BIOMETHANE INDUSTRIAL PARTNERSHIP

A VISION ON HOW TO ACCELERATE BIOMETHANE PROJECT DEVELOPMENT

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BIP Europe
Biomethane Industrial Partnership

This is a report by Task Force 2 of the Biomethane Industrial Partnership.

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Executive Summary

A VISION ON HOW TO ACCELERATE BIOMETHANE PROJECT DEVELOPMENT

In May 2022, the European Commission introduced a target for 35 bcm sustainable biomethane production by 2030 as part of its REPowerEU plan. Policy makers and industry collaborate in the Biomethane Industrial Partnership (BIP) to achieve the target. Today, production stands at around 3 bcm, 95% of which is produced in just 6 countries (Germany, France, Italy, Denmark, The Netherlands, Sweden). In order to meet the 35 bcm target, it will be necessary to mobilise sufficient volumes of sustainable biomass, mostly waste and residue feedstocks, from across the EU and therefore additional production capacity in (almost) all Member States. Scaling up production capacity to meet the REPowerEU target requires significant capital investments. These need to be planned within the next 2 or 3 years because it often takes 18 months to construct a new production installation plus in many cases two or three years (or longer) to obtain the necessary permits.

This report analyses how project development and investment decisions can be accelerated. It covers the deliverables described in points 1 b) and c) of the adopted Work Programme for Task Force 2[1] and may be updated and expanded. It presents the analysis of Task Force 2, with a view to build a common understanding on the best ways to accelerate projects and investments in biomethane across the EU and engage with all relevant stakeholders.

Feedback on this report and further contributions[2] to the work of Task Force 2 are welcome.

The starting point is that project developers and investors will only be able to decide on investments in new production capacity if they perceive a **positive business case**. This is based on analyses of costs, revenues and the level of risk over the investment lifetime. This report analyses fundamental factors that can de-risk investments, reduce costs and help secure sufficient revenues, while considering an efficient deployment of public funds: (1) incentives, (2) access to all end use sectors and (3) existence of an EU internal market for biomethane.

Project developers will only decide on investments in new production capacity if they perceive a positive business case

Project developers, investors and end users need **clarity on the long-term role of biomethane** to replace fossil energy, i.e., a long-term vision on the role of biomethane and roadmaps to achieve them, underpinned by solid **modelling**.

Incentives

Biomethane, as a renewable energy source, is more expensive than fossil energy sources such as natural gas because the full external environmental cost of fossil energy is not included in its price. This market failure can be overcome by incentives to enable investments. These include demand side actions such as sectoral targets and biomethane quota or mandates**.**

Biomethane project developers, investors, producers and offtakers that are members of the BIP experience a patchwork of national regulation, with different strategies and incentives in place.[3]

Incentives across the EU follow specific market conditions. A key finding is that initial **production subsidies** are most suited to kick-start investments in biomethane capacity or to support investments in innovative production capacities, while **demand side actions** (such as greenhouse gas intensity targets or biomethane quotas) can replace or complement subsidies to further scale up biomethane investments in maturing markets. Such an **incentives pathway** is also described and recommended in the recent GreenMeUp study[4] produced by a research consortium and funded by the European Union's Horizon Europe programme. It consists of several steps as outlined below.

[2] For example inputs from relevant R&S projects funded by the EU Horizon programme, e.g. (not exhaustive), the GreenMeUp, NUTRI2CYCLE, RES4LIVE, MICRO4BIOGAS, FlexSNG or SEMPRE-BIO projects.

[3] This is also confirmed in the overview provided in Stefano Proietti (ISSINOVA) et al for European Commission (2019), REGATRACE D6.3 – Long term visions and roadmaps, p.16-53, see: REGATRACE-D6.3.pdf

[4] https://www.greenmeup-project.eu/

1. In national markets with little or no production today (emerging markets), production support kick-starts investments during a first market phase. This provides project developers and investors with targeted, stable revenues.[5]

2. Flexibility mechanisms ('opt-in and opt-out') added to subsidy schemes can allow producers to either receive subsidies or produce unsubsidised biomethane that can be sold to consumers in any end use sector across the EU.

3. In more developed national biomethane markets, demand-side actions such as greenhouse gas intensity reduction targets or RES targets can complement or replace national production subsidies.

4. Over time, a gradual harmonisation of national incentives could take place, including joint auctions and pan-EU incentives.

According to the analysis of the BIP Task Force 2, the incentives described in points 1 to 3 should be in place within the next 1-2 years across the EU, if the 35 bcm target is to be reached by 2030. If implemented, the four steps enable stable revenues for project developers and investors while at the same time de-risking projects because cross-border trade to consumers of choice would ultimately be facilitated. While initial production support is financed by governments, demand side actions are directly financed by consumers.

Access to consumers in all end use sectors

Access to gas consumers in all end use sectors can help to secure the highest revenues for producers and offers them a wide range of offtake possibilities. Although biomethane can replace natural gas in any end use, including in industry, buildings, electricity production, road transport and maritime transport and including LNG and CNG consumption, barriers to access certain end uses exist. This report identifies a specific barrier to use biomethane in road transport due to regulation to reduce tailpipe emissions of vehicles. This is an important barrier because the transport sector, although only requiring a relatively small quantity of biomethane in the future, can offer sufficient price signals and therefore be a large driver for new investments in production capacity.

