certificate Scheme, an industry-led voluntary scheme for biomethane producers. One RGGO is issued for each kilowatt per hour of green gas produced, and captures information about the environmental attributes of that gas. This allows that information and value to be passed along a chain of custody from a gas producer to a gas consumer.

Renewables Obligation (RO) – The RO scheme was designed to encourage generation of electricity from eligible renewable sources in the UK. It closed to all new generating capacity on 1 April 2017.

Renewable Transport Fuel Obligation (RTFO) – The Renewable Transport Fuel Obligation (RTFO) supports transport decarbonisation by encouraging the production and use of renewable fuels. Obligated suppliers can meet their obligation by either redeeming Renewable Transport Fuel Certificates (RTFC) or by paying a fixed sum for each unit of fuel they wish to 'buy-out' from their obligation. RTFCs are created and provided to participants who supply renewable fuels based on the quantity of biofuel they generate. The RTFO is administered by the Department for Transport.

[6] Renewable Energy Assurance Limited. (2024). https://www.realschemes.org.uk/

Smart Export Guarantee (SEG) – The SEG launched on 1 January 2020 and is a government-backed initiative. The SEG requires some electricity suppliers, known as SEG Licensees, to pay small-scale generators, known as SEG Generators, for low-carbon electricity which they export back to the National Grid, providing certain criteria are met.

The scheme covers anyone with an installation, including AD installations, located in Great Britain with up to a capacity of 5MW.

Sustainability Audit Reporting – A process that evaluates the performance of an organisation in relation to its sustainable development goals.

Tariff Guarantee Notice – A provisional tariff guarantee notice is issued by Ofgem when the Stage 1 application is approved. A tariff guarantee notice is issued when full registration is granted (Stage 3, after Stage 2 is approved).

Tariff Tier – Support payments for biomethane injection are based on an applicable tariff amount for the volume of eligible biomethane injected. The GGSS has a three-tier tariff structure such that as the volume of biomethane increases, tariffs decrease, to reflect potential economies of scale.

Theory of Change (ToC) – The ToC captures how an intervention is expected to achieve its intended outcomes. It involves considering the proposed inputs and activities, and the causal chain that leads from these inputs and activities to the intended outputs and outcomes of the intervention.

Terawatt-hour (TWh) – A TWh is a unit of energy that represent one trillion watts of power per hour.

UK Emissions Trading Scheme (UK ETS) – The UK ETS is a cap-and-trade scheme and a market-based pricing mechanism to incentivise and control the reduction of carbon emissions. It went live on 1 January 2021, replacing the UK's participation in the European Union ETS. The UK ETS currently applies to energy intensive industries, the power generation sector, and aviation, but does not recognise biomethane.

Waste feedstock – Waste streams and re-useable carbon sources, such as non-recyclable organic waste, plastics, industrial waste gases, and manure slurries. Certain types of waste are suitable feedstocks for anaerobic digestion.

Executive Summary

RSM UK, supported by Winning Moves and Ricardo Energy, have been appointed by the Department for Energy Security and Net Zero (the Department) to evaluate the Green Gas Support Scheme (GGSS) and Green Gas Levy (GGL) from November 2022 to May 2026. This report summarises findings from the second year of the evaluation of the GGSS and GGL.

The Green Gas Support Scheme and Green Gas Levy

The GGSS opened for applications in November 2021, following the application closure of the Non-Domestic Renewable Heat Incentive (ND RHI) scheme for new biomethane sites in March 2021. Biomethane, produced by the upgrading of biogas generated via anaerobic digestion (AD) of organic matter, is chemically similar to natural gas, and can therefore be injected into the gas grid. The GGSS aims to incentivise the deployment of new AD biomethane plants to produce and inject biomethane into the gas grid, thereby helping to decarbonise Great Britain's gas supplies by increasing the proportion of 'green' gas in the grid. Ofgem is the authority responsible for the administration of the GGSS. The GGSS incentivises new AD plant deployment by making quarterly payments to participating plants, for up to 15 years, based on the volume of biomethane that is injected into the grid by the participating plant.

The GGSS is funded by GGL. The GGL applies to licensed suppliers of fossil fuel gas. These suppliers are required to make quarterly levy payments, the amount of which is determined by the number of meters they serve. While it is anticipated that these costs may be transferred to consumers, suppliers are not legally obligated to do so. Gas suppliers who supply 95% or more green gas (certified biomethane generated through AD) during a scheme year are exempt from paying the levy.

Evaluation Purpose and Approach

The evaluation team are delivering process and impact evaluations over the lifetime of the evaluation. The evaluation takes a theory-based approach using contribution analysis[7] with process tracing, based on Theories of Change (ToCs) for the GGSS and GGL.

This annual interim report is the second published output of the evaluation of the GGSS and GGL, reflecting and synthesising the findings from the second-year evaluation of their activities and outputs. It examines the activities pertaining to the GGSS and GGL, and the pathways by which they were delivered.

In the first year, the evaluation team developed GGSS and GGL ToCs, eight GGSS and five GGL contribution claims, and a process map for the GGSS and GGL to provide a framework through which the scheme processes can be assessed. Process evaluations were performed for GGSS and GGL to understand what worked well and less well, and provide insight into the

[7] The evaluation uses a 'contribution analysis' methodology as a way to synthesis and weigh different strands of evidence to produce a narrative on how the programme, relative to other factors, led to observed impacts.

effectiveness, at different points of the process. The first year also entailed the first online pulse survey of GGSS applicants and AD plants that were funded on the ND RHI scheme, a review of literature on the UK biomethane market and its context, and analysis of scheme and levy application and monitoring data.

In the second year, the second GGSS process evaluation and interim contribution claims[8] workshop were undertaken to build the analytical foundation for the final phase of the evaluation. The process evaluation included applicant and non-applicant interviews and a contribution claims workshop. The contribution claims workshop reviewed the high-level contribution claims, including causal and alternative hypotheses, focusing on the adequacy of processes required to deliver the intended impacts. Following the workshop, the GGL contribution claims were reduced from five to three to streamline evidence requirements.

This second annual interim report is structured around three GGSS and two GGL evaluation questions for the process evaluation. It reflects the second round of GGSS process evaluation interviews, the refined contribution claims for GGSS and GGL, and updated analysis of scheme and levy application and monitoring data.

For the upcoming final synthesis report, due in June 2026, the GGSS and GGL impact evaluations, and the second online pulse survey of GGSS applicants and AD plants will be completed. These will be followed by the final contribution claims workshop, allowing for robust contribution analysis for GGSS and GGL.

GGSS Design and Implementation

This section outlines the respondents' thoughts about the design and implementation of the GGSS. The GGSS budget management framework aims to ensure financial stability and prevent overspending through mechanisms like the Annual Tariff Review (ATR), budget caps, and degression. The ATR adjusts tariffs to maintain viability and value for money, with the 2024 ATR increasing tariffs across all tiers, especially benefiting smaller plants. Budget caps control overall expenditure and the number of accepted projects, while degression adjusts tariffs based on expenditure thresholds. Despite these mechanisms, applicants face challenges with feedstock availability and investor willingness, which are primary barriers to investment decisions. The application process is generally well-received, though Stage 3 is seen as burdensome. A mid-scheme review in 2023 extended the GGSS application deadline to 2028, providing greater certainty for long-term planning. The GGSS interacts with other policies like the Defra's Simpler Recycling policy, influencing market development and investment, but respondents believed that challenges remain in policy coordination, sustainability standards, and feedstock shortages.

[8] A contribution claim is a component of a contribution analysis framework, encompassing a hypothesis of how expected impacts will occur as a result of the programme, an alternative explanation of how the impacts may be realised, and the evidence that is expected to be observed for each account if it is true. These 'claims' are tested as part of the evaluation research activity and accepted or rejected, then refined, based on evidence gathered.

Design of the GGSS

The GGSS budget management framework is designed to prevent overspending through key mechanisms such as the ATR, budget caps, and degression, supported by forecasting and payment estimation.

The ATR allows for tariff adjustments to maintain financial viability while ensuring value for money. The 2023 ATR primarily increased Tier 3 tariffs, but this had limited impact on applications. In contrast, the 2024 ATR increased tariffs in all tiers, and had a significant effect, leading to multiple resubmissions from applicants seeking to benefit from increased tariffs across all tiers. The increase in Tier 1 tariffs was particularly beneficial for smaller plants, improving the scheme's attractiveness. Applicants viewed ATRs as essential for long-term viability, helping projects balance costs and revenue. However, concerns remain regarding rising costs due to inflation and feedstock availability. In addition, smaller plants, especially those financed by debt, faced financial strain, prompting calls for greater flexibility in tariff structures and clearer payment schedules to help them manage their finances.

The GGSS budget is managed through two key budget caps: the Overall Scheme Expenditure Budget (OSEB), which sets the GGL and ensures overall spend control, and the Application Budget (AB), which determines the number of projects that can be accepted. As of Financial Year (FY) 2024/25, 90% of the AB had been allocated, ensuring access without creating a queue of pending projects. There has been no evidence of overspending or insufficient funds; however, this is partly due to lower-than-expected application uptake. Respondents had no strong opinions on the effectiveness of the budget caps.

Degression provides certainty for industry investment by reducing tariffs for new applicants when expenditure thresholds are met. This mechanism helps maintain value for money by adjusting tariffs when deployment exceeds forecasts. However, no respondents expressed an opinion on its effectiveness.

Overall, budget management mechanisms were not a deciding factor for applicants. Instead, 90% of ongoing applicants cited challenges with pre-application inputs, such as feedstock availability and investor willingness, as the primary barriers to final investment decisions.

Delivery of the GGSS

The administration of the GGSS application process has generally been well-received, with Stages 1 and 2 perceived as clear, structured, and manageable. The online portal was described as user-friendly and an improvement over the ND RHI system. While tight timelines posed challenges, they were considered reasonable, and Ofgem was regarded as thorough and responsive. However, completion of Stage 2 took significantly longer than Stage 1, with an average decision time of nine weeks compared to four weeks for Stage 1. This was attributed to the complexity of financial close documentation. Stage 3, however, was widely viewed as burdensome due to unclear documentation requirements, significant administrative efforts, and coordination issues with suppliers and contractors. Applicants often had to engage in extensive back-and-forth with Ofgem, further extending processing times.

Despite these challenges, applicants commended Ofgem for its engagement, responsiveness, and clear communication. Stakeholders valued the GGSS Guidance as a vital reference and found the initial launch event informative. However, suggested improvements included a

condensed version of the Stage 3 requirements, additional technical guidance, and enhancements to the online portal to allow amendments without requiring full resubmission.

Mid-Scheme Review

The Department conducted a mid-scheme review of the GGSS in 2023 to consider its effectiveness and review several areas for potential amendments. The Department published its response in January 2024 and made the necessary regulatory changes in June 2024. Stakeholders largely welcomed the GGSS deadline extension to 2028, with 60% of participants noting that it provided greater certainty for long-term planning, securing investment, and supply chain arrangements. Some ongoing applicants have increased staffing in response to the extension, reallocating talent from oil and gas to biogas sectors. However, some applicants felt the deadline remained tight due to challenges in obtaining planning permissions and securing finance. Additionally, some applicants raised concerns about energy costs for running heat pumps despite the positive impact of policy adjustments. Despite these concerns, the extension has increased interest in the scheme, with some Non-Applicants now reconsidering applying to the GGSS.

Interaction with the Wider Policy Context

The interaction between the GGSS and other linked policies, such as the Renewable Transport Fuel Obligation (RTFO) and Defra's Simpler Recycling policy, has influenced applications and participants in both positive and challenging ways.

On the positive side, these policies contribute to market development and investment. The RTFO supports biomethane production for transport decarbonisation, complementing the GGSS. Renewable Gas Guarantee of Origin (RGGO) certificates ensure the origin of renewable gas, such as biomethane, with one certificate equivalent to a kWh of green gas delivered to the grid. Some respondents suggested that introducing biomethane into the UK Emissions Trading Scheme (UK ETS) reporting could help it align with the RGGO to drive demand for GGSS, increase market confidence, and incentivise investment. Additionally, Defra's Simpler Recycling policy is expected to strengthen the feedstock supply chain by increasing food waste availability for AD plants, ensuring a more sustainable and consistent supply. Other government initiatives, such as the Feed-in Tariff[9], previously supported biogas-to-electricity projects, but, with its closure, investment focus has shifted towards biomethane under GGSS, highlighting the need for long-term financial support.

However, respondents also identified challenges that limit the effectiveness of these policies. Some applicants expressed uncertainty about how GGSS interacts with European Union markets, particularly regarding RGGO certification, which affects trade opportunities. The time it took to publish Defra's government response contributed to slow decision-making processes, impacting clarity and planning for applicants. Fragmented sustainability requirements across transport and heat sectors have created confusion, with respondents recommending a unified body to establish clear cross-sector objectives. Some applicants also faced feedstock shortages due to insufficient food waste separation, with Non-Applicants suggesting stricter waste policies or carbon-based mechanisms to incentivise better waste management.

