

Public consultation:

Competitive bidding process for State aid for upgraded biogas and other gasses from renewable sources that can be injected into the Danish gas system

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1. Introduction

The Danish Energy Agency (DEA) invites potential bidders, relevant market operators and other interested parties to give their views on the forthcoming tenders on aid for upgraded biogas and other gasses from renewable sources.

The DEA assesses that the tenders constitute State aid as defined in art. 107(1) of the Treaty on the Functioning of the European Union (TFEU). The scheme is designed following the Commission's Guidelines on State aid for climate, environmental protection and energy 2022 (CEEAG)¹ to ensure compatibility with the internal market under art. 107(3)(c) of the TFEU.

According to section 4.1.3.4 of the CEEAG, Member States must conduct a public consultation, asking for opinions on the scheme's competition impact and proportionality. The requirement went into force on 1 July 2023.

The duration of the public consultation should, according to point 99(a) of the CEEAG, be at least six weeks and should cover the following topics:

- i). The scope of the technologies eligible for aid under the scheme.
- ii). Proposed use and scope of the competitive bidding process and any proposed exceptions.
- iii). Main parameters for allocation of the aid, including for enabling competition between different types of beneficiaries.
- iv). Main assumptions used to demonstrate the incentive effect, the necessity and the proportionality of the aid.
- v). Method and estimate of subsidy per ton of CO₂e emission avoided (per reference project).

The structure of this memo is as follows: Sections 2-7 outline different aspects of the scheme, including the background, the objective of the scheme and the information relating to the topics listed above. Section 8 includes a list of questions covering the topics above, which the DEA kindly asks any interested party to answer. Section 9 provides practical information regarding the submission of contributions to the public consultation.

A draft of the conditions for the competitive bidding process in Danish can be found on the DEA's website². Please note that the conditions for the competitive bidding process may be changed before the opening of the first bidding process due to answers received following this consultation or for other reasons.

2. The background and objective of the scheme

2.1 A new model for State aid for green gas

On 22 June 2020, a majority of the political parties of the Danish Parliament concluded the Climate Agreement on Energy and Industry 2020 (Climate Agreement

¹ Communication from the Commission, Guidelines on State aid for climate, environmental protection and energy 2022 (2022/C 80/01) (CEEAG).

² Further information, including the latest draft for conditions for the competitive bidding process, is available in Danish at: <https://ens.dk/ansvarsomraader/bioenergi/stoetteudbud-til-biogas-og-andre-groenne-gasser>.

2020)³. According to the Climate Agreement 2020, there is a need for biogas and other green gasses to supplement electricity from renewable sources in the energy system and for green gasses to contribute to the green transition of industrial processes that cannot be electrified. According to the agreement, the aid should be awarded based on a competitive bidding process.

On 21 December 2021, the parties behind the Climate Agreement 2020 reached an agreement on the price model for the aid to be awarded under the tender, according to which the aid should be paid as a fixed price premium per GJ injected into the Danish gas network⁴.

The planned scheme would be the first time State aid for upgraded biogas and e-methane is awarded based on a competitive bidding process in Denmark. The former schemes for biogas were not based on a competitive bidding process, and there has not previously been a State aid measure for e-methane in Denmark⁵.

The Danish Climate Act of June 2020 sets a legally binding target for Denmark to become climate neutral in 2050 and two intermediate goals in 2025 and 2030 of achieving 50-54% and 70% reduction of national greenhouse gas (GHG) emissions compared to 1990⁶. These goals complement the EU's climate protection target in the EU Climate Law of reducing GHG emissions by at least 55% by 2030 and becoming climate neutral by 2050⁷. According to the Climate Agreement 2020, it is estimated that the planned tenders for aid for upgraded biogas and other green gasses may reduce GHG emissions by approx. 0.2 million tons CO₂e annually by 2025 and 0.7 million tons CO₂e annually by 2030. Thus, the scheme will play an important part in reaching Denmark's climate ambitions. However, the scheme will also contribute to the EU's transition from fossil fuels to renewable energy.