[5] In mature markets, direct production support will play a role in stimulating investments in innovative biomethane and e-methane production capacity. Innovative biomethane is defined in this report as biomethane produced through innovative technologies that are not yet commercially available but ready for large-scale implementation (TRL>7), including gasification-based biomethane.

EU internal market for biomethane

An effective EU internal market for biomethane allows consumers to **access the most cost-efficient production locations** and benefit from competition among producers while enabling producers to **access the highest paying consumers** across the EU, helping to create a positive business case.

Several barriers and solutions have been identified that hamper the EU internal market for biomethane and the ability for producers to sell their biomethane to consumers in various end use sectors across the EU:

a. The restrictive nature of national production subsidies, which can be solved by the incentives pathway as discussed above:

b. Ensuring that national registries for guarantees or origin, following the same existing rules, are available in all Member States and are connected to an EU wide registry;

c. Ensuring that registries for sustainability certificates are available in all Member States and are connected to the EU Union Database;

d. Ensuring that the existing harmonised sustainability criteria and auditing criteria apply across the EU, including for biomethane imported from third countries;

e. Ensuring that the existing harmonised mass balancing rules apply across the EU and covering the entire EU gas pipeline system including LNG terminals and storage facilities ('single EU mass-balancing facility').

BIP Task Force 2 is convinced that if action is taken along the lines as described above well before 2030, this would enable a positive business case for biomethane investments and thus help to achieve the REPowerEU target.

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Introducing the BIOMETHANE VISION REPORT

1 Introduction

In September 2022 the Biomethane Industrial Partnership (BIP) was launched; a public-private partnership between the European Commission, Member States and the biomethane industry to jointly work to achieve 35 bcm sustainable biomethane production by 2030, as included in the REPowerEU plan.[6] Several Task Forces have been created under the BIP. Task Force2 works on acceleration of project development.

Biomethane is a decentralised form of renewable energy, with a large number of production installations with sizes ranging from 1 to 30MW capacity, different business models and varying feedstock mixes. The European gas grid enables decentrally produced biomethane to be used across Europe. However, the EU biomethane market today is fragmented, with mostly national markets and large differences in market maturity between countries. Most of the ~3 bcm EU biomethane production takes place in just six countries: Germany, France, Italy, Denmark, the Netherlands and Sweden, and is consumed nationally.[7] Other countries have far less or no biomethane production.

To meet the REPowerEU target of 35 bcm annual biomethane production by 2030, very significant capital investments in additional production capacity are needed, as explained in the next chapter. This requires tapping into sustainable biomass potentials across the EU, not just in the current top 6 markets. The existing investment pipeline falls significantly short of the required level and time is pressing because developing and building new projects can easily require 4 years time (see chapter 2). This report analyses how project development and investment decisions can be accelerated in the next 2-3 years. The starting point is that, for investments production capacity to be decided with the speed and scale needed to achieve the REPowerEU target, investors and project developers should perceive a **positive business case**. A project developer will assess whether an investment has an attractive business case using evaluation metrics such as Net Present Value (NPV) or Internal Rate of Return (IRR). These metrics evaluate the project's capital and operational costs, project risk and revenues over the lifetime of the investment. This is further explained in Chapter 2.

This report focuses on aspects that help to ensure a positive business case outside of the immediate biomethane cost structure which is analysed by Task Force 4 of the BIP. The topics addressed in this report are fundamental factors that can de-risk investments, reduce costs and help enabling sufficient revenues, namely:

- **Effective incentives**, analysed in chapter 3.
- **Access to consumers in all end use sectors** analysed in chapter 4.
- **EU internal market for biomethane**, analysed in chapter 5.

[6] REPowerEU plan (18 mei 2022), available here: REPowerEU (europa.eu)

[7] EBA (2022). Statistical report 2022. Chapter 7: country analyses.

The business case for INVESTORS

2 The business case for investors

Total biomethane production in the EU amounted to 31 TWh or almost 3 bcm in 2021.[8] This means that 32 bcm of additional capacity has to be built until end of 2029. Scaling up to 35 bcm biomethane production in 2030 requires ~€83 billion investments in 5,000 new production installations to be operational at the end of 2029.[9]

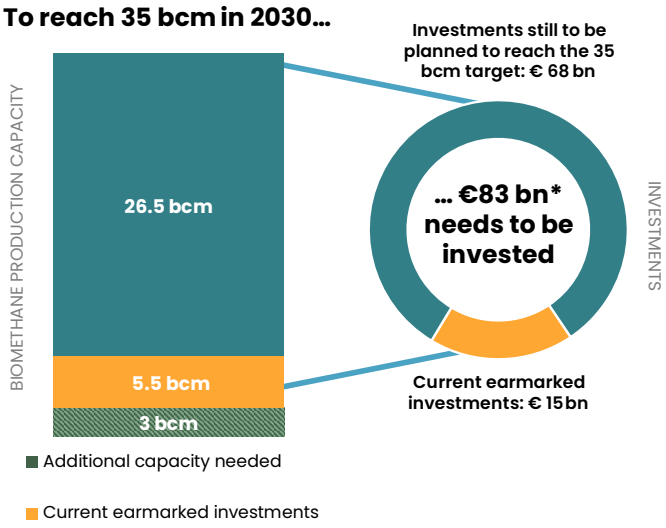

FIGURE 1. PRODUCTION CAPACITY, EARMARKED INVESTMENTS AND INVESTMENTS NEEDED

Recently, the European Biogas Association (EBA) published an overview of currently earmarked investments in the EU biomethane sector, that amount up to €15 bn.[10] That is a significant investment volume which could result in around 5.5 bcm of additional production capacity, bringing total EU production capacity to around 8.5 bcm.