[9] The Smart Export Guarantee (SEG) replaced the Feed-in Tariff. AD installations up to 5MW and micro-combined heat and power up to 50kW will be able to receive a guaranteed export tariff under SEG.

Although the GGSS represents progress compared to previous schemes, its effectiveness could be further improved through better policy coordination, clearer sustainability standards, and enhanced communication to strengthen alignment with decarbonisation objectives.

GGSS and GGL Contribution to Impact

The evaluation has yet to conduct a formal impact evaluation. However, as per the evaluation design, contribution claims developed in the initial evaluation scoping stages have been tested based on the process evaluation evidence gathered to date. Contribution analysis refers to the method to understand the likelihood the intervention has contributed to an outcome observed, or not (i.e. via a contribution claim). It tests the causal pathway to impact with the best available evidence. Annex 6 outlines the expected evidence to support the causal and alternative hypotheses. This evidence is limited to two rounds of GGSS process evaluation interviews and one round of GGL process evaluation interviews. The findings presented are, therefore, emerging and the methods (e.g. process tracing tests) may be refined after evidence from the impact evaluation have been gathered. The contribution claims cover the ToC impacts of greenhouse gas emissions, renewable heat production, the AD biomethane sector. It also updates the evidence that support the contribution claims for the GGL.

Enabling Policy Effects

AD is a natural process driven by microorganisms; it produces biogas and, through upgrading, biomethane. AD plants also produce digestate, a by-product of biogas generation. The ability to monetise digestate was seen as an incentive to apply to the GGSS. Ongoing applicants noted innovation opportunities through by-products that could generate additional revenue streams. These included monetising CO_2 capture and digestate for fertiliser and clean water, creating a ‘circular economy’ by providing the digestate to farmers with the agreement that the farmers provide them with waste as feedstock, using biomethane to help decarbonise heavy goods vehicles, and securing offtake agreements with large organisations, such as those within the food and beverage industry, to whom they will sell CO_2. Non-Applicants acknowledged the value of digestate produced by plants, but emphasised that wider government policy could support its use. For example, one Non-Applicant suggested a tax break initiative for farmers to use digestate instead of them buying artificial fertilisers.

Additionally, the GGSS is seen as promoting employment and supply chain market growth in the renewables sector, particularly as more AD plants are commissioned. Local projects and job creation were noted as important for fostering community buy-in and supporting the overall growth of renewable initiatives, especially in underrepresented areas.

Impact on Reducing Greenhouse Gas Emissions

A core objective, and impact in the ToC, of the GGSS is a reduction in greenhouse gas emissions. Three contribution claims (Annex 6) were tested in relation to this benefit area.

Based on the evaluation evidence to date, it is not possible to establish a definitive causal relationship between the GGSS and a reduction in greenhouse gas emissions through

displaced natural gas. However, this is largely due to timing. Moderate evidence of growing scheme demand, alongside a lack of systematic deployment outside the scheme, suggests that growth in biomethane production and injection relies on the GGSS. In addition, there was strong evidence to reject the alternative hypothesis that the biomethane market was a key driver for AD plants deploying or intending to deploy. This means that the causal hypothesis is not rejected: guaranteeing the revenue stream of AD plants for 15 years incentivises their deployment and operation. As more plants register onto the GGSS and begin injecting, further evidence is expected to confirm or refute the scheme's contribution to emissions reductions.

The evaluation also sought to test whether the GGSS sustainability and compliance regime was sufficient to ensure that any benefits in terms of emissions reductions are not offset through lifecycle emissions associated with biomethane production. The evaluation further theorised that the GGSS (through its requirement of a minimum of 50% of feedstocks from wastes and residues) may have an impact on GHG emissions by ensuring that 'upstream emissions' occurring through organic waste entering landfill could be avoided. It has not yet been possible to gather sufficient evidence on this impact area. However, there is some evidence indicative that it is supported. The fact that 15 new AD plants hold tariff guarantees supports the causal hypothesis with the expected evidence that these AD plants intend to meet this criterion and expect to be able to access the required feedstock.

Impact on Renewable Heat Production

A second core objective of the GGSS is to see an increase in the amount of heat produced from renewable sources. One contribution claim was tested in relation to this area of impact. There is some supportive evidence that GGSS was a key factor in incentivising deployment and will, in time, lead to biomethane production as more plants complete their plant construction and GGSS registration. Early evidence suggests that other potential uses (e.g. transport, electricity decarbonisation) of biomethane produced by these newly deploying plants will be less prominent and a high proportion will be used for renewable heat production.

Impact on the AD Biomethane Sector

A final stated objective of the GGSS is to support investment and growth of the AD biomethane industry. Four contribution claims were tested on this impact area.

The evaluation was able to find strong support for the contribution claim that GGSS tariff rates were appropriately set and monitored to ensure developers could implement viable business models and make the case to invest in AD plant construction. Evaluation evidence included the moderately strong demand for the scheme, with 53 initial applications as at December 2024[10] (of which 27 represent unique plants) and evidence of a pipeline of plants yet to apply among Non-Applicants. In addition, evidence from the process evaluation interviews suggested that the tariff rates were also an important determinant of the size of plants deploying onto the scheme, providing further evidence of a link between tariff rates and plant deployment. Indeed, there was strong evidence from the sector that without GGSS tariff guarantee, new plants

[10] Ofgem (2025). Green Gas Support Scheme: Quarterly Report – Issue 13. Available at: Green Gas Support Scheme Quarterly Report – Issue 13

would not have been economically viable and would not have been constructed. Hence, the evaluation has found that the GGSS tariff guarantees have a causal influence on investment in the sector.

It was further theorised that government signals of continued support for biomethane production and injection (post-ND RHI closure) had provided confidence in the market that would encourage current market operators (e.g. developers, investors) to remain in the market and new operators to enter, thereby contributing toward establishing a self-sustaining market. However, evaluation evidence at this stage was inconclusive and provided only weak support that the GGSS has had an impact on market confidence. There was similarly supportive, though ultimately inconclusive evidence, that policy signals beyond the GGSS (i.e. any potential future government support for biomethane production and injection) played a role in driving market confidence.

Related to the above area of impact, the evaluation sought to test the extent to which the GGSS gave confidence to the wider AD plant supply chain in the UK (e.g. component manufacturers, plant operators) to invest and support growth in skills and capacity. The evaluation at this stage found little evidence to support this hypothesis of impact, noting that responses about jobs were about the management and operation of AD plants in the UK. However, the evidence to reject the view that the AD biomethane supply chain would likely grow organically without the presence of the GGSS was strong.

Finally, the evaluation tested the impact of the GGSS on innovation (and resulting cost reduction) in the sector. Given most plants remain in the application process, and have yet to be registered, opportunities to test this expected impact were limited.

Impact of the Green Gas Levy

The evaluation also explored the impact of the GGL with three contribution claims. This aspect of the evaluation was drawn from the GGL process evaluation interviews conducted in the first year of the evaluation (as aforementioned, the contribution analysis is updated with the available evidence to date).

First, the evaluation considered contribution claims regarding its impact on facilitating the GGSS. Second, it considered its impact on consumer gas bills. Finally, it considered contribution claims regarding the impact on future policy making in relation to levies on fossil fuels.

There is evidence from the process evaluation that the GGL is working as intended; including qualitative feedback, it is meeting its policy aim, collecting sufficient funds to make payments to biomethane producers on the GGSS. Qualitative feedback emphasised that the levy has collected the level of funding that it intended to meet, although the amount collected exceeds the payments made; this imbalance is not evidence that the levy did not work as intended. The consistent view across all respondents was that the process to set the levy each year worked well, and the steps to set the levy were clear and easily repeatable year-on-year.

At this interim stage, there is limited but supportive evidence that the GGL is appropriately designed to fund the GGSS. However, interim evidence regarding the alternative hypothesis remains inconclusive due to timing, as the levy had not been fully tested when the GGL process evaluation was conducted. It is also too early to say whether or not the causal hypothesis regarding consumer bills and policymaking is supported. The GGL impact evaluation will collect the evidence to test these contribution claims.

Introduction and Report Scope

RSM UK, supported by Winning Moves and Ricardo Energy, have been appointed by the Department for Energy Security and Net Zero (the Department) to evaluate the GGSS and GGL from November 2022 to May 2026. This report summarises findings from the second year of the evaluation of the GGSS and GGL.

Context of the GGSS and GGL

The UK's commitment to achieving net zero carbon emissions by 2050[11] relies on significant shifts across its energy systems, including decarbonising the gas grid. Biomethane, as recognised in the UK's Biomass Strategy,[12] is expected to play a crucial role in this transition.

Biomethane is produced in the UK primarily through the anaerobic digestion (AD) of organic materials, including agricultural waste, food waste, sewage sludge, and energy crops. This process involves breaking down organic matter in the absence of oxygen, which generates biogas via an AD reactor. To produce biomethane, raw biogas is purified through a process called upgrading, where other gases and carbon dioxide are removed, leaving high-quality biomethane. Once purified, biomethane can be injected into the gas grid on site.

$$\boldsymbol{Organic\ matter \rightarrow AD\ reactor \rightarrow Biogas\ Upgrading \rightarrow Injected\ into\ gas\ grid}$$

The biomethane industry in the UK has been growing since 2011 largely due to policies such as the Non-Domestic Renewable Heat Incentive (ND RHI)[13] and, more recently, the GGSS.[14] There are currently 143 biomethane facilities accredited under the ND RHI in the UK that have produced 26.7 TWh[15] of biomethane between November 2011 and March 2024.[16] Biomethane injection into the gas grid increased by 11% from 6.8 TWh in 2022 to 7.5 TWh in 2023.[17] Despite this increase, biomethane still accounts for only a small fraction of the UK's gas consumption. In 2023, the UK consumed a total of 702.8 TWh of gas, with biomethane contributing just 1%,[18] highlighting significant potential for further growth.

The GGSS, funded by the GGL, seeks to further develop the UK biomethane market and contribute to the Biomass Strategy's 2050 target of achieving 30–40 TWh of biomethane

[11] Net Zero Strategy, 2021
[12] Biomass Strategy, 2023
[13] Ofgem (2024). Non-Domestic Renewable Heat Incentive (RHI). Available at: https://www.ofgem.gov.uk/environmental-and-social-schemes/non-domestic-renewable-heat-incentive-rhi
[14] Ofgem (2024). Green Gas Support Scheme and Green Gas Levy. Available at: https://www.ofgem.gov.uk/environmental-and-social-schemes/green-gas-support-scheme-and-green-gas-levy
[15] This figure is the equivalent heat, Ofgem report the amount of heat in the volume of biomethane produced by multiplying volume by calorific value.
[16] RHI monthly deployment data: March 2024 (Annual edition)
[17] Digest of UK Energy Statistics Annual data for UK, 2023
[18] DESNZ (2024) Digest of UK Energy Statistics Annual Data for UK, 2023

injection.[19] While the GGSS alone is not expected to deliver the full 30–40 TWh, it is anticipated that it will play a significant role in progressing towards this goal.

Overview of the GGSS and GGL

The Green Gas Support Scheme

The GGSS launched on 30 November 2021 and aims to support biomethane production in Great Britain.[20] Biomethane producers must apply to be registered on the GGSS to receive quarterly payments for up to 15 years with a tariff guarantee. Payments are based on the volume of eligible biomethane injected to grid. The GGSS has a three-tiered tariff structure. Initial quantities injected are paid at the Tier 1 rate. When the quantity of injected biomethane reaches the Tier 1 limit, payments are made at the Tier 2 rate. Payments are made at the Tier 3 rate when the Tier 3 threshold has been reached. The current tariff levels as of 1 October 2024[21] are as follows:

- Tier 1: up to 60,000 MWh per year – 6.69p/kWh
- Tier 2: the next 40,000 MWh per year – 4.16p/kWh
- Tier 3: above 100,000 MWh up to 250,000 MWh per year – 3.88p/kWh

The tariff rates above are valid for successful applicants who submitted their applications after 1 October 2024. The rates before this will vary depending on when the applicant submitted their application. Further detail of historical tariffs can be found in Table 2 and on Ofgem's website.[22] The GGSS regulations allow for review and amendment to the tariffs and tariff degression thresholds annually. The outcome of the annual tariff review must be announced by 1 September, and changes come into force from 1 October.