2.2 Timeline and number of competitive bidding processes

The competitive bidding processes are planned to be held in the period 2023-2030. At the moment, the plan is to conduct five bidding rounds. The aid payment will commence 1-2 years after the specific bidding round when the installation is connected to the gas network and will continue for up to 20 years.

³ Climate Agreement for Energy and Industry etc. 2020 of 22 June 2020, available in Danish at: [https://kefm.dk/Media/8/8/aftaletekst-klimaafale-energi-og-industri%20\(1\).pdf](https://kefm.dk/Media/8/8/aftaletekst-klimaafale-energi-og-industri%20(1).pdf).

⁴ Follow-up agreement regarding the climate agreement for energy and industry of 21 December 2021, available in Danish at: <https://kefm.dk/Media/637757616832904692/Opf%C3%B8lgende%20aftale%20ifm.%20Klimaafale%20for%20energi%20og%20industri%20mv.%2021-12-2.pdf>.

⁵ Commission Decision of 14 November 2023 in case SA.35.485 2012/N – Denmark Aid for all forms of biogas use – A, and Commission Decision of 16 December 2015 in case SA.36.659 2013/N – Denmark Aid for all forms of biogas use – B.

⁶ Consolidated Act no. 2580 of 13 December 2021 on the Climate, available in Danish at: <https://www.retsinformation.dk/eli/lta/2021/2580>.

⁷ Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and mending Regulations (EC) No 401/2009 (EU) 2018/199 (European Climate Law).

The budgets (in 2020 prices) on total payments from the state to the winning bidders in each round of the competitive bidding process are:

1. Bidding round 6.400 million DKK (payments from 2024)
2. Bidding round 1.500 million DKK (payments from 2027)
3. Bidding round 1.500 million DKK (payments from 2028)
4. Bidding round 1.800 million DKK (payments from 2029)
5. Bidding round 1.760 million DKK (payments from 2030)

If the budget in one round of the competitive bidding process is not exhausted, i.e. there are residual funds available, the remaining unallocated funds can be transferred to subsequent rounds.

3. Eligibility

3.1 Technologies eligible for aid

Gases eligible for aid under the scheme will be upgraded biogas and e-methane derived from renewable energy sources and injected into the Danish gas system.

Upgraded biogas is based on biomass such as slurry, manure and organic waste. Before biogas can be injected into the gas system, it must be upgraded, which implies separating the carbon dioxide from the methane whereafter the upgraded biogas can be injected into the gas system. The winning bidders must comply with the sustainability requirements, including energy crops and methane loss, set out in the Danish Promotion of Renewable Energy Act (the RE Act)⁸ or executive orders issued under the provisions of the RE Act. The DEA will be entitled to suspend the payment of the aid if the beneficiary fails to comply with these requirements.

The scheme will also include synthetic e-methane based on the carbon dioxide from the biogas upgrading process and hydrogen. For e-methane to be eligible for aid under the scheme, hydrogen must be produced using only electricity from renewable energy sources. Thus, the winning bidder must comply with the Commission Delegated Regulation (Delegated Act)⁹, which supplements the directive on the promotion of the use of energy from renewable sources (REII Directive)¹⁰ when producing e-methane.

E-methane may be produced in a separate catalytic unit upgrading unit, where the carbon dioxide separated via the upgrading unit is added to the hydrogen from an electrolyser. In this case, the output is e-methane, which is measured at the exit from the catalyser.

The scheme will also be open to methanation using biological methods where hydrogen is added to the biogas reactor, and the CO₂ in a biological process is

⁸ Consolidated Act no. 1791 of 2 September 2021 on the Promotion of Renewable Energy, available in Danish at: <https://www.retsinformation.dk/eli/lta/2021/1791>.

⁹ Commission Delegated Regulation (EU) 2023/1184 of 10 February 2023 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin.