This, however, falls significantly short of what is needed. Additional investments in 26.5 bcm of production are needed on top of what is planned, at an estimated capital cost of €68 billion. It will be a significant task to attract this volume of investments in time to meet the 35 bcm target.

It takes around 18 months to construct a plant, plus it can take 2 to 3 years or even longer to secure permits. This means that for production capacity to be operational at the end of 2029 (to produce 35 bcm during 2030), investment plans would have to be drawn up and permit applications preparations starting before mid-2026 at the latest. This leaves just three years to develop new projects. Shorter permitting procedures would increase the available time. This point is analysed in a separate BIP Task Force 2 report.

To attract the required levels of investments in just a couple of years' time, project developers and investors will have to be convinced that a **positive business case** for biomethane

[8] EBA (2022). Statistical report 2022. Page 26, 155.

[9] Calculated by Common Futures, assuming 4,000 new medium-sized installations of 4 mln m^3/year (around 5MW capacity, requiring €12 mln capital investment per installation) and 1,000 large installations of 16 mln m^3/year (or around 20MW capacity, requiring €35mln capital investment per installation) see here, also quoted in the 1st EBA Biomethane Investment Outlook. This volume of investment can be lowered if a share of existing biogas plants would be upgraded to biomethane.

[10] EBA, 1st EBA Biomethane Investment Outlook (2023). EBA reports a total pipeline of €18 billion, of which €3bn concern projects located outside the EU.

production exists during the lifetime of new investment projects.

The existing €15 billion investment pipeline shows that some developers and investors are convinced of a positive business case in some EU Member States already today. At the same time, a significant gap exists between earmarked investments and the required level of investment needed to meet the target. BIP Task Force 2 is convinced that this gap can be bridged if the right investment conditions are in place, on the basis of the findings as analysed in this report.

The biomethane sector is diverse, with many different installation sizes and feedstock mixes used. This means that the cost structure for each project will be different and therefore the specific business case will differ for each project. Biomethane plant sizes can be categorised into **three main groups**:

- Small scale (CAPEX < €5-8 million): projects led by agriculture players with access to feedstock at farm level, capacity of 50-250 m^3 biomethane per hour (leading to an annual production of 4.5 GWh to 22 GWh)[11];
- Medium scale (CAPEX €7-25 million): feedstock is sourced from several farms, or using municipal organic waste, capacity of 250-1000 m^3 biomethane per hour (annual production of 22 GWh to 90 GWh);
- Large scale (CAPEX > €25 million): projects with a capacity of >1,000 m^3 biomethane per hour (>90 GWh annually), ability to source (often heterogeneous) feedstocks from further away.

The required quantities of feedstock depend on the substrate mix used and its energy content. Depending on the feedstock used around 4 kg of feedstock can be needed to produce a cubic metre of biomethane produced through anaerobic digestion.[12] Most existing biomethane installations in the EU are small scale plants, as can be seen in the figure below from EBA's statistical report 2022.

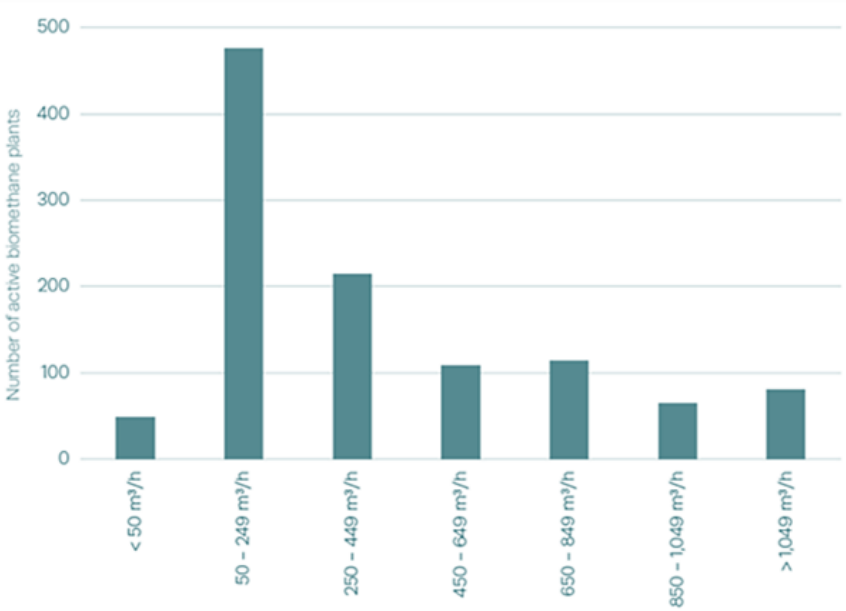

FIGURE 2. TOTAL NUMBER OF ACTIVE BIOMETHANE PLANTS IN EUROPE IN 2021 PER PLANT SIZE RANGE.