Once registered with the GGSS, participants must demonstrate ongoing compliance with sustainability requirements by calculating the emissions associated with biomethane production on a quarterly basis. This process is outlined in the GGSS Guidance.[23] A key condition is that 50% of the feedstocks used to generate the biomethane must be classified as wastes. Unlike the ND RHI, lifecycle greenhouse gas (GHG) emissions figures must be calculated for all feedstocks, including wastes. The average GHG figure for biomethane produced during a reporting period must meet a carbon intensity threshold of 24 grams of CO_2 equivalent per megajoule (gCO_2e/MJ) of biomethane produced, a lower limit than the previous ND RHI threshold of 34.8 gCO_2e/MJ.

The GGSS application process consists of three main stages. In the first stage, applicants submit high-level details about their plant and meet administrative obligations. At the second stage, they must demonstrate financial close by providing evidence of all financial agreements

[19] UK Biomass Strategy, 2023
[20] The scheme is not available to participants in Northern Ireland.
[21] Green Gas Support Scheme (GGSS): Annual Tariff Review 2024
[22] Green Gas Support Scheme Tariff Table | Ofgem
[23] Green Gas Support Scheme guidance | Ofgem

for project funding. In the third and final stage, applicants need to demonstrate the ability to inject biomethane into the grid and that their AD plant has been commissioned. Successful applicants are then registered on the GGSS. Applicants must have met all the eligibility criteria including the requirement that the equipment integral to the production of biomethane for injection is new and not shared, and also have demonstrated that they can meet the ongoing obligations of the GGSS after registration.

As of the latest update, published on 30 January 2025 with October-December 2024 data and covering the third quarter of the GGSS's fourth year, 53 initial applications have been made under the GGSS, with 39 Provisional Tariff Guarantee Notices issued. Out of these, 20 have received full Tariff Guarantees. Of these 20, 10 full applications have been submitted with one successful registration so far and 9 are under review by Ofgem.[24,25] The Department is committed to ensuring the GGSS delivers its objectives. In 2023, the Department conducted a Mid-Scheme Review of the GGSS and consulted on proposals for policy amendments to the scheme.. In January 2024, the Department published its response. Two significant changes were made. First, the GGSS was extended until 31 March 2028, providing more time for prospective applicants to register on the scheme. Prior to the extension, some applicants were struggling to meet the requirement of sourcing 50% of their feedstocks from waste. The extension ensures alignment between the GGSS and the introduction of municipal food waste collections across England, as set out in Defra's Simpler Recycling Government Response, which will increase the availability of waste feedstocks. Second, an exemption was introduced for heat supplied by eligible heat pumps to the anaerobic digesters and biomethane production process, ensuring it is not deducted when calculating eligible biomethane production.[26]

The Green Gas Levy

The GGL funds the GGSS and applies to licensed fossil fuel gas suppliers in Great Britain. The scheme started on 30 November 2021 and is administered by Ofgem. The GGL covers the full costs of the GGSS, including payments to participants and administration costs.

A mechanism is used by the Department to adjust the levy rate on an annual basis to help manage risks related to overspend and under-collection. This is based on updated forecasts of scheme costs from the Overall Scheme Expenditure Budget (OSEB) and therefore accounts for changing market conditions, ensuring the scheme remains adequately funded without excessive surplus or deficit.

Additionally, the GGL utilises mutualisation. Mutualisation is triggered if a supplier fails to make levy payments when there is insufficient credit cover in place and the default amount is more than the mutualisation threshold. New and existing scheme suppliers are also required to provide credit cover, which acts as a financial guarantee to cover potential default levy payments.

[24] Ofgem (2025) GGSS Quarterly Report – Issue 13
[25] As the GGSS is operational, the data is frequently changing.
[26] DESNZ (2023). Green Gas Support Scheme: mid-scheme review - GOV.UK. Available at: https://www.gov.uk/government/consultations/green-gas-support-scheme-mid-scheme-review

The GGL rate is set annually and changes year on year. For the financial year 2024/2025 it is currently set at 0.105p per gas meter per day, or 38p per meter for the entire financial year.[27] It is expected that these costs will be passed on to consumers. An exemption is available for suppliers with at least 95% certified biomethane in their total gas supply during a scheme year.

The GGL process involves several steps for gas suppliers to comply with their obligations under the GGSS. Gas suppliers must set up an account by emailing Ofgem and providing contact details for three key roles. Ofgem then confirms the account setup and instructs the supplier to create a password. Suppliers are required to submit quarterly meter point data for the number of Meter Point Reference Numbers they serve.

The levy rate, calculated annually by the Department based on the OSEB, is applied to suppliers' meter point data. Suppliers must pay electronically by the deadline set out in the levy payment invoice. If payments are not made, Ofgem will apply late payment interest, and suppliers must provide credit cover for each gas supply licence. Ofgem has enforcement powers to ensure compliance, including issuing penalty notices and potentially taking legal action for unpaid amounts. According to the GGSS Quarterly Report – Issue 13, there were zero instances of failure to provide levy payments by the deadline between 1 October 2024 and 31 December 2024. However, four suppliers failed to meet their administrative obligations, and one supplier failed to provide contact information.[28]

Report Structure

The remaining chapters of the report are structured as follows:

- Evaluation Methodology: This chapter summarises the theoretical underpinnings of the evaluation, the evaluation approach, the methods chosen for data collection and analysis, and any limitations to the study's findings.
- GGSS Design and Implementation: This chapter synthesises evaluation evidence relating to the GGSS (interview analysis and application data analysis) to draw out findings for each process evaluation question. It contextualises against the activities and outputs of the scheme.
- Assessment of GGSS and GGL Contribution to Outcomes and Impacts: This chapter presents the findings from the interim contribution analysis, which considers the extent to which outcomes and impact in the Theories of Change (ToCs) have been observed to date.
- Learning and Implications: This chapter translates findings from the two previous chapters into key conclusions for the GGSS and GGL. The chapter discusses findings in

[27] DESNZ (2023). Green Gas Levy (GGL): rates, underlying variables, mutualisation threshold and de minimis for the 2024-2025 financial year - GOV.UK. Available at: https://www.gov.uk/government/publications/green-gas-levy-ggl-rates-and-exemptions/green-gas-levy-ggl-rates-underlying-variables-mutualisation-threshold-and-de-minimis-for-the-2024-2025-financial-year
[28] Ofgem (2025). Green Gas Support Scheme quarterly report - Issue 13. Available at: https://www.ofgem.gov.uk/publications/green-gas-support-scheme-ggss-quarterly-report-issue-13

relation to the ToCs, and assesses evidence collected against the expected pathways that the GGSS and GGL were anticipated to take to deliver impact. It concludes with suggested implications for scheme and levy.

The report is supplemented by six annexes, namely:

- Annex 1: Evaluation Questions lists the questions for the full evaluation, highlighting those under investigation in this evaluation report.
- Annex 2: Theory of Change presents the two ToCs developed for the evaluation.
- Annex 3: Research Tools presents the topic guides used as part of the second process evaluation.
- Annex 4: Application and Monitoring Data Analysis presents the summary data tables, analysis and visualisation of scheme performance indicators, and application monitoring data for the GGSS.
- Annex 5: Qualitative Thematic Analysis details thematic findings from the second process evaluation interviews conducted with stakeholders and beneficiaries of the GGSS. The interviews were conducted using the research tools in Annex 3.
- Annex 6: Interim Contribution Analysis provides the detail of the evidence and process tracing tests applied to each contribution claim for the GGSS and GGL and preliminary contribution analysis.

The annexes are available in a separate document on the main report GOV.UK page .

Evaluation Methodology

This chapter provides a summary of the research approach and activities undertaken as part of the second year of the evaluation, including: an overview of the theory-based evaluation approach; a description of the primary research activities and secondary data sources reviewed; an overview of the analysis and synthesis approach; and a note on the limitations of findings.

Evaluation Approach

The evaluation team are delivering process and impact evaluations over the lifetime of the evaluation. The evaluation takes a theory-based approach using contribution analysis with process tracing, based on ToCs for the GGSS and GGL.

As a result of where the GGSS and GGL are in the policy delivery cycle, the focus of the evaluation to date has largely been on process, that is, understanding what works well and less well, and providing insight into effectiveness at different points in this journey. In the first year, the evaluation team developed GGSS and GGL ToCs (Annex 2), eight GGSS and five GGL contribution claims, and a process map for the GGSS and GGL to provide a framework through which the scheme processes can be assessed. Process evaluations were performed for GGSS and GGL. The first year also entailed the first annual online pulse survey of GGSS applicants and AD plants that were funded on the ND RHI scheme, a review of literature on the UK biomethane market and its context, and analysis of scheme and levy application and monitoring data.

In the second year, the second GGSS process evaluation and interim contribution claims workshop were undertaken to build the analytical foundation for the final phase of the evaluation. The process evaluation included interviews with 17 applicants and non-applicants (from a target of 20, giving a response rate of 85%). The contribution claims workshop reviewed the high-level contribution claims and counterclaims, focusing on the adequacy of processes to deliver the impact intended for them in due course. Following the workshop, the first three GGL contribution claims, which tested the causal pathway to the same Impact in the ToC, were condensed into one to streamline evidence requirements. The GGL contribution claims were, thus, reduced from five to three.

Given the complexity of the GGSS and the subsequent methodological challenges in apportioning impact between policy and wider factors, the impact evaluation approach is theory-based using contribution analysis with process tracing. Thus, the methodology has focused on testing the validity of the contribution claims through the evidence gathered in interviews and available scheme data. This has included assessing the assumptions about causal pathways in the GGSS and GGL ToCs, and how they have worked in practice. A detailed description of the contribution analysis framework is presented in Annex 6. For the upcoming final synthesis report, due in June 2026, the GGSS and GGL impact evaluations, and the second pulse survey of GGSS applicants and AD plants will be completed. These will be followed by the final contribution claims workshop, allowing for robust contribution analysis for GGSS and GGL. The contribution analysis framework in this report builds the analytical

foundation upon which the subsequent impact evaluation and final contribution analysis, which will be performed in 2025 and 2026, respectively, will be based.

This annual interim report is the second published output of the evaluation of the GGSS and GGL, reflecting and synthesising the findings from the second-year evaluation of their activities and outputs. This annual interim report is structured around the three GGSS and two GGL evaluation questions for the process evaluation. It covers the second GGSS process evaluation interviews, the refined contribution claims for GGSS and GGL, and updated analysis of scheme and levy application and monitoring data. A preliminary assessment of outcomes and impact has also been made.

Data Collection and Analysis

Stakeholder Interviews

The second process evaluation collected data on the GGSS through semi-structured qualitative interviews with 14 applicants to the scheme and three non-applicants (a total sample size of 17), summarised in Table 1. The first process evaluation interviewed five applicants and five non-applicants. Four of the applicants interviewed for the first process evaluation were also interviewed for the second process evaluation (the one unsuccessful applicant declined to be interviewed again). Therefore, this evaluation builds upon the responses from the first evaluation.

Table 1: Stakeholder Interviews Conducted

Stakeholder Group	Target Sample Size[29]	Achieved Sample Size	Percentage Achieve Sample Size (%)
GGSS Applicants (Successful, Ongoing applications, Unsuccessful applicants)	17	14	82%
GGSS Non-Applicants	3	3	100%
Total	**20**	**17**	**85%**

The evaluation identified relevant stakeholder populations for interview recruitment and sampled on a purposive basis. GGSS applicants included all those who had made an application to the GGSS, either successfully registering their plant (Successful), currently in the process of applying (i.e. having achieved provisional or full tariff guarantees and progressing to the next stage of their application) (Ongoing), and those whose applications had been rejected,

[29] The sampling for this second GGSS process evaluation occurred in July 2024, when there were 44 applications (39%).

revoked,[30] or withdrawn (Unsuccessful). The AD plant remains on the scheme, but the new owner was unavailable for an interview. The 14 applicants who were interviewed included 10 Ongoing, 3 Unsuccessful, and 1 Successful.

GGSS non-applicants were identified by the Department. The 3 Non-Applicants who were interviewed represented organisations that had expressed interest in applying to the GGSS but had not yet applied.

Seventeen applicants (11 Ongoing, 5 Unsuccessful, 1 Successful) and 3 Non-Applicants were approached, giving a response rate of 85%.

Interviews were conducted between August 2024 and October 2024. Interviews were based on topic guides. Topic guide questions focused on evidence required to answer the evaluation questions (Annex 3). Respondents were recruited via email, and interviews took place on Microsoft Teams. Interviews were up to one hour long.

The evaluation team produced, cleaned, and anonymised interview transcripts for case-level and thematic analysis. This was conducted using NVivo, a Computer-Assisted Qualitative Data Analysis Software package. Interview transcripts were added to NVivo and reviewed for internal consistency. Transcripts were then coded against an initial coding framework based on the evaluation questions, with coding also occurring inductively, driven by emerging findings.[31] Themes were presented along with an explanation and supporting quotes. Thematic analysis outputs from NVivo are presented in Annex 4.