¹⁰ Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources.

converted into methane through bacteriologic and archaic activities. In this case, the output is both biogas and e-methane. The entire measured output may be eligible for aid if it is produced on a combined biogas/e-methane plant.

Existing biogas plants, which receive aid under the old schemes¹¹, may also be eligible for aid under the tenders if the plant is expanded, enabling e-methanation in the existing biogas reactor. In such a scenario, the amount of aid paid under the measure will be based on the energy content of the added hydrogen from the electrolyser, with a technical deduction from losses of hydrogen in the process.

Thus, the scheme includes both the expansion of existing biogas plants and new biogas plants. However, expansions of existing plants must entail significant new additions to the biogas plants, such as a new biogas reactor and an upgrading facility. For e-methane production, the expansion must include an electrolyser for hydrogen. Consequently, an expansion may be at the same location as an existing biogas and upgrading biogas plant.

3.2 Technologies not eligible for aid

Not all technologies producing gas that can be injected into the Danish gas system will be eligible for aid under the scheme. For example, gas produced by pyrolysis will not be able to be awarded State aid under the scheme.

Pyrolysis is a process in which organic waste from agriculture and forestry is converted into biochar, gas, and oil by heating the waste to a high temperature without oxygen. In the pyrolysis process, half of the carbon in the waste is converted into biochar, while the other half becomes oil and gas. The gas from pyrolysis contains methane and ethylene, which are separated from the other gases. The DEA finds that technology is immature, and only test and demonstration plants have until now been established.

Moreover, solid biomass based on wood is a limited resource on which Denmark already is heavily dependent. Solid wood biomass accounts for most of the renewable energy produced and used in Denmark and has increasingly replaced the use of coal in the electricity and heating sector. To ensure diversity in the energy mix, Denmark does not wish to pursue the use of additional wood-based biomass in its energy mix by allowing wood pellets for pyrolysis, as this would push for higher demands for wood pellets instead of using biogas based on residual biomass, such as slurry, manure and organic waste.

To avoid undermining the environmental protection objectives, aid will not be granted under the envisaged scheme for gas from pyrolysis, as it would likely displace less polluting forms of energy, such as biogas produced by residuals from agriculture.

3.3 Project maturity

The bidders will be responsible for finding locations for the plant and obtaining all relevant approvals.

Before the bidders may participate in the competitive bidding process, they must have obtained an opinion from the competent authority stating the scope and level

¹¹ See footnote 5.

of detail of the environmental information, which the bidder must submit to the authority in the form of an environmental impact assessment report (the Opinion)¹².

If a bidder has received a decision to grant development at the time of the competitive bidding process, the bidder may submit this decision instead of the Opinion. Bidders that are not obliged to obtain the Opinion must have received a decision from the competent authority stating that the project in question is not encompassed by the requirement of an environmental impact assessment and development consent to participate in the competitive bidding process¹³.

For e-methane projects that are directly subject to environmental assessment, i.e. covered by appendix 1 in the Danish Act on Environmental Impact Assessment, a statement from the environmental authority stating that the project is described at a sufficiently detailed level so that the first public comment phase of the environmental assessment process can be initiated will be sufficient to participate in the bidding process¹⁴.

Furthermore, the bidders must also have concluded a conditional contract with the Danish Transmission System Operator, Energinet, or the Danish Distribution System Operator, Evida, who own and operate the gas distribution network in Denmark. The contract between a bidder and Energinet or Evida must be conditional on the bidder being successful in the competitive bidding process.

4. Proposed use and scope of competitive bidding processes

As stated in section 2.2 above, the scheme will include a maximum of five bidding processes to be carried out over a period of up to six years. Each bidding process will be open to all eligible technologies described in section 3 above. Hence, projects including upgraded biogas and projects including e-methane will compete with each other for the aid, and there will be no special requirements that apply to only one type of potential bidder.