[11] Assuming that the production facility runs 96% of the year (8,400 hours per year).

[12] Biomethane from silage cultivated as intercrop needs ~3kg/ m^3, biomethane from manure needs >5kg/ m^3.

While the business case will be different for each project, **project developers and investors in each of the three grouphs of plant sizes will be looking for a positive business case** and will use well-defined concepts as net present value (NPV) and internal rate of return (IRR) to assess the profitability of a projected investment. Net Present Value is the value of an investment over its lifetime discounted to today's value, calculated as the sum of all future cash flows accounting for the time value of money. The latter is done based on a discount rate or WACC (Weighted Average Cost of Capital). NPV results in an absolute number; a positive NPV (number greater than zero) means that the projected investment is thought to be profitable.

Closely linked to NPV is the concept of IRR (internal rate of return), which is used to calculate the yearly rate of return (profit) on investment. IRR is shown as a percentage of the initial investment sum, e.g. an investor will only commit to an investment project if it would yield a 10% IRR.

The concepts of NPV, WACC and IRR evaluate possible investments by looking at costs and revenues over the lifetime of a project, which could be 8, 10 or even more than 15 years. Project costs and expected revenues are influenced by the perceived project risk.

Biomethane **project costs** include both capital investment costs (CAPEX) in biogas digesters and upgrading units including financing costs, and operational costs (OPEX) including, inter alea, biomass feedstock costs, labour costs and costs for process energy. The costs mentioned above for scaling up production capacity to 35 bcm are capital costs only. Total production costs excluding gas grid connection costs have been estimated by EBA to vary between €55 and €100 per MWh (2021 cost figures),[13] with the range mainly depending on the installation size, feedstock mix and location. Biomass feedstock costs can make up around 30 to 40% of the total costs. These costs are indicative and BIP Task Force 4 is currently assessing project cost. Biomethane **project revenues** include revenues from **selling biomethane, digestate** and (if applicable) **separated CO_2**. It also includes any revenues from government subsidies and guarantees of origin.

For a positive business case, revenues must cover total production cost plus profit. Biomethane often replaces natural gas. When delivered to industry or power plants, emissions from its combustion are zero-rated and not accounted for in the emissions of an installation. This means that EU-ETS installations that use biomethane do not need to purchase ETS allowances. The natural gas price for futures contracts signed on 28 August 2023 for gas delivered during calendar year 2024 was €55/MWh[14]. The EU ETS price stands at €86 per tonne[15] which translates to €17/MWh of natural gas based on the greenhouse gas intensity of natural gas when combusted. While it is not feasible to accurately quantify the business case of biomethane, these prices indicate that biomethane the price of natural gas including cost of carbon will in many cases not be sufficient to generate sufficient revenues to create a positive business case. Until the moment that the full environmental external costs of fossil energy are included in its price, **biomethane is faced with a situation of market failure that can be addressed by incentives**.

[13] EBA statistical report 2022, page 72.
[14] Dutch TTF Natural Gas Futures | ICE
[15] Carbon Price Viewer - Sandbag Climate Campaign, accessed 28 August 2023.

The transport market offers some possibilities for unsubsidised investments. For example, the market for renewable transport fuels in Germany offers attractive revenues of around €50 per MWh, on top of the value of the molecules.[16]

One important overarching factor is the need for clear and stable policy support and long-term targets for biomethane

Following the investment logic as introduced above and when assessing project costs and revenues over the lifetime of a project, the assumed **project risk** plays an important role. The higher the perceived project risk the higher the financing costs, because of a higher WACC, thus lowering the profitability of a project. Reversely, the lower the perceived project risk, the lower the financing costs, leading to a lower WACC, thus increasing the profitability of a project.

In this report, a number of factors are analysed that either lead to a higher or a lower project risk and therefore cost, or can impact projected revenues of a project. One important overarching factor is the need for clear and stable policy support and long-term targets for biomethane. And in particular, three factors have been found to significantly decrease project risk, reduce costs and/or increase revenues and therefore lead to a better business case:

1. Effective incentives for each stage in market development;
2. Access to consumers in all end use sectors;
3. EU internal market for biomethane.

Biomethane offers additional benefits beyond its molecular value and climate change mitigation. These additional environmental, social and agricultural benefits are not (yet fully) considered in its business case, nor taken into account in most existing incentives schemes.

[16] See section 3.3 for a description of this policy. Value is based on a price of €260 per tonne of CO_{2eq} for GHG intensity reduction by renewable fuels (mid 2023), assuming 100% GHG reduction of biomethane (using a large share of manure in the feedstock mix) compared to the fossil fuel comparator. It should be noted that this market is small, limited by the number of LNG and CNG vehicles.

Effective incentives
GOOD PRACTICES
& BARRIERS

3 Effective incentives: good practices and barriers

3.1 Stable policy support based on an analysis-based vision

Investors and project developers that are part of Task Force 2 of the BIP find that clear political support and targets, based on a vision are important factors in de-risking investments in new projects.