Application and Monitoring Data

The evaluation identified and drew on four sources of application and monitoring data to track key performance indicators for both the scheme and the levy, namely:

- GGSS application summary data, extracted in October 2024 and provided by the Department.
- GGSS Annual Report dataset, published in July 2024 and available online on Ofgem's website.[32]
- GGSS Quarterly Reports, published quarterly and available online via Ofgem's website.[33]

[30] 'Revoked' refers to the situation in which a tariff guarantee or registration has been removed. 'Rejected' refers to the situation in which an applicant did not receive a tariff guarantee.
[31] A coding framework provides a list of categories or codes that allow researchers to simplify complex qualitative data into a set of themes and categories that can be analysed.
[32] Ofgem (2024). Green Gas Support Scheme Annual Report - April 2023 to March 2024. Available at: https://www.ofgem.gov.uk/publications/green-gas-support-scheme-annual-report-april-2023-march-2024
[33] Ofgem (2024). Green Gas Support Scheme quarterly report - Issue 13. Available at: Green Gas Support Scheme Quarterly Report – Issue 13

- GGSS budget caps, production factors, and inflation forecasts, published on the Department's website.[34]

Analysis of these datasets focused on key scheme benefit areas and metrics. Relevant variables were identified from the available datasets, and application data was cleaned and collated to produce a dataset for further analysis. Descriptive statistical analysis was applied alongside data visualisation. In some cases, to unpack data further, additional calculations were completed.

The quantitative analysis for the GGSS evaluation involved translating application data for the volume of biomethane (total plant, and volume eligible on the scheme) in cubic meters (M^3) to the level of output in GWh using an online convertor (using a Gross Calorific Value of 35.17 MJ/m^3). This converted the gas in M^3 to MJ by multiplying the volume in M^3 by the Gross Calorific Value, and then dividing by the conversion factor of 3.6 to convert to KWh. By applying production factors, this enabled assessment of the total expected eligible biomethane per year to be injected by applicant plants. The evaluation also used application and decision date data from the application data received to estimate the time taken to progress applications. Analytical outputs were compiled thematically, and summary text was used to highlight findings. This analysis is presented in Annex 5.

Contribution claims developed in the initial evaluation scoping stages were tested based on evaluation evidence gathered to date. The causal pathways were agreed during the ToC development, based on the evaluation questions. The contribution analysis developed hypotheses of how interventions are expected to lead to the impact in the ToC, providing a structured approach to gather evidence to test the plausibility of each hypothesis and weigh the relative contribution claim of the intervention compared to other explanatory factors. This was complemented by process tracing. Process tracing is a practical method for testing causal hypotheses in 'real world' situations. The detailed analysis is presented in Annex 6.

Challenges and Limitations

It is important to note that the findings in this report are only representative of a small sample size and contain limited experience of full scheme processes.

The GGSS only has one fully registered AD plant. The owner was willing to participate in this second process evaluation and share their experience on the GGSS process. This has meant that the evaluation was not able to report on post-award processes due to very limited evidence and, where evidence is available, due to concerns of disclosive findings.

While the population of applicants has increased since the first process evaluation, it remains relatively low. Using the 95% confidence level of the population, for GGSS applicants, the sample size of those interviewed increased from 12 in the first process evaluation (conducted

[34] DESNZ (2024). GGSS budget caps, production factors, and inflation forecasts for 2024-2025. Available at: https://www.gov.uk/government/publications/green-gas-support-scheme-budget-management/ggss-budget-caps-production-factors-and-inflation-forecasts-for-2024-2025

between January 2023 and May 2023) to 17 in the second process evaluation. In practice, there were few opportunities to resample and reach out where invitations were declined.

Given the analytical challenge of drawing conclusions from such a small sample and the disclosive nature of discussing responses from one respondent, the evaluation has not highlighted specific findings on GGSS delivery. Aspects for further research from successful applicants include the timings of payments, coordination between the auditor hired by Ofgem and Ofgem, and the administrative or operational load associated with certifying and selling biomethane, particularly in relation to its potential impact on scheme participation and efficiency.

The contribution analysis and process tracing tests in this report were performed on the evidence available to the evaluators at the date of writing the report. This evidence is limited to two rounds of GGSS process evaluation interviews and one round of GGL process evaluation interviews. Crucially, no impact evaluation evidence is currently available. Therefore, the contribution analysis and processing tracing tests in this report are extremely limited and are referred to as being ‘interim’. The impact evaluation for GGSS and GGL will begin in January 2025, after which the contribution analysis and processing tracing tests will be updated.

GGSS Design and Implementation

This chapter draws out findings from the GGSS second process evaluation and analysis of application and monitoring data undertaken between August and October 2024. It adds to the evaluation evidence base from previous process evaluation activities on how the GGSS has been implemented to date. It considers the barriers and enablers of outcomes, key success and challenges identified, expected and unexpected outcomes of the scheme, and, crucially, what has worked and not worked in its delivery. All figures relate to the cohort of interviewees.

The following subchapters explore the interview responses from the second process evaluation interviews, which focused on the GGSS, using evaluation questions that cover Context, Inputs, Activities, and Outputs of the ToC.

Design of the GGSS

Process Evaluation Questions:

EQ2: How has the GGSS budget management (budget caps / Annual Tariff Reviews (ATRs) / degressions) affected scheme attractiveness?

This evaluation question covers enabling inputs (e.g. the challenge of meeting carbon budgets in the near to medium term), policy inputs and activities (e.g. the annual budget cap, ATR and degression mechanisms), and plant deployment effects and benefits (e.g. periodic payments for 15 years for new plants based on tiered tariff system) in the ToC.

Summary of Findings on Budget Management

The GGSS budget management mechanisms have played an important role in shaping scheme participation. The ATRs were generally well received, with applicants appreciating tariff increases that improved financial viability and investment certainty. However, some respondents raised concerns about rising costs due to inflation and the need for more flexibility in tariff structures. Budget caps, while effectively managing expenditure, were not a major consideration for applicants when deciding to apply. Degression was acknowledged as a necessary mechanism to ensure value for money, but no applicant commented on its impact. Overall, the budget management mechanism has been seen as effective in maintaining scheme stability, though external factors such as feedstock availability and investor willingness played a greater role in application decisions than the budget management mechanisms.

Budget Management

The GGSS's budget management framework has been designed to minimise the risk of overspending relative to funds collected by the GGL. The primary mechanisms supporting this framework include the ATR, budget caps, and degression, complemented by processes such as deployment forecasting and payment estimation for biomethane plants.

Annual Tariff Review

The GGSS Regulations 2021 give the Secretary of State the option to change GGSS tariffs and tariff degression thresholds as part of the ATR. Decisions are published in the ATR. Through the ATR, the Department aims to ensure tariff payments are sufficient to incentivise deployment on the GGSS, whilst ensuring value for money to the public. During this evaluation, the GGSS tariffs have increased, as detailed in Table 2.

Table 2: Tariffs following the Annual Tariff Review

Tier	July 2022	October 2023	October 2024
Tier 1 (0 - 60,000 MWh[35])	6.33p/kWh[36]	6.33p/kWh	6.69p/kWh
Tier 2 (60,001 - 100,000 MWh)	4.06p/kWh	4.06p/kWh	4.16p/kWh
Tier 3 (100,001 MWh - 250,000 MWh)	1.79p/kWh	3.59p/kWh	3.88p/kWh

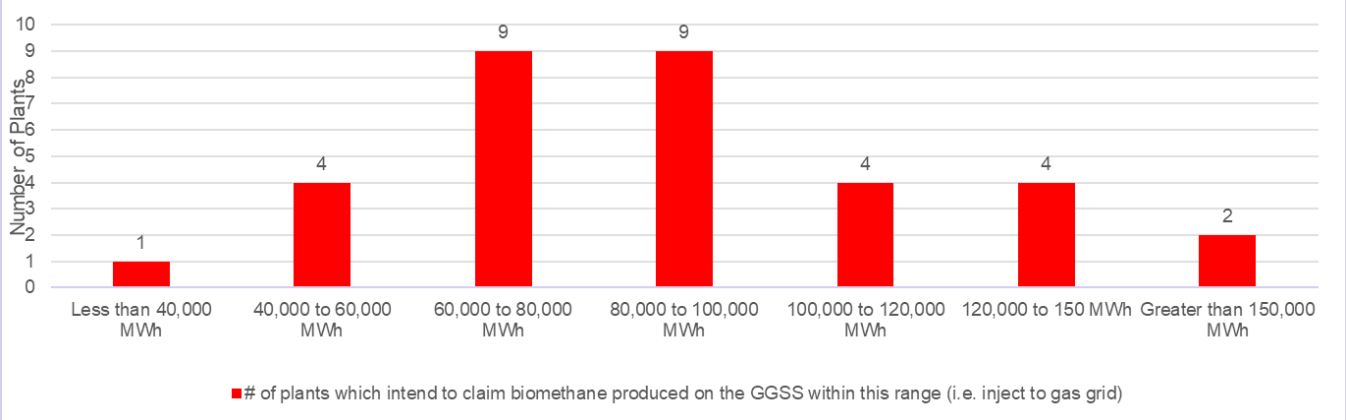
Source: Ofgem.[37] Note: Adjusted for the Consumer Price Index as at 1 April 2024.

The 2023 review found that tariffs at Tiers 1 and 2 were appropriate, incentivising deployment but not over-compensating plants. Only Tier 3 tariffs were increased after updated cost assumptions for larger plants. The 2024 review led to increases in Tier 1, Tier 2, and Tier 3 tariffs to reflect updated cost and revenue assumptions.

Figure 1 depicts the number of plants with the expected eligible biomethane production capacity.[38] The majority of plants in the sample (nine) intend to inject between 60,001 and 80,000 MWh or 80,001 and 100,000 MWh of eligible biomethane, qualifying for Tier 2 tariffs (in total, 18 plants would receive Tier 2 tariffs). Five smaller plants expect to inject below 60,000 MWh and receive Tier 1 tariffs. Ten plants expect to inject more than 100,000 MWh and, thus, qualify for Tier 3 tariffs.

[35] Megawatt-hour per annum
[36] Pence per Kilowatt-hour
[37] Ofgem (2024). Green Gas Support Scheme Tariff Table. Available at: https://www.ofgem.gov.uk/publications/green-gas-support-scheme-tariff-table
[38] Stage 1 applications request information on the expected maximum initial capacity as well as the expected volume of eligible biomethane to be injected each year.

Figure 1: Plant Size of Unique, Ongoing/Successful Applicants



All respondents were positive about the increase in their respective tier's tariff rates, noting improvements in financial viability and project sustainability. However, this benefit is only realised for new applicants. Existing applicants do not benefit directly unless they withdraw and reapply at a higher tariff, which some have chosen to do.

The new tariff rates introduced as part of the 2024 ATR were considered effective in influencing the applicants' decision to apply to the GGSS. The ATRs improved the scheme's appeal by allowing projects to create more resilient business models to balance costs and revenue variables. The 2023 ATR increase in Tier 3 tariffs did not lead to a significant increase in Tier 3 applications. Instead, the 2024 ATR changes led to multiple resubmissions from applicants seeking to benefit from the improved tariffs. Applicants who withdrew and resubmitted applications to benefit from the updated tariffs predominantly did so following the 2024 ATR rather than the 2023 ATR, which had limited impact on resubmissions. The 2024 ATR increase in Tier 1 and Tier 2 tariffs further enhanced the scheme's attractiveness for smaller plants in particular. The increase in Tier 1 was particularly noted as supporting smaller plants to scale and achieve operational efficiency.

Applicants' feedback emphasised the importance of ATRs in supporting long term project viability. While applicants appreciated the scheme's financial structure, some Ongoing applicants highlighted the need for tariff adjustments to respond to rising costs due to inflation and equipment expenses. Rising costs posed challenges for smaller and mid-sized plants with high relative financial risks. Tariff adjustments would help plants avoid potential financial strain on projects nearing completion. Established applicants with larger plants reported leveraging multiple income streams to manage internal budgets while waiting to be registered and able to receive tariff payments, but smaller projects struggled with the cost involved in finding available feedstock as they transitioned from landfill to alternative waste feedstock.[39] Some applicants recommended greater flexibility in tariff structures and clarity around timing of payments, given the high level of investment required. The concern was not being able to generate revenue to cover the costs in the long-term – this was particularly concerning for AD plants financed by

[39] Biomethane can be produced through upgrading landfill gas when organic waste decomposes in landfill sites. The GGSS supports biomethane production via AD. One Ongoing applicant with a smaller plant expected to be able to use landfill gas (through the upgrade of landfill gas) for biomethane production. Though they eventually applied to the GGSS, they noted that their transition from landfill to alternative waste feedstock presented challenges with securing feedstock.

debt. With respect to Non-Applicants, all three were planning to make applications; two had been making plans for some time, but internal challenges shaped the scale and timing of these plans. The changes in the ATR did not have an impact on their decision to apply to the GGSS.