There will be no size limit for the installations per bid, and a bid can involve the construction of one or more biogas upgrading plants and e-methane plants or installations composed of both a biogas upgrading plant and an e-methane plant. The only limit to the bids will be the overall budget for each bidding round.

The DEA will ensure that competitive bidding processes will be open and based on clear, transparent and non-discriminatory criteria. The conditions for the bidding process, the contract and other relevant documents will be published on the DEA's website at least six weeks before the deadline for submission of bids.

¹² Section 23 of consolidated act no 4 of 1 March 2023 on the assessment of the effects of certain plans, programmes and concrete projects on the environment, available in Danish at: <https://www.retsinformation.dk/eli/lta/2023/4> (the Danish Act on Environmental Impact Assessment).

¹³ Section 21 of the Danish Act on Environmental Impact Assessment.

¹⁴ The Danish Act on Environmental Impact Assessment.

5. Main parameters for allocation of the aid

5.1 Ranking of the bids

The bidders must state a price in DKK per GJ for the first 20 years of operating the biogas plant or e-methane plant from the date on which the installation injects upgraded biogas or e-methane into the Danish gas system for the first time, as well as the volume of gas to be produced each year, in their bids. This price will be the premium the beneficiary will receive on top of the spot market price for natural gas. The volume sets the upper limit for how much aid each plant may receive in a year.

A bidder may submit independent bids for different installations. However, a bid may not be conditional on the award of contracts concerning plants included in another bid.

The aid will be awarded following a pay-as-bid principle, where the only criteria for ranking the bids will be the price per GJ of gas. The type of gas, i.e. upgraded biogas or e-methane, will not be considered. Thus, aid contracts will be awarded to the bids with the lowest price, provided they can be kept within the available funds.

If several bids contain the same price, the bids in question will be ranked according to the quantity of gas, from the largest to the smallest.

If two or more bids, each of which but not together may be accommodated within the available funds, contain the same price and the same quantity of gas, the bids in question will be ranked through a drawing of lots.

5.2 Flexibility mechanism – marginal bid

A marginal bid means a bid that, based on the ranking mechanism outlined in section 5.1 above, could be awarded a contract but which would entail that the available funds are exceeded. If there is a marginal bid, the DEA will offer the bidder with the marginal bid the opportunity to downscale the quantity of gas such that it is within available funds but at the original bid price.

6. The incentive effect, the necessity and the proportionality of the aid

6.1 The incentive effect and the necessity of the aid

To be considered compatible with the internal market under TFEU art. 107(3)(c), the State aid must have an incentive effect. According to point 26 of the CEEAG, an incentive effect occurs when the aid induces the beneficiary to change its behavior to engage in additional economic activity or a more environmentally friendly economic activity, which it would not carry out without the aid or would carry out in a restricted or different manner. Moreover, to be approved, the aid must also be necessary, which, following point 38 of the CEEAG, also requires showing that the aid project would not be carried out without the aid.

As elaborated below, due to the difference between production costs and the expected profits of the investment, the DEA assess that gas injected into the Danish gas system produced from upgraded biogas and e-methane cannot compete on market terms in Denmark with gas generated from conventional fossil gas

production. Without the aid, there would be a funding gap, and upgraded biogas and e-methane would not be financially viable. Therefore, the DEA assesses that the aid from the scheme is necessary and has an incentive effect.

Upgraded biogas

Based on the DEA-financed Energy Technology Development and Demonstration Program project described in the report *Danish Gas Technology Centre: Production of upgraded biogas from 2020*¹⁵, the DEA has calculated the funding gap for the biogas reference projects. The calculation includes an overview of the main costs (investment, biomasses, operation, maintenance, cleaning and injection) and revenues (aid and sale of gas and Guarantees of Origin (GOs)) during the 20-year lifetime of the project in 2020 prices. The gas price projection used is from the DEA's publication *Denmark's Climate Status and Outlook 2021* and does, thus, not reflect the increase in gas prices happening since the autumn of 2021.