Denmark offers a good example of a country with a clear and stable political vision and support framework for biomethane. Support for biogas and biomethane started during the 1980's all the way to the dedicated national "Green Gas Strategy" published in 2021:[17]

- From the 1980's, biogas production was promoted as an effective way to decrease emissions and energy dependency.
- In 2009, biogas was publicly considered as a way to reduce methane emissions and produce green energy by recycling manure (fixing a target of 50% of the livestock manure to be used in green energy production by 2020).
- In 2012, this vision was extended to biomethane and its injection in existing gas grids, as a new support scheme was set up for this production pathway.
- In 2019, a forecast of energy equivalent of biogas and biomethane consumption towards 2030 was recognised as strategic for the renewable energy targets.
- In May 2020, a new roadmap took shape, with a clear vision for end-use development.
- Denmark aims to fully replace all natural gas consumption by biomethane in 2030

The consistent support for biomethane helped to make Denmark one of the largest biomethane producers in the EU, with 5.7 TWh of production in 2021, or 25% of total national gas demand.

Some other Member States have also clearly outlined how they plan to increase biomethane in their energy mix and how they see its future role. France has set a target for 10% biomethane and green hydrogen in its gas grid by 2030 and the Netherlands will set a demand mandate for 2030.[18] Other Member States are expected to follow. The process to update National Climate and Energy Plans offers an opportunity to all Member States to develop a view on the future role of biomethane.

At EU level, the European Commission has introduced the 35 bcm biomethane target as part of its REPowerEU plan plus created the Biomethane Industrial Partnership to help achieve the target. This signals political support for biomethane.

[17] groen_gasstrategi_en.pdf (ens.dk)

[18] Mandated quantity will be based on greenhouse gas savings and likely result in around 1.6 bcm biomethane. See: - (overheid.nl)

Despite the examples provided above, there is no clear national or EU-wide consensus on the long-term role and value of biomethane in the energy mix by 2030, 2040 and 2050, as it exists for other renewable technologies.[19]

There is a need for clear national or EU-wide consensus on the long-term role and value of biomethane in the energy mix by 2030, 2040 and 2050

The long-term contribution of biomethane is not yet clarified at EU and national level. Because investments have a lifetime of up to 15-20 years, biomethane project developers and investors in BIP Task Force 2 find it crucial to build a collective understanding of the future role of biomethane in the European and national energy systems, based on solid modelling. For example, multiple modelling scenario's such as a 'business as usual' growth based on current incentives, a '35 bcm by 2030' scenario and a 'further scale up post 2030' scenario, could provide relevant insights to support a debate on the future role and value of biomethane and a basis for the development of targets and incentive schemes. The benefits and energy system value of biomethane when used in various end use sectors are explained in Chapter 4.

3.2 Subsidies to foster investment in emerging markets

The total biomethane production in the EU today is still small, with 31 TWh or 2.9 bcm in 2021.[20] This means that up to 32 bcm of additional capacity must be built until 2030, depending on the degree to which already existing biogas plants will be upgraded to biomethane.[21] Current production is not evenly distributed over the EU. The biomethane production in Europe is currently mainly confined to six countries: Germany (12.8 TWh), Denmark (5.7 TWh), France (4.4 TWh), Italy (2.3 TWh), the Netherlands (2.4 TWh) and Sweden (1.6 TWh).[22] Together, the countries produced 29.2 TWh (2.8 bcm) of biomethane in 2021, ~95% of the European total. These Member States have existing biomethane markets yet still not mature in size and characteristics compared to markets for other renewable energy commodities. In most other Member States, biomethane production is either non-existent or still in its infancy. These Member States have 'emerging biomethane markets'.

Scaling up to the 35 bcm target in 2030, not only requires investments in new production capacity in the six largest markets but requires investments in other Member States too. The Biomethane Investment Outlook of EBA shows that for some emerging markets, the first steps have been taken in this regard.[23] For example, ~€1 billion investments in biomethane between now and 2030 were announced in Spain. In Poland, investments are being planned with a value of ~€0.5 billion. Poland is in the process of developing a subsidy scheme targeting 1 bcm of biomethane by 2030, that could require about

[19] For example the EU strategy on offshore renewable energy COM(2020)741, which specifies offshore wind and ocean energy capacity targets for 2030 and 2050.
[20] EBA (2022). Statistical report 2022. Page 26, 155.
[21] Around 15 bcm (natural gas equivalent) of biogas production exist in the EU which is currently not upgraded to biomethane. This biogas capacity could be upgraded to biomethane plants. Some biogas plants may be very well suited for upgrading. Other existing plants may be small plants located far away from gas grids, making it less feasible to upgrade.
[22] EBA (2022). Statistical report 2022. Chapter 7: country analyses.
[23] EBA (2023). 1st EBA Biomethane Investment Outlook. Page 2.

~€2.5 billion of investments. Significant investments are planned in Ireland too.

How can investors in countries without any biomethane production be convinced to start investing in biomethane? That will require a positive business case, as described in the previous chapter. Typically, investors can see an increased risk in investing in new markets compared to investing in established markets.

When looking at how investments can be generated in emerging markets, lessons could be drawn from how leading EU biomethane markets managed to attract initial investments in their country in the past.