The ATR was well-received, with many respondents intending to build AD plants. The ATR was viewed as being instrumental in helping with internal investment cases, especially by providing a 15-year government-backed revenue structure. The GGSS provides a relatively stable revenue stream for AD projects, offering some certainty with tariffs.

Additionally, the GGSS, with its encouragement of larger AD plants, has been viewed as a step forward compared to the ND RHI. Consequently, some applicants expressed a preference to reach 100,000 MWh each year to remain economical. By fostering economies of scale, GGSS participants are better positioned to achieve operational efficiency.

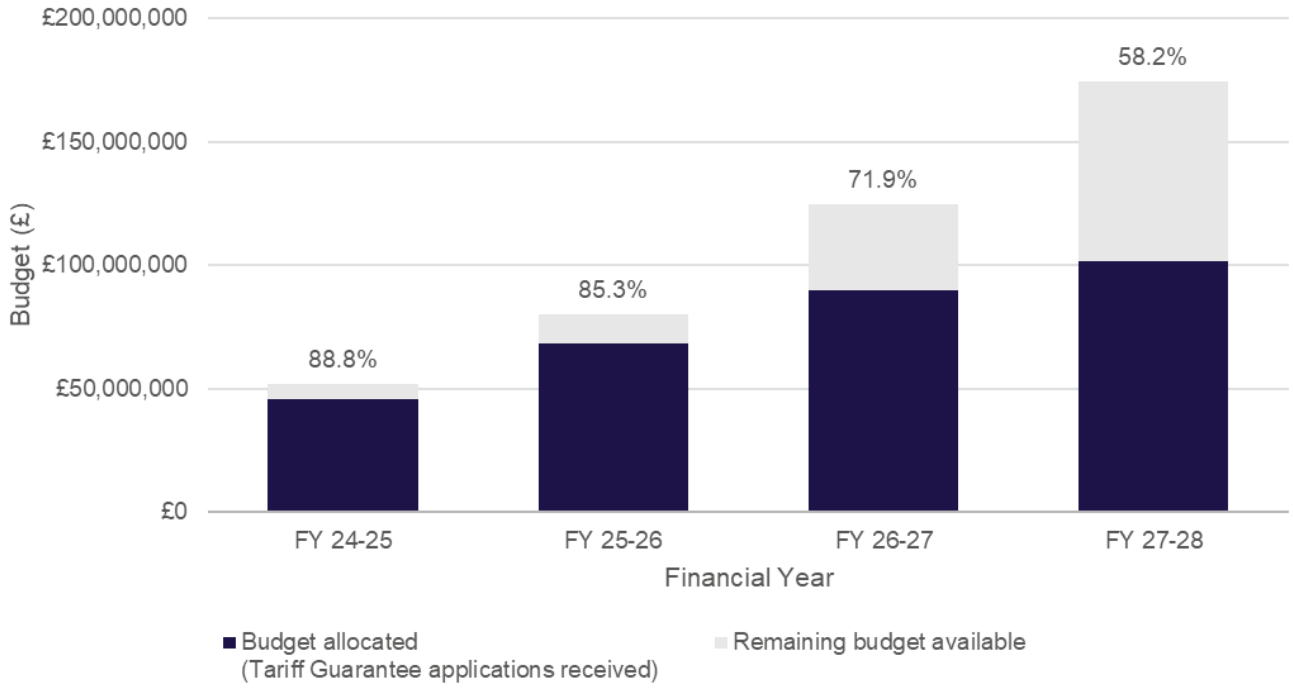
Budget Caps[40]

The GGSS budget management relies on two key budget caps: the Overall Scheme Expenditure Budget (OSEB) and the Application Budget (AB). OSEB is used to set the GGL, which is calculated annually and applied to suppliers' meter point data. It is designed to provide an overall budget cap against which actual levels of scheme expenditure will be tracked and monitored. The AB, managed by Ofgem, is used to assess and accept new plants into the scheme. As shown in

Figure 2 (overleaf), 88.8% of the FY2024/25 AB has been committed to projects, while 58.2% of the FY2027/28 have been allocated (based on the planned deployment of current applications). Budget caps are set using deployment forecasts to estimate the level of biomethane production and likely spend in the scheme year, based on market intelligence. The annual budget caps aims to strike a balance between controlling spend and ensuring projects can access the GGSS without being placed in a queue because the annual budget is fully committed. The process of estimating deployment is inherently uncertain, given the influence of changes in external factors on plants' ability to deploy.

[40] Alongside budget caps, degression supports the balance between incentivising biomethane production, providing market certainty, and offering value for money by automatically reducing the tariffs available for new applicants if set expenditure thresholds are met. While asked about the attractiveness of budget caps, ATR, and degression, respondents spoke about the ATR and budget caps.

Figure 2: Annual GGSS Budget Cap



Source: Ofgem, as at December 2024.[41]

It is noted that, across the scheme years considered in this evaluation report, there has been no overspend or instances where there were insufficient funds to pay for biomethane production. However, this should be interpreted with caution, as the budget caps have not yet been fully tested due to limited application uptake and injection rates.

No respondent had an opinion about the effectiveness of the budget caps.

Degression

Degression sufficiently incentivises biomethane production and provides certainty for industry investment by automatically reducing the tariffs available for new applicants if set expenditure thresholds are met. It allows the Department to ensure the GGSS offers value for money to the public. If the Department's forecasts show that it is paying out more on the scheme than expected due to higher capacity deployment, then it is assumed that tariffs are too generous. When a degression occurs, this reduces the tariffs available by 10% to subsequent GGSS applicants. No respondent had an opinion about the effectiveness of degression.

There was no evidence that degression or any of the budget management mechanisms were a factor in applicants deciding to, or not to, apply to the GGSS. In fact, 90% of Ongoing applicants cited difficulties with pre-application inputs (e.g. feedstock availability, investor willingness), rather than the GGSS budget management mechanisms, as a barrier to making final investment decisions.

[41] Ofgem (2024). Green Gas Support Scheme and Green Gas Levy. Available at: https://www.ofgem.gov.uk/environmental-and-social-schemes/green-gas-support-scheme-and-green-gas-levy/green-gas-support-scheme-and-green-gas-levy-applicants

Delivery of the GGSS

Process Evaluation Questions:

EQ1: How effective has the implementation and delivery of the scheme been?

(a) What has been the experience of the administration of the scheme, including payments processes, (by Ofgem) by applicants? Has it created any unnecessary applicant burden or barriers to further deployment under the scheme?

(b) What problems have applicants faced during the application process?

This evaluation question primarily covers scheme delivery by Ofgem, including application assessment and metering data for payments, in the ToC. Additionally, it explores barriers, such as competition for, and rising price, of feedstock, plant site availability and planning permission delays, the supply chain, recession, inflation, and gas price uncertainty, and low levels of awareness or appreciation of carbon credentials of biomethane in the market. It also considers policy inputs and activities (e.g. Mid-Scheme Review, wider enabling policies and regulation, visibility of government objectives), and secondary effects (e.g. alternative uses of biomethane).

Summary of Findings on Scheme Implementation and Application Process

The implementation and administration of the GGSS has generally been well-received, with applicants acknowledging improvements compared to previous schemes, particularly with the clarity of the online portal and guidance. The application process for Stages 1 and 2 was described as clear and well-structured, with applicants able to progress at expected timelines. However, delays were observed in Stage 2 due to the complexity of financial close documentation, and Stage 3 was widely perceived as administratively burdensome. Stakeholder engagement during the application process was good, with Ofgem providing responsive support, but areas for improvement were noted, such as clearer guidance for Stage 3 and better coordination between various agencies.

External factors such as feedstock availability, investor willingness, and planning permission delays were cited as the primary barriers to participation in the GGSS rather than the scheme design itself. Supply chain disruptions, inflation, and high capital expenditure also posed challenges. Despite these issues, interest in the scheme remains high, with applicants recognising its importance in supporting biomethane plant development. Addressing administrative inefficiencies and providing further clarity on technical requirements could enhance the overall applicant experience and scheme effectiveness.

Experience of the Application Process

The application process for the GGSS is comprised of three, consecutive stages. Stage 1 is the initial application. It requires the applicant to apply for a tariff guarantee to secure a fixed tariff rate before their installation is fully commissioned and registered on the scheme. The applicant is expected to provide evidence of a connection agreement, planning permission

details, expected maximum initial capacity, and expected volume of eligible biomethane to be injected into the grid. Stage 2 requires the applicant to provide evidence of financial close to demonstrate that committed funds are available to cover the construction and commissioning of the proposed project. If the Stage 2 application is successful, Ofgem will issue a tariff guarantee. At Stage 3, the applicant can apply for the GGSS registration once the plant has been commissioned. This requires the applicant to provide evidence of commissioning, such as a commissioning date, and the ability to inject biomethane into the grid. If an applicant is successful at Stage 3, full registration of the AD plant will be granted. The application process is managed through an online portal.

Table 3 illustrates the total applications received under the GGSS, as at the end of December 2024, and the number of applications that have progressed through each of the three application stages. The GGSS has received 53 individual applications in Stage 1 and 39 in Stage 2. It granted provisional tariff guarantees to 39 applicants and tariff guarantee to 20 applicants in Stages 1 and 2, respectively. Only one plant has successfully completed Stage 3 of the application process, commissioned their AD plant, and registered onto the scheme to begin generating and injecting biomethane to the gas grid.

Table 3: Total Applications Received and Granted

Application Stage	Total Received	Total Granted
Stage 1 (Provisional tariff guarantee)	53	39
Stage 2 (Tariff guarantee)	39	20
Stage 3 (Registration)	1	1

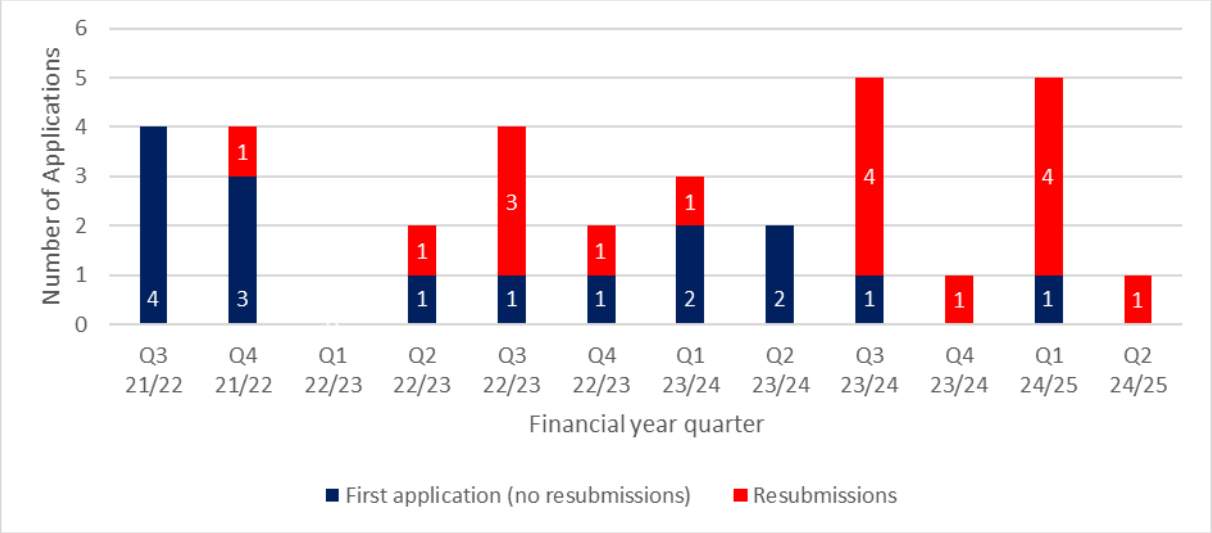
Source: GGSS Application Data, December 2024[42].

Although 53 individual applications have been received in Stage 1 (inclusive of those rejected, withdrawn, and where tariff guarantee was cancelled or revoked), a number of these are reapplications from investors who were unsuccessful in their previous Stage 1 or Stage 2 applications. This indicates applicants' willingness to reapply as needed, particularly to address earlier application challenges (discussed later in this report) and take advantage of tariff adjustments.

Although there are 53 applications in total, the interviewed sample represented 33 applications. Of the sample[43], the GGSS received 16 unique applications. Six were in Stage 1, eight were in Stage 2, one plant was in Stage 3, and one had fully registered.[44] This fully registered plant owner participated in both process evaluations for the Department. Most unique applications (seven) were submitted during the scheme's first six months, as shown in Figure 3.