Four scenarios have been created to reflect uncertainty regarding income from GOs. One includes income from GOs equal to the price of EU Emission Trading System (ETS) CO₂ quotas, based on the fact that biogas GOs can be used instead of paying EU ETS allowances. Furthermore, two scenarios include income from GOs: One at 50% higher than the EU ETS CO₂ quotas and one at 50% lower to reflect variations and uncertainty of the price of GOs. The last scenario does not include income from the sale of GOs. All scenarios show a funding gap, i.e. that the aided projects would not be financially viable without aid for upgraded biogas. Results of the funding gap analysis are found in table 1 below:

Table 1 – Funding gap for upgraded biogas

Scenarios with different GO prices	GO price equal to Quota price	Low scenario -50%	High scenario +50%	No income from GO
GO price DKK/GJ	29.6	14.8	44.4	0
Funding gap DKK/GJ	47	62	33	78

E-methane

The DEA estimates the Levelised Cost of Energy for e-methane to be DKK 190 per GJ. Based on this result, four scenarios funding gap scenarios for e-methane, similar to the above for upgraded biogas, have been estimated:

Table 2 – Funding gap for e-methane

Scenarios with different GO prices	GO price equal to Quota price	Low scenario -50%	High scenario +50%	No income from GO
GO price DKK/GJ	29,6	14,8	44,4	0
Funding gap DKK/GJ	117,4	132,2	102,6	147

6.2 Start of works

In addition to the above, the DEA will also ensure that the aid has the required incentive effect, by requiring the individual project bidders to declare that the work on the project has not started, as defined in point 19(82) of the CEEAG, before the submission of their bids.

¹⁵ The report, which is in Danish, is available at: https://dgc.dk/media/bejblfib/produktion_opgrad_biogasoptimering.pdf

6.3 Proportionality of the aid

The DEA assesses that there will be sufficient competition in the competitive bidding process to ensure that bidders offer the lowest possible price per GJ of upgraded biogas e-methane to be injected into the gas grid. Hence, the DEA preliminary assesses there to be more than enough projects in the pipeline to exhaust the budgets for at least the first two bidding processes.

However, despite the indication of strong competition for the funds under the scheme, the DEA suggest the following mechanism to ensure the proportionality of the aid.

Bid cap and pay-out cap

Besides granting the aid through a competitive bidding process, the DEA plans to introduce a bid cap and a pay-out cap to safeguard against very high bids and ensure that aid payment decreases if the market price for natural gas rises above expected levels.

Thus, the DEA will include a bid cap of DKK 100 per GJ (2020 prices). Moreover, if the spot market price for natural gas exceeds DKK 120 per GJ (2020 prices), the price premium will be lowered by DKK 1 for each DKK 1 the spot market price for natural gas exceeds DKK 120 per GJ. If the spot market price exceeds DKK 120 per GJ plus the premium, the aid to be paid will be zero, i.e. the winning bidders will not have to pay the Danish Government.

The DEA believes that the bid cap and the pay-out cap will ensure proportionality both in the situation where the beneficiaries will be allowed to issue and sell GOs and the situation where beneficiaries will not be allowed to issue and sell GOs for gas produced under the scheme.

Cumulation

Projects which receive aid under the present scheme may not receive any other aid.

Duration of support

As stated in sections 2.2 and 5.1 above, the premium will be paid for up to 20 years. The lifetime of a biogas plant and an e-methane plant is estimated to be 20 years. The lifetime for the upgrading facility is expected to be 15 years but only accounts for approximately 7 % of the total investment in a biogas production facility. Therefore, the overall lifespan for all projects eligible for aid under the scheme is estimated to be 20 years. Hence, as Danish accounting rules allow for depreciation over the entire lifetime of an installation, no aid will be dispersed after the plants are depreciated.