Scaling-up biomethane investments in new markets requires closing the gap between biomethane production costs plus margin, and the (fluctuating) price of its fossil fuel alternative including the cost of carbon

To scale up biomethane investments in new markets requires to close the gap between biomethane production costs plus producer margin and the (fluctuating) price of its fossil fuel alternative plus their cost of carbon, and a positive and predictable business case for investors and offtakers. Different types of incentive instruments have been designed to deal with this. These instruments and best-practice examples are described below. A more elaborate overview of examples will be provided in an upcoming report of BIP Task Force 1.

Feed-in tariffs (FIT)

With a FIT, biomethane producers receive a guaranteed remuneration for each unit of biomethane fed into the gas grid within a defined period of time. Feed-in tariffs (FIT) have been widely implemented in Member States as the preliminary subsidy for the production take-off. France implemented its first FIT for biomethane in 2011, which was gradually modified to consider distinctive characteristics (such as production size and plant types), and since recently includes a premium for favourable feedstocks (such as manure).

Germany has had a FIT scheme since 2004 as part of its renewable energy law (Erneuerbare Energien Gesetz or EEG). The scheme subsidised electricity production using biogas and biomethane, thereby only offering an indirect subsidy for biomethane. The scheme is implemented through tendering,[24] previously it was an open-access scheme.[25] After the preliminary FIT, an upgrading bonus was implemented from 2009-2014 to give biomethane an advantage compared to biogas.[26] That scheme proved to be highly successful in developing the biomethane sector as Germany is by far the largest biomethane producer in the EU.

[24] The total available subsidy budgets are often capped. By tendering the government will allocate subsidy payments to biomethane producers that bid for the lowest level of subsidy to produce biomethane, whereas in open-access schemes the subsidies are distributed on a first-come-first-serve basis.

[25] GreenMeUP deliverable 1.1, page 35.

[26] In addition, grid operators are obliged to connect biomethane plant to the grid and the connection fee for project developers is limited to €250,000 if projects are located less than a kilometer from the gas grid.

Contracts for Difference are an instrument which works similar to a FIT without possibilities to create additional revenues for biomethane producers e.g. by being able to opt-out and opt-in of subsidy schemes.[27] An example of biomethane subsidies allocated via a CfD is the Italian scheme as defined in the Ministerial Decree 2022.

Feed-in Premium (FIP)

A feed-in premium (FIP) is a subsidy payment in the form of a variable 'top up-payment' on top of the price that biomethane producers receive when selling their molecules at the price of natural gas. The Netherlands implemented a FIP to fill the price gap between the natural gas price and biomethane costs.[28] The premium is linked to the feedstock used as well as to greenhouse gas emission reductions. Italy adopted a FIP approach as well, to bridge the difference between the biomethane production cost and the price of natural gas plus Guarantees of Origins.

CAPEX subsidies

An example of CAPEX subsidies for biomethane to grid connection is available in France. Here, in 2018, biomethane producers were granted by law the right to injection into gas grid, partly paid for by the government. French energy regulator (CRE) gave permission to invest more than €1.3 billion in reinforcing the French gas distribution network to enable an increase in biomethane injection and distribution. This investment allows around 1,200 biomethane projects to be grid connected. In addition to these network investments, the state covers 60% of the cost to connect new biomethane production. Project developers only pay 40%.

Support for digestate and biogenic CO_2 as biomethane co-products

Indirect support instruments have also shown to stimulate biomethane production. It refers to incentives (or obligations i.e. proximity principle[29]) to provide feedstock to biomethane producers, on the one hand, and, on the other hand, to incentivise additional products on top of biomethane (e.g. digestate, biogenic CO_2, or on-site flexible electricity generation).[30] They increase the competitiveness of biomethane production, contributing to evening off the price of the gas with conventional fuels. The Swedish government from the late 1990's, has promoted the use of organic fertilisers, including digestate from anaerobic digestion, securing additional revenues stream for biogas and biomethane producers.

Guarantee for equity

Private funding seems easier to obtain for project developers with medium and large-scale projects. A guarantee for equity for biomethane projects can help attract investments in mid-sized projects, particularly in countries where project risks are perceived too high, i.e., countries with no biomethane production and no support schemes in place today. The guarantee can follow an equity portfolio approach and support projects in the equity raising.

[27] A Contract for Difference (CfD) is defined by the Florence School of Regulation as 'a mechanism to incentivise investment in energy production assets with a high upfront cost, by providing stable prices over a long period'. In very liquid markets CfD's can be financial derivative products.

[28] GreenMeUP deliverable 1.1, page 36.

[29] The principle that biomass feedstock should be sourced close to biomethane plants.

[30] GreenMeUP deliverable 1.1, page 38.

3.3 Demand-side actions to further increase investments

Almost all biomethane produced in the EU today is enabled by dedicated production subsidies. Another way in which biomethane investments can be enabled is through demand side incentives. These can be less burdensome for public budgets as they ensure that consumers of fossil energy rather than governments pay for additional biomethane production. Several demand-side actions are possible, including: 1) greenhouse gas intensity reduction obligations and consumer targets, 2) biomethane quota for energy suppliers, and 3) tax exemptions.

Greenhouse gas intensity reduction obligation and consumer targets

An important example of a greenhouse gas intensity reduction obligation is the EU Emissions Trading System (EU ETS). This is a **cap and trade system to reduce emissions of greenhouse gases** covering operators of large industrial and power plants, and in the future also covering the transport and buildings sectors. Biomethane can be an attractive option to reduce greenhouse gas emissions and comply with EU ETS obligations in all of these sectors based on its high lifecycle emission reduction.