[42] Provided by DESNZ by a bespoke data request, which aligns with Ofgem's GGSS Quarterly Report – Issue 13.
[43] The full dataset up to December 2024 can be found in Annex 4.
[44] There were 17 resubmissions, so the GGSS has received 33 applications in total from the interviewed sample.

Figure 3: Number of Applications[45]



Of the sample (i.e. those interviewed), six applications, of which one was unique, were submitted in Q1-Q2 2024/25. Including resubmissions, applications to the GGSS have been steady since its launch, receiving between four and five submissions every third quarter. This indicates sustained interest in the GGSS in the sample.

Stages 1 and 2

Applicants reported a generally positive experience with the GGSS application process for Stages 1 and 2. The process for providing the required inputs was described as smooth and straightforward, with no major barriers encountered. While some specific details needed attention (e.g. ensuring meter readings at the biomethane plant and those at the monitoring site matched), these were not considered overly burdensome. Many applicants leveraged external consultants to support their applications at these stages. This reliance on consultants was largely driven by their efficiency in managing the preparation and submission of required documents, particularly in addressing the detailed technical and administrative requirements. Consultants were noted as adding value by simplifying processes and ensuring compliance with scheme guidelines, especially given what was perceived as a significant volume and specificity of information required.

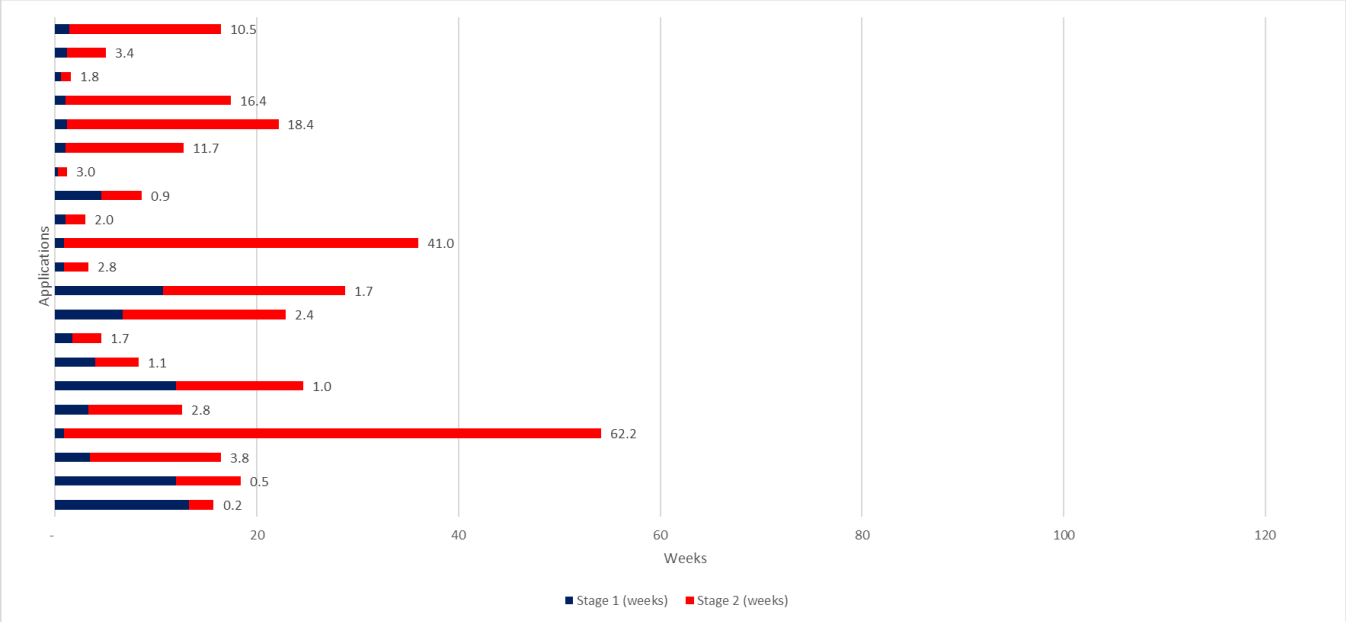
Applicants were able to progress through the GGSS application at the pace that they expected. The timelines were deemed tight, especially when having to engage with third parties to collect information (e.g. banks for financial close information), but deadlines were clear and manageable. The review and approval process by Ofgem was deemed meticulous and thorough, but a number of applicants noted a long turnaround time for decisions

Ongoing applicants commented on the significant improvements in the GGSS process compared to the ND RHI process, noting the online portal being more user-friendly and efficient than that used for ND RHI.

[45] This figure shows multiple resubmissions by the same applicant.

Despite the positive feedback, some applicants noted delays in Stage 2. Of all Stage 1 applications in the interviewed sample, the average length of time to progress from submission to decision was 4 weeks. Of those Stage 2 applications that were successful, the average length of time to progress from submission to decision was nine weeks. This increase in processing time for Stage 2 was attributed to the greater complexity of documentation required for financial close. Figure 4 depicts the number of weeks each applicant spent in Stage 1 and Stage 2 before a decision was made (including the ratio of weeks spent in Stage 2 to weeks spent in Stage 1).

Figure 4: Number of Weeks in Stage 1 and Stage 2



Note: Of the total interviewed sample (33), 21 moved from Stage 1 to Stage 2.

All but one applicant spent more application time in Stage 2 than in Stage 1 (this applicant spent slightly more than half their application time in Stage 1 than in Stage 2). The applicant who spent their longest time in Stage 2 did so at 62.2 times the time they spent in Stage 1. Excluding outliers, the average ratio of time spent in Stage 2 to Stage 1 was more than double (2.2). Note that this figure shows only those who progressed from Stage 1 to Stage 2, excluding applications that were withdrawn, revoked, rejected, or cancelled.

In summary, Stages 1 and 2 of the GGSS application process were perceived as clear and well-structured. While some delays were noted, these were largely expected given the rigorous review process and the complexity of requirements, particularly during Stage 2.

Stage 3

One Ongoing applicant, who ran one of the larger AD plants, found Stage 3 to be relatively simple, noting that the additional information required was reflected in the GGSS Guidance. This plant undertook stringent documentation preparation and management, suggesting that an AD plant that managed documentation well could move relatively smoothly through the process. However, the majority of applicants described Stage 3 as burdensome due to the complexities of the documentation required. Specific issues cited included:

- Missing or incorrect documentation. The lack of clarity of the requirements resulted in back-and-forth correspondence between the applicant and Ofgem.
- The administrative burden resulting from the nature of some of the documentation required. Where applicants faced issues with faulty meters or did not have a record of previous meter readings, some were required to contact the manufacturer to retrieve historic data in order to complete their application.
- Delays being exacerbated by coordination efforts between various parties for minor corrections. For example, correcting project numbers, site acceptance testing packages, and commissioning dates.

The length of time in Stage 3 application was compounded by challenges in aligning documentation timelines with external contractors or suppliers, particularly when commissioning schedules or gas-to-grid dates needed adjustment. Applicants found it less effective to rely on external consultants during Stage 3 than for Stages 1 and 2. The breadth and specificity of the information required meant that applicants often felt that they were better positioned to complete the submissions themselves. As a result, many described Stage 3 as a "learning by doing" process, navigating the requirements through experience and ongoing interaction with Ofgem.

Stakeholder Engagement

All prospective applicants are expected to read the GGSS Guidance and familiarise themselves with the requirements of the GGSS Regulations, especially the ongoing obligations. Ongoing obligations include evidence that the biomethane is sustainable, the equipment continues to meet all the eligibility criteria, and processes continue to comply with the relevant planning permission, environmental permits, and waste management licences. Since all installations are different, the information and evidence required may vary – Ofgem assesses these on a case-by-case basis.

There have been regular updates through emails, newsletters, and the Ofgem website on changes to the GGSS, demonstrating a commitment to keeping stakeholders informed and involved. Ofgem was praised for their availability and willingness to efficiently resolve difficulties. The personnel were considered helpful and supportive. For example, they were responsive and provided clarity when additional information was required, and answered all questions promptly and comprehensively. Applicants were well-informed through the application process. In addition, the GGSS Guidance provided by Ofgem was said to be clear and concise, and served as a vital reference point during the initial phases of applications. It helped applicants understand the data requirements for biomethane site development for Stages 1 and 2. Non-Applicants were also generally positive with the GGSS Guidance and application process, to the extent that they experienced it.

It was also noted by all stakeholder groups that the initial kick-off event for the GGSS was well-organised and provided clarity, setting a positive tone for future communications.

Improvements to the Application Process

The following improvements to the application process were suggested:

- Introduction of a condensed version of the GGSS Guidance, with only key points about the Stage 3 requirements (e.g. photographic evidence), to make the Stage 3 process straightforward.
- Introduction of further guidance on the technical aspects of the application, such as online tutorial training for the GGSS GHG emissions calculator. Both Applicants and Non-Applicants suggested the need for clearer, more accessible documentation explaining technical requirements (e.g. tools like the GGSS GHG emissions calculator).
- Simplification of the planning systems or introduction of incentives for council planning departments to drive applications through to fast-track applications. Non-Applicants highlighted how a lack of knowledge and understanding of the GGSS (and the AD sector in general) in council planning departments presented a challenge to applications.

The following improvements to the online portal were suggested:

- The ability to make changes to the application, such as the gas to grid date (due to shifts in time frames of sourcing equipment, etc), would have avoided certain delays. Applicants who wished to make changes were required to withdraw and resubmit their application, thereby restarting the entire GGSS process. This was particularly difficult from a funding availability perspective.[46]
- Some applicants would have preferred to keep a copy of their original application. Though Ofgem emailed copies of the submission when asked, applicants considered it more ideal if a report could be downloaded after submission.

Wider Context and Barriers to Application

Investor Willingness

Applicants noted several challenges related to the investor willingness for AD plants, and these have contributed to barriers to application under the GGSS. In particular:

- Timing of internal investment approvals. Of the Ongoing applicants, 20% cited a “chicken and egg” situation: timing and approval issues was a major challenge, such as the dependency between subsidy approvals and investment confirmation for Stage 2, which requires evidence of financial close.
- High Capital Expenditure (CapEx). CapEx has increased because supply chains are considered limited. For instance, the time to retrieve the necessary AD equipment (e.g. parts for control systems, CO_2 liquefaction units, grid entry units) is long, given the global supply and demand from AD plants. Some applicants have put mitigations in place, such as using a large contractor, but other delays were caused by securing and installing the equipment.

[46] Under the current GGSS application process, applicants cannot amend key details of their application, such as the gas to grid date, after submission because it is a regulatory requirement. Instead, they must withdraw and reapply, which resets the entire application process, potentially affecting project timelines and financial planning.

- The high cost of developing AD plants contributed to slow uptake. Some quoted a lack of investment and interest from several big developers.[47] One Unsuccessful applicant, despite their interest, highlighted the challenges of securing buy-in and coordinating financing with multiple stakeholders. They noted that the difficulty was further compounded by the challenge of attracting investment in biomethane, as the applicant was unable to demonstrate sufficient value for money.

Some applicants submitted speculative applications to secure funding, but were reassured that funding would be available if they applied when they were ready.

One Non-Applicant did not apply because, at this time, their project does not seem profitable given the costs involved. The increase in the tariffs do help, but they would need to rerun their financial models against the increase in the costs due to the inflation rate.

Planning Permission

Site-specific challenges, including delays in securing planning permissions and access to utilities, were identified as hindering progress. Non-Applicants highlighted poor availability and timeliness of access to utilities (e.g. water and power), as well as slow response times from the National Transmission System. These issues, coupled with local opposition to rural site development and the high costs of urban site preparation, made site identification and development particularly challenging. The limited availability of larger sites (felt to be necessary for achieving the economies of scale required to make AD plants viable), the lack of transport access to rural sites and the high remediation costs of industrial and brownfield sites were also identified as key issues by applicants.

Availability of Feedstock

Non-Applicants cited challenges with the availability of a sustainable, cost-effective source of feedstock. For example, poultry farming is fragmented, and several agreements need to be in place with different farmers (some of whom are uncertain about how long they would stay in the market) to secure sufficient feedstock. In addition, there are other options for use of certain feedstock. For example, the cost of chicken manure as feedstock has increased due to alternative uses, such as government-subsidised burning for energy or farmers converting them into fertiliser, reducing its availability for AD plants. These challenges were exacerbated by higher transport costs, which offset recent feedstock price reductions. One Unsuccessful applicant was unable to secure investor funding due to feedstock price volatility but has plans to reapply.