7. Method and estimate of subsidy per ton of CO_{2e} emission avoided

The DEA has estimated the subsidy per ton of CO_{2e} avoided for each of the four scenarios based on the GO price described above in section 6.1. The CO_{2e} reduction for upgraded biogas includes the emission reductions from agriculture and the substitution of fossil natural gas with biogas, as well as the emissions from methane loss at the biogas plants, which are seen as the major emission flows related to upgraded biogas. The operators are obligated to use renewable energy for the operation of the plants, why no emission is related to this process. For e-methane,

the CO₂ reduction only includes the substitution effect, as there are no additional emission reductions from agriculture or methane loss from the biogas plant when producing e-methane. The total reduction per PJ biogas is estimated to be 0.061 mil. tons CO₂e for upgraded biogas, and 0.057 for e-methane as shown below:

- Reduction in agriculture: 0.02 mil. ton CO₂e/PJ biogas
- Methane loss at biogas plants: -0.016 mil. ton CO₂e/PJ biogas
- Effect of substituting fossil natural gas with biogas: 0.057 mil. ton CO₂e/PJ biogas

The estimates of subsidy per ton CO₂e avoided are found in table 2 below:

Table 3 – Subsidy per ton CO₂e avoided

Scenarios with different GO prices	GO price equal to Quota price	Low scenario - 50%	high scenario +50%	No income from GO
GO price DKK/GJ	29.6	14.8	44.4	0
Aid DKK/ton CO ₂ e reduction for upgraded biogas	770.5	1016.4	541.0	1278.7
Aid DKK/ton CO ₂ e reduction for e-methane	2059.6	2319.3	1800.0	2578.9

8. Consultation questions

The DEA invites potential bidders, relevant market operators and other interested parties to comment on the following:

1. Technologies eligible for aid

The DEA believes that the limitation of the eligible technologies described above in section 3 is justified. However, the DEA welcomes any comments regarding the eligibility of the technologies under the competitive bidding process outlined in this memo.

2. Proposed use and scope of the competitive bidding process.

The DEA believes that the bidding process outlined above in section 4 is the most efficient way to ensure competition among bidders, keeping the aid for each project to the minimum needed to induce investments in bio-methane and e-methane. However, the DEA welcomes opinions on how the use or scope of the tender process could be amended to increase the competition.

3. Main parameters for allocation of the aid including for enabling competition between different types of technologies/bidders

The DEA believes that the proposed evaluation criterion outlined above in section 5 ensures sufficient competition between different technologies and obtaining the lowest possible subsidy per ton of CO₂ emission avoided. However, the DEA welcomes considerations concerning the criteria used

for allocating the aid, enabling competition between different types of technologies.

4. Main assumptions used to demonstrate the incentive effect, the necessity and the proportionality of the aid.

The DEA believes that the assessment of the counterfactual scenario, i.e. the situation without aid, stated above in section 6.1, to be a reasonable depiction of the costs and revenues of the reference projects. However, the DEA welcomes insights concerning the main assumptions used to demonstrate the incentive effect and the necessity of the aid.

The DEA believes that the assessment that there is strong competition for the funds under the scheme, together with the other safeguards described above in section 6.3, will be sufficient to ensure the proportionality of the aid. However, the DEA welcomes considerations concerning the proportionality of the aid.

5. Method and estimate of subsidy per ton of CO₂e emission avoided (per reference project).

The DEA believes that the estimates of subsidy per ton of CO₂ emission avoided stated above in section 7 to be reasonable. However, DEA welcomes any comments regarding the method used or the assumptions regarding the subsidy per ton of CO₂e emission avoided, for example, whether other parameters should be included in the estimate.

9. Participation on the consultation

The deadline for submitting input to the public consultation is January 25, 2023.

Input to the public consultation can be submitted in writing by e-mail annotated with j.no. 2023-10797 to the DEA, ens@ens.dk with copy to sncn@ens.dk or by regular mail to Energistyrelsen, Carsten Niebuhrs Gade 43, 1577 København V.