Another EU level demand side incentive are the **binding targets for renewable energy in transport** as included in the EU Renewable Energy Directive (EU RED). The targets for renewable road transport fuels in the EU RED already effectively incentivises biomethane investments in some countries today, in particular Germany, where an attractive incentive exists to reduce the greenhouse gas intensity of fossil transport fuels by using renewable fuels including biomethane.[31] Renewable transport fuel obligations in some other Member States offer a market for unsubsidised biomethane, for example the Netherlands.[32]

Biomethane quota for energy suppliers

In addition to Germany, several other EU Member States with relatively high levels of biomethane production have started to introduce demand side actions that benefit biomethane. For example, France will introduce a biomethane production certificate (BPC) scheme, complementing the public support systems introduced above from 2026 onwards. The green certificates oblige gas suppliers to have a given share of biomethane in their sales of gas to customers. With the BPC scheme, the French government involves the natural gas suppliers in the growth of biomethane production and thereby creates a demand for biomethane based on private investments. The Netherlands, is likely to introduce a 1.6 bcm biomethane mandate (based on greenhouse gas reduction) for energy utilities to purchase biomethane and sell it to their gas consumers, meaning that gas end consumers will pay (indirectly, via energy utilities) the additional revenues biomethane producers need for a positive business case. Other countries may follow.

Tax exemptions

Tax incentives to final users are another form of demand-side financial mechanisms. Taxation of biomethane differs by country. In some countries, such as France, biomethane is subject to similar tax as fossil fuels. Also, two Member States have a tax reduction for heat generation from methane without distinguishing between biomethane and natural gas. There are several

[31] The German Treibhausgasminderungquote policy was designed to comply with article 7a of the EU Fuel Quality Directive (Directive 2009/30/EC), while at the same time meeting the EU RED transport target. It requires road transport fuel suppliers to reduce the greenhouse gas intensity of all fuels sold to the market with a reduction percentage increasing to 25% by 2030 compared to 1990 levels, See: BMUV: Beschlossene Anpassungen der Treibhausgasminderungsquote (THG-Quote) | Infografik

[32] In other Member States the EU RED transport target has led to an increased role for biomethane as renewable transport fuel, albeit through production subsidies, such as in Italy.

examples known of Member States implementing tax exemptions for biomethane and biogas, which can provide strong incentives for the consumption of biomethane.[33] Sweden used to have a CO_2-tax for which biomethane was exempted. This used to be a driver for investments in biomethane. In Germany, tax exemptions were applied to purchasing biomethane in both CHP and heat generations, as well as for vehicle fueling. EU neighbours Norway and Switzerland have implemented full energy tax exemptions for biomethane use in transport.

3.3.1 Incentives pathway

The historic developments of existing markets show that subsidies have been instrumental to attract investments. Production subsidies can kick-start investments in biomethane capacity. This is especially relevant in emerging markets because subsidies offer a high level of certainty to investors since they directly increase revenues of producers, and therefore directly improve the business case. Subsidies can be designed to steer the market towards specific installation sizes, feedstocks, plant types and quality.

However, subsidies also have important downsides: they may limit the flexibility of producers to sell biomethane to consumers in a variety of end use markets and limit the flexibility to sell biomethane to offtakers in other Member States. This flexibility is important to producers to maximise revenues. Besides, to subsidise the production of 35 bcm biomethane from government budgets would be expensive.

Demand side incentives can either substitute or complement production subsidies and they work best when they fully take into account the actual emission reduction contribution of biomethane on a full life cycle basis, proven by certification.

Demand-side incentives are important to further scale-up biomethane investments, especially in markets with already established biomethane sectors

Demand-side actions and their pros and cons are also discussed in an upcoming deliverable of Task Force 1 of the BIP. These incentives are important to further scale up biomethane investments, especially in markets with already established biomethane sectors. BIP Task Force 2 foresees a pathway in which emerging markets subsidise initial quantities of biomethane. This will lead to the creation of a biomethane sector and to building national expertise on biomethane. Further scale up can be accelerated through demand side incentives.

Such a pathway is also included as a recommendation in the recent GreenMeUp study[34] produced by a research consortium for the European Commission.

[33] EBA (2022). Recommendations Energy Taxation Directive, page 3

[34] https://www.greenmeup-project.eu/

3.4 Incentives for innovative biomethane and e-methane

In addition to incentives for biomethane produced through anaerobic digestion, incentives may also target innovative biomethane technologies. These innovative technologies are not yet commercially available but ready for large-scale implementation (TRL>7-8), such as pyrolysis, gasification, and hydrothermal gasification. Next to gasification-based biomethane, sustainable renewable methane can also be produced in the form of e-methane, through the methanation of hydrogen with CO_2. This can double methane production in biomethane production plants if their biogenic CO_2 is used.

Additional production of innovative biomethane would diversify and expand the range of feedstock that can be used to produce biomethane because wood waste and forestry residues can be converted through gasification technology to biomethane. Innovative biomethane can be produced in large installations in the order of 100 MW, which is much larger than anaerobic-digestion based biomethane installations.[35]

Large scale innovative biomethane production will increase the likelihood that the 35 bcm biomethane target can be achieved also if biomethane production in some emerging markets would be slow to scale up. E-methane production can use biogenic CO_2 captured at biomethane plants to produce around 60% additional methane on-site of biomethane plants.