Wider Market Conditions

Some applicants believed that the major barriers to AD facilities being built were driven by additional factors external to the GGSS, such as inflation, high building cost, high transport costs, and the administrative cost of needing to correspond with the Environment Agency and Defra. The GGSS tariff rates were not sufficiently responsive to the changes in these costs.

[47] This refers to AD plant developers.

Other comments regarding wider market conditions included:

- Inflation, high transport costs, and adverse weather conditions have compounded difficulties and increased costs (e.g. feedstock), making it harder to manage digestate and maintain profitability. Applicants have accepted that the disruption in the downstream equipment supply chain caused by the Ukraine War and COVID-19 extended the construction period of AD projects from 10-12 months to 15-16 months. Although, some applicants ordered equipment early in anticipation of losing supply due to the Ukraine War, so are on track with their timescales.
- Significant supply chain delays for AD plant parts, with lead times of up to 3 years for Pentair upgraders and 9-12 months for other operators. This was exacerbated by tight GGSS Stage 3 construction timelines and a limited number of global suppliers.
- Two plant owners commented that the insufficient budget for larger facilities could lead to overlooking the UK for AD plant investment

Despite these challenges, the increasing number of applications to the GGSS signals significant potential for achieving key outcomes, such as biomethane plant deployment and greater use of waste feedstock, which are essential for reducing greenhouse gas emissions. The growing interest in the scheme could also help boost business confidence and strengthen the biomethane supply chain. However, respondents commented that ensuring the scheme reaches its full potential, addressing the delays experienced in the application process, is crucial. If these issues are resolved, the GGSS could have a substantial long-term impact, driving market growth, creating economic benefits, and contributing to the reduction of greenhouse gases.

Respondents thought that the GGSS is imperative to the renewable energy market:

- GGSS provides essential financial support, making the development of biomethane plants more feasible, even amidst high CapEx requirements. Applicants believed renewable energy market confidence is stable. Some Non-Applicants and Unsuccessful applicants are eager to build an AD plant.
- Government support remains essential for maintaining cost-effective biomethane production and investment confidence in the sector to achieve environmental sustainability.

While larger AD plants may achieve self-sufficiency over time, this depends on stable feedstock costs and economies of scale. Respondents noted that without continued financial support, whether through GGSS or future policies, the sector risks stagnation, particularly as fossil fuel dependence persists and AD development costs remain high. Some also highlighted that a sudden withdrawal of support could reduce AD plant capacity, impacting both the agricultural sector and the transition to renewable energy.

Mid-Scheme Review

The Department conducted a mid-scheme review of the GGSS in 2023 to consider its effectiveness and review several areas for potential amendments. The Department published

its response in January 2024, and made the necessary regulatory changes in Spring 2024. These changes were: (i) extending the GGSS to 31 March 2028 to provide sufficient time for prospective applicants to commission on the scheme before it closes; and (ii) introducing an exemption for heat supplied by eligible heat pumps to stop it being deducted as part of eligible biomethane calculations in the same way that fossil fuel heat sources are. When asked about their opinions on the Mid-Scheme Review, 60% of participants welcomed the GGSS deadline extension to 2028, noting that it helped plan long-term projects. Some remarked that the GGSS is underpinning further investment in the UK; the extension is perceived to give time to obtain planning permission, talk to the local community, secure investment, and create supply chain contracts. One Unsuccessful applicant still saw the extension to 2028 as tight (e.g. in gaining planning permissions, securing finance), but some Ongoing applicants have begun investing in staff (e.g. project team, technical team, development team, moving skills from oil and gas into biogas) in response to the extension. One Non-Applicant stated that they considered applying to the GGSS directly due to the deadline extension. One Unsuccessful applicant noted that making the energy from heat pump non-deductible is helpful, but the electricity price to run the heat pump is significantly costly. Therefore, they need to consider the value for money of their project.

Interaction with the Wider Policy Context

Process Evaluation Questions:

EQ3: How has interaction between the GGSS and other directly linked policies, such as the RTFO and Defra's Simpler Recycling policy, impacted applications and participants?

This evaluation question covers policy inputs and activities (e.g. wider enabling policies, eligibility and sustainability requirements), and enabling inputs (e.g. broader environmental policies, the Green Gas Certificate Scheme[48]). It also covers economic and market effects and benefits (an Impact in the Theory of Change), such as increased awareness in the market of biomethane.

Summary of Findings on Policy Interaction

The GGSS operates within a broader policy landscape that includes government-led initiatives such as the RTFO and Defra's Simpler Recycling policy, as well as industry-led schemes like the RGGO. These interactions provide opportunities to enhance market confidence, create synergies for biomethane production, and strengthen the supply chain for AD plants. Some applicants viewed these policies as complementary, particularly in supporting feedstock availability and providing long-term investment security.

However, several challenges were identified, including delays in policy decisions, fragmented sustainability requirements across sectors, and uncertainty regarding trade with European Union (EU) markets. Some respondents highlighted public misconceptions about biomethane's environmental impact, which could affect market perceptions. Additionally, food waste

[48] The Green Gas Certificate Scheme is not a government run scheme.

shortages posed difficulties for securing feedstock, with calls for stricter waste separation policies to mitigate this issue.

While the GGSS has been recognised as a step forward compared to previous schemes, better coordination among policies, clearer sustainability criteria, and improved communication could enhance its effectiveness and ensure stronger alignment with decarbonisation goals.

Role of Linked Policies

The GGSS operates within a wider framework of policies designed to promote renewable energy and decarbonisation in the UK. Some respondents noted that an interaction between industry-led and HM Government-led schemes, and between industry-led schemes, would allow potential long-term benefits. These include the RTFO and Defra's Simpler Recycling policy as the HM Government-led schemes. The industry-led schemes include RGGO.

The UK Emissions Trading Scheme (UK ETS) is a cap-and-trade carbon emissions trading scheme that currently does not recognise biomethane. RGGO certificates ensure the origin of renewable gas, such as biomethane, with one certificate equivalent to a kWh of green gas delivered to the grid. However, some respondents recognised the role that linking RGGOs to the UK ETS, through introducing biomethane into the UK ETS, could play in driving demand for the GGSS, boosting market confidence, and incentivising investment. Although, at present, UK ETS does not complement the GGSS, linking the two could create a premium biomethane market, similar to financial incentives in some European territories.

The RTFO supports the government's policy on decarbonising transport by encouraging the production and use of renewable fuels that do not damage the environment. RGGOs are certificates issued by the Green Gas Certificate Scheme. Together, these policies aim to complement the GGSS by fostering market development, ensuring sustainability, and incentivising the production and use of renewable gas.

Defra's Simpler Recycling policy includes reference to legislation that waste collection authorities in England must arrange weekly separate food waste collection. It will enable consistent, more streamlined collections from all households, businesses and relevant non-domestic premises. Applicants note that Defra's Simpler Recycling policy[49] is expected to strengthen the feedstock supply chain. This includes feedstock volumes and how it is acquired for the plant. The boost in feedstock availability for AD plants is expected to create a more sustainable supply chain. For other applicants, the policy supports their current operations.

Respondents shared several key insights about how the GGSS interacts with other policies and initiatives. They mentioned that:

- Although biomethane is not part of the UK ETS, the interaction between the RGGO and the UK ETS was identified as a potential long-term benefit. Respondents recognised the tole that linking RGGOs to the UK ETS reporting in the future could help drive demand for GGSS, increasing market confidence and incentivising investment.

[49] At the time of the interviews, this was at consultation stage.

- Interactions with the Renewable Energy Assurance Limited (REA), which carries out a range of certification activities to promote renewable energy, were described as positive, facilitating smooth engagement with UK markets. Because of REA, dealing with UK markets was not a source of difficulty.
- The support landscape includes schemes such as the Feed-in Tariff (FiT)[50] and Renewables Obligation. Respondents noted that the FiT previously drove rapid AD deployment by providing a stable revenue stream for biogas-to-electricity projects. With FiT no longer available, investment focus has shifted to biomethane under the GGSS. The success of FiT highlighted the need for long-term financial stability to sustain sector growth.
- The move towards net zero is fostering a wider public understanding and support for renewable energy initiatives.

Applicants highlighted that they plan to utilise additional government policies, such as carbon trading mechanisms, once fully registered.

Challenges with Wider Policies

While these policies offer opportunities for synergy, they also present challenges that affect applications and participants in the GGSS. Respondents identified challenges that they believed limit the effectiveness of these policies. Note that the cited challenges were not reported by all respondents – each participant mentioned points that were relevant to them:

- 20% Ongoing applicants observed uncertainty surrounding the interaction between GGSS and EU markets, especially for RGGO certification, which they believed inhibits their ability to trade in European markets.
- The time between the ATR call for evidence and the response is long[51], and Defra's Simpler Recycling consultation was lengthy; alongside political shifts, these time spans contributed to slow decision-making processes. Although, one applicant stated that the Renewable Energy Association and Anaerobic Digestion and Bioresources Association reminded them of consultations, helping them to monitor the political context.
- The fragmented sustainability requirements for transport and heat sectors were noted as a source of confusion, particularly in relation to the wider available support for biomethane production. Respondents recommending the establishment of a unified body to set clear cross-sector objectives across sectors.
- One Ongoing applicant also highlighted a public relations challenge: biomethane and biogenically generated electricity are often conflated with biomass, which has received negative media attention due to concerns about its environmental impact. This misperception complicates efforts to promote locally sourced energy crops for biomethane production.

[50] FiT is being used by other plants owned by some GGSS applicants, who opined on the experience of the various schemes. Though, the Renewables Obligation, which is separate from FiT, supports biogas.
[51] The GGSS 2024 ATR call for evidence was open between 29 April 2024 and 27 May 2024, and the response was published on 30 August 2024.

- Food waste shortages for feedstock hampered some applications to the GGSS. Non-Applicants suggested that stricter government action on waste separation, or policies encouraging food waste, could encourage consumers to sort food waste more effectively. Some Non-Applicants suggested introducing a carbon-based mechanism with higher tariffs for low-carbon-intensity feedstock, which could further support feedstock supply.

A common theme among respondents was the need for greater coordination and collective input among stakeholders to ensure alignment with decarbonisation objectives.

Assessment of GGSS and GGL Contribution to Outcomes and Impacts

This chapter presents findings from the second GGSS process evaluation that related to outcomes and impacts as well as the interim contribution analysis. Detail of the evidence and analysis, and the associated limitations to the analysis, that has contributed to the narrative below is detailed in Annex 6. This chapter covers the Outcomes and Impacts detailed within the ToC (refer to Annex 2).

Scope of Assessment

The evaluation has yet to conduct a formal impact evaluation workstream. However, as per the evaluation design, contribution claims developed in the initial evaluation scoping stages have been tested against the agreed expected evidence based on evaluation evidence gathered to date. These contribution claims will be revisited following the impact evaluation workstream completion (in 2025) to provide a final assessment of programme contribution to impact.

Enabling Policy Effects

The respondents for the second GGSS process evaluation were asked about the alternative uses of biomethane and economic benefits to gather evidence on the causal pathway from the policy inputs to the impact of the scheme.

Innovation Opportunities

While discussing alternative uses of biomethane and other support schemes to supplement revenue, some applicants stated that they were considering how to monetise digestate or CO_2. AD is a natural process driven by microorganisms; it produces biogas and, through upgrading, biomethane and biogenic CO2. AD plants also produce digestate, a by-product of biogas generation. The ability to monetise digestate was seen as an incentive to apply to the GGSS. Some applicants were still considering how to monetise digestate or CO_2. However, 60% of Ongoing applicants noted innovation opportunities through by-products that provide additional revenue streams. These included:

- Monetising CO_2 capture and digestate for fertiliser and clean water, in acknowledgement of gas and RGGOs price decreases reducing profitability elsewhere.
- Creating a ‘circular economy’ by providing the digestate to farmers with the agreement that the farmers provide them with waste as feedstock. Most applicants observed cost in transporting feedstock, so are aiming to secure feedstock from the local area. Applicants, however, are willing to absorb some transport costs if alternative uses for digestate can provide value for money.

- Using biomethane to help decarbonise heavy goods vehicles.
- Securing offtake agreements with large organisations, such as those within the food and beverage industry, to whom they will sell CO_2.

Non-Applicants felt that the digestate produced by plants is a valuable product, but believed wider government policy could support its use. Specifically:

- One Non-Applicant noted that they could turn the digestate into fertiliser pellets if they were able to use heat. The resultant reduced volume would reduce the transport needed to take the digestate offsite.
- One Non-Applicant suggested a tax break for farmers to use digestate instead of them buying artificial fertilisers.

Economic Benefits

The GGSS is seen as a contributor to skills development in, and education of, biomethane. This, in turn, is expected to promote employment and supply chain market growth in the renewables sector, particularly as more AD plants are commissioned. In fact, one Ongoing applicant quoted 10 people per plant will be employed, once fully registered[52]. Local projects and job creation were noted as important for fostering community buy-in and supporting the overall growth of renewable initiatives in underrepresented areas. Applicants and Non-Applicants highlighted a need for improved public understanding of biomethane's benefits to secure local support, particularly in rural areas.

Interim Contribution Analysis

An interim contribution analysis was performed on the causal pathway to three impacts for the GGSS: reducing GHG emissions, increasing renewable heat production, and increasing investment in the AD biomethane sector. The causal pathways relating to GGL impacts were also updated with the emerging evidence, where applicable.

Impact on Reducing Greenhouse Gas Emissions

A core objective of the GGSS is a reduction in greenhouse gas emissions. Three contribution claims (**GGSS CC1, GGSS CC2, GGSS CC3**) were tested in relation to this benefit area.

Based on the limited evaluation evidence to date, it is not possible to establish a causal relationship between the GGSS and a reduction in greenhouse gas emissions through displaced natural gas (**GGSS CC1**). This is largely a timing issue. Moderate evidence of growing scheme demand, alongside a lack of systematic deployment outside the scheme, suggests that growth in biomethane production and injection relies on the GGSS. However, actual evidence of significant levels of biomethane injection into the grid (necessary to displace emissions from natural gas usage) is absent. It is anticipated that, in time, this will change,

[52] Note: Applicants did not confirm that the GGSS had created new jobs while they were progressing through the application process (only one respondent has successfully deployed, but sharing their view would be disclosive). Applicants anticipate new jobs will be created once their AD plants are deployed.

given the fact that the majority of plants with tariff guarantee are still in the process of registering. Therefore, as more plants register onto the scheme and begin injecting, it is expected that the available evidence may become more supportive of impact in this area.

The evaluation identified that, where plants have deployed (or have shown their intention to deploy through applying to the scheme), this is not something that can be explained by market forces. There was strong evidence to reject the alternative hypothesis that the biomethane market was a key driver for AD plants deploying or intending to deploy.

The evaluation also sought to test whether the GGSS sustainability and compliance regime was sufficient to ensure that any benefits in terms of emissions reductions are not offset through lifecycle emissions associated with biomethane production (**GGSS CC2**). With limited GGSS plant deployment, it has not yet been possible to gather sufficient evidence on this impact area. To the extent of deployment at the time of delivery, the GGSS impact evaluation will test whether or not plants did comply with sustainability requirements, and whether this was motivated primarily by GGSS policy design, or by other wider factors such as environmental ambitions of the organisation or compliance with wider regulations.

The evaluation further theorised that the GGSS (through its requirement of a minimum of 50% of feedstocks from wastes and residues) may have an impact on greenhouse gas emissions by ensuring that 'upstream emissions' occurring through organic waste entering landfill could be avoided (**GGSS CC3**). A similar narrative to the above emerges, in that, as plants have yet to deploy in great numbers, this theory is not yet supported by the evidence. However, the fact that 15 new AD plants hold tariff guarantee confirms that these AD plants intend to meet this criterion and expect to be able to access the required feedstock. The planned impact evaluation research will test more fully the reasoning of plant operators to understand whether GGSS policy design was crucial to encourage plants to adopt this level of waste feedstock threshold.

There is insufficient evidence at this stage of the evaluation on the market view of waste feedstock, with only a small number of non-GGSS AD plants responding to evaluation survey research (although, it is anticipated that greater evidence will be available for the final evaluation). However, moderate evidence was found to challenge the view that without the GGSS criteria, plants may have met threshold levels of waste feedstock purely for economic purposes. The challenging market conditions (e.g. limited waste feedstock availability) provide some level of indicative evidence that the market alone is unlikely to support greater adoption of waste feedstocks. A further key aspect of this theory, as yet untested, is the extent to which utilising waste feedstock can be equated with avoiding upstream emissions. This again will be tested in the impact evaluation.

Impact on Renewable Heat Production

A second core objective of the GGSS is to see an increase in the amount of heat produced from renewable sources. The objective to see an increase in renewable heat as a result of increased biomethane injection, directly replacing natural gas used for heating, is core because it is expected to be on the causal pathways to biomethane market growth and other

economic benefits (e.g. job growth, GVA). One contribution claim (**GGSS CC4**) was tested in relation to this area of impact. In addition to testing whether or not the GGSS had incentivised AD plant deployment, the evaluation has explored the extent to which biomethane produced had been (or was likely in the future) to be injected into the grid, rather than used for other purposes (e.g. renewable transport fuel through the RTFO).

As previously discussed, there is some supportive evidence that GGSS was a key factor in incentivising deployment and will, in time, lead to biomethane production as more plants complete their plant construction and GGSS registration. Early evidence suggests that other potential uses of biomethane produced by these newly deploying plants will be less prominent and a high proportion will be used for renewable heat production. However, this initial finding is based on a small sample and not yet conclusive.

Impact on the AD Biomethane Sector

A final stated objective of the GGSS is to support investment and growth of the AD biomethane industry. Four contribution claims (**GGSS CC5, GGSS CC6, GGSS CC7, GGSS CC8**) were tested on this impact area.

The evaluation was able to find strong support for the contention that GGSS tariff rates were appropriately set and monitored, to ensure developers could implement viable business models and make the case to invest in AD plant construction (**GGSS CC5**). Evaluation evidence included the moderately strong demand for the scheme, with 53 applications (of which 27 represent unique plants[53]) and evidence of pipeline of plants yet to apply among non-applicants. This is tempered only by the fact that in the upcoming scheme years, there is still some unallocated budget. As of October 2024, 11.2% of the FY24/25 budget and 18.4% of the FY25/26 budget remain unallocated, suggesting additional capacity for new projects. Evidence from process interviews suggested that the tariff rates were also an important determinant of the size of plants deploying onto the scheme, providing some further evidence of a link between tariff rates and plant deployment. Indeed, there was strong evidence from the sector that without GGSS tariff guarantee, new plants would not have been economically viable and would not have been constructed. Hence, the evaluation has found that the GGSS tariff guarantees have a causal influence on the investment in the sector.

It was further theorised that government signals of continued support for biomethane production and injection (post-ND RHI closure) had provided confidence in the market that would encourage current market operators (developers, investors) to remain in the market and new operators to enter, contributing toward growing an eventually self-sustaining market (**GGSS CC6**). Evaluation evidence at this stage was inconclusive and provided only weak support that the GGSS has had an impact on market confidence. There was similarly supportive, though ultimately inconclusive evidence, that policy signals beyond the GGSS (i.e. any potential future government support for biomethane production and injection) played a role in driving market confidence. There was, however, less supportive evidence that the wider market forces, rise of green financing and environmental, social and governance (ESG)

[53] The remaining applications are resubmissions.

investing were significant in contributing to this impact area, although again, evidence was not available to conclusively reject this as an alternative explanation.

Related to the above area of impact, the evaluation sought to test the extent to which the GGSS gave confidence to the wider AD plant supply chain in the UK (e.g. component manufacturers, plant operators) to invest and support growth in skills and capacity (**GGSS CC7**). At this stage, the evaluation found little evidence to support this contribution claim of impact, with expected suggestive evidence such as plants relying on local supply chains and creating new jobs, not found. Indeed, process evaluation findings highlighted a strong degree of reliance on international supply chains for AD plant manufacture and construction. The impact evaluation will target more direct evidence gathering on supply chains and sector bodies. However, the evidence to reject the view that the AD biomethane supply chain would be likely to grow organically without the presence of the GGSS was stronger. There was no conclusive evidence to reject, but there was strong evidence to indicate that this was not the case.

Finally, the evaluation tested the impact of the GGSS on innovation (and resulting cost reduction) in the sector (**GGSS CC8**). Given most plants have yet to deploy, opportunities to test this expected impact were limited and no supportive evidence was identified.

Impact of the Green Gas Levy

The evaluation has also explored the impact of the GGL. First, it considered its impact on facilitating the GGSS (**GGL CC1**), as well as its impact on consumer gas bills (**GGL CC2**). Finally, it considered the impact on future policy making with regard to levies on fossil fuels (**GGL CC3**).

At this interim stage, there is limited but supportive evidence that the GGL is appropriately designed to fund the GGSS. However, interim evidence regarding the alternative hypothesis remains inconclusive due to timing, as the levy had not been fully tested when the GGL process evaluation was conducted.[54] Therefore, further evidence is required as part of the GGL impact evaluation (both monitoring data and interviews).[55]

There is evidence from the process evaluation that the GGL is working as intended, that is, it is collecting sufficient funds to make payments to biomethane producers on the GGSS. Feedback has highlighted that the amount collected by the levy has exceeded the payments made, however, this imbalance is not evidence that the levy did not work as intended. The consistent view across all respondents was that the process to set the levy each year worked well, and the steps to set the levy were clear and easily repeatable year-on-year. Department stakeholders also expressed confidence that the levy would do what it was intended to do, in terms of sufficiently funding the GGSS.

In terms of impact on end users' bills (**GGL CC2**), it is too early to say whether the causal hypothesis is supported. There is weak evidence to support the view that the GGSS budget

[54] Note: The GGL process evaluation was conducted in 2023, the wider evaluation's first year.
[55] Note: The GGL impact evaluation commenced in early 2025.

management process ensured that the levy rate was kept at an acceptable level from process findings, but further time is required to fully test the operation and effect of the GGL from when evidence was collected. At the time of the evaluation research with gas suppliers, the levy rate was low, reflecting low deployment onto the scheme. Hence, full evidence of levy impact is limited.

Finally, on policymaking, it is too early to say whether the GGL has normalised levies of this sort on fossil fuel gas suppliers and provided sufficient experience to government on how to develop and design such levies in the future (**GGL CC3**).

Learning and Implications

A summary of the learnings captured in the preceding chapters and implications of the evaluation findings on how the GGSS and GGL are operating in practice, with findings derived from the respective ToCs.

The increase in tariff rates for Tier 3 from 2023 ATR as well as Tier 1 and Tier 2 (alongside Tier 3) from 2024 ATR were positively received by the affected stakeholders, especially for helping to support the necessary capacity for AD projects (e.g. food waste sector). However, rising costs in AD plant development due to inflation and supply chain constraints present financial challenges that the current GGSS budget management structure may not fully accommodate. Without flexibility[56], smaller plants may face financial strain. Incorporating flexibility in tariff adjustments would allow project to better cope with unexpected financial pressures, supporting a wider range of applicants in achieving project viability.

The evaluation has found that external barriers (e.g. availability of sufficient waste feedstocks, planning permissions) have been more significant than internal barriers (e.g. application burden due to the breadth of information required) in contributing to the slower than hoped uptake of the scheme. Ofgem was praised for providing clear guidance and being available to efficiently resolve difficulties – this echoes the sentiments in the first process evaluation. However, Stage 3 documentation requirements and communication gaps created delays and administrative burdens for applicants. Simplifying Stage 3 guidance, developing streamlined guides, and including explanations for technical aspects would reduce applicant workload and enhance applicant experience.

Extending the application deadline to 2028 in the Mid-Scheme Review was welcomed, as it is perceived to give time to obtain planning permission, talk to the local community, secure investment, and create supply chain contracts. However, limited and fragmented feedstock supply options, exacerbated by high transport costs, add to the operational challenges for AD plants, potentially limiting scheme uptake. Policies that promote local and sustainable feedstock sourcing, such as food waste segregation requirements, could provide more reliable feedstock for AD plants.

Limited support for by-products like digestate and CO_2 constrains project profitability, reducing financial sustainability for AD plants. Without a clear market or Government incentives, these by-products can become a cost burden rather than a revenue source. Establishing incentives or a structured market for by-products could increase the financial viability of biomethane projects, reducing waste and promoting circular economy practices.

[56] Flexibility was mentioned in reference to tariff structures, implying that smaller plants would have liked more frequent, or sufficient, adjustments to help alleviate any financial burden that they face.

Next Steps

This is the second, and final, process evaluation of the GGSS. It was complemented by preliminary contribution analysis, which has been updated annually with all available evidence to date, to test the adequacy of the GGSS and GGL processes of leading to the impacts. The programme evaluation moved onto the GGSS and GGL impact evaluations in January 2025. These will systematically assess the impact of the programme – that is, assess what difference the GGSS and GGL makes. It will build on the learning of this report, providing additional insights into what works well and what works less well, responding to all the evaluation questions. The next pulse survey commenced in January 2025. The impact evaluation interviews and second pulse survey will be followed by the final contribution claims workshop, allowing for robust contribution analysis for GGSS and GGL. Subsequent work will benefit from engagement with increased numbers of participants and increased evidence on scheme processes post-award.

This publication is available from: www.gov.uk/government/publications/green-gas-support-scheme-ggss-and-green-gas-levy-ggl-interim-evaluation-2025

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