Both innovative biomethane and e-methane can play a role before 2030 and can support further scale up of renewable methane afterwards. To enable first large commercial projects, R&D support and production subsidies will be necessary.

Both innovative biomethane and e-methane can play a role before 2030 and can support further scale up of renewable methane afterwards

Task Force 2 would like to raise awareness on the benefits of accelerating the deployment of innovative biomethane and e-methane and discuss how it can be best incentivised and urgently clarify the role it could play both in national strategies for biomethane and in achieving the REPowerEU's 35 bcm target by 2030.

[35] GoBiGas, a 20MW woody biomass to biomethane demonstration project based on thermal gasification has been created with EU funding in Göteborg, Sweden. The project ran from 2005 to 2018. Chalmers University of Technology published an evaluation report concluding that a viable commercial project size would be 100MW. See: GoBiGas demonstration – a vital step for a large-scale transition from fossil fuels to advanced biofuels and electrofuels (chalmers.se)

4 Access to all biomethane end-uses

An important factor in the business case for biomethane is the ability for projects to generate sufficient revenues from selling the product to end customers. Having the ability to sell to a wide variety of offtakers, including traders, increases the ability of project developers to obtain sufficient revenues and reduce project risk, while moving towards giving European consumers access to biomethane produced at the most cost-effective locations. Access to a wide variety of offtakers consists of two facets: deployment in a wide variety of applications and trade and sales to consumers across borders.[36] This chapter focuses on the first aspect, the next will cover the second.

4.1 Biomethane can replace natural gas in any of its uses

Biomethane is a renewable molecule that can directly replace natural gas, including CNG and LNG, in its various applications. End-uses of biomethane include residential heating, electricity production, industrial energy and material usage, and transport fueling in road transport and shipping. To get an understanding of the potential European market for biomethane, this section highlights what the European gas market (natural gas and biomethane) looks like today. In addition, the section describes the energy system services biomethane can provide to the different end-use applications listed above.

In 2022, the consumption of natural gas in the EU amounted to 356 bcm.[37, 38] The majority of this gas was consumed in the residential sector (~145 bcm or 40%),[39] followed by the electricity sector (~125 bcm or 35%),[40] and industry (~90 bcm or 25%).[41] Gas consumption in road and maritime transport today is small. Road transport consumed ~2.5 bcm methane[42] and biomethane consumption in shipping is growing.

[36] Cross-border trade as assessed in this report means the transfer of all attributes associated with a quantity of biomethane other than the methane molecules. These attributes are the renewable quality of biomethane, the greenhouse gas savings achieved and other environmental and social benefits.

[37] European Commission (2023). Quarterly Report on European Gas Markets report Q4 2022.pdf (europa.eu), p. 4

[38] European Commission (2023). Quarterly report on European gas markets Q3_FINAL.pdf (europa.eu), p. 4

[39] ACER (2022). Gas factsheet | www.acer.europa.eu

[40] European Council (2023). How is EU electricity produced and sold? - Consilium (europa.eu)

[41] Eurostat (2023). Final energy consumption in industry - detailed statistics - Statistics Explained (europa.eu)

[42] Eurostat (2023). Final energy consumption in road transport by type of fuel.

In the future, natural gas consumption will decrease because of climate and energy policies. The 'Fit for 55' MIX scenario of the European Commission, published in July 2021, shows a demand for natural and manufactured gas of 243 Mtoe, or 230 bcm, by 2030.[43]

Biomethane already plays a role in various applications today.[44] In Germany, most biomethane is used to produce electricity in CHP units. In Italy, most biomethane is consumed in road transport, facilitated by a relatively large CNG car fleet. Also in Sweden over half of the biomethane consumed is used in transport. In Denmark, the biomethane is shared among residential heating and industry.

4.2 The future role of biomethane across the energy system

The future role for biomethane in various end use sectors has been modelled by the European Commission. However, the Fit for 55 modelling results do not explicitly report the role of biomethane in various end use sectors. The modelled total quantity of biomethane in 2030 (using the PRIMES model) is small and seems to be mainly allocated to the transport sector. This is mainly because the modelling took place in 2020 and 2021, before the start of the energy crisis, when natural gas prices and modelled CO_2 prices were low, and because specific renewable fuel targets exist for the transport sector. Current modelling does not seem to (fully) take into account the ability of biomethane, transported, stored and distributed in existing gas infrastructure, to reduce the necessary investments in electricity infrastructure. New modelling by the Commission to support the political debate on a 2040 EU climate target may explicitly report the role of biomethane and show an increased role for biomethane in various end use sectors based on the fact that natural gas and CO_2 prices are higher currently compared to 2020, and considering an increased role for biomethane in national strategies, in particular the updated National Energy and Climate Plans.

4.3 Energy system services of biomethane in end use sectors

Biomethane can play an important role in the future energy system in combination with renewable electricity, hydrogen and other renewable and low carbon energy carriers.

Renewable gases, such as biomethane, are deemed a great alternative energy source to reduce greenhouse gas emissions. Building on the work done by CEN Technical Committee 408 to develop specifications for biomethane (EN16723-1 for injection into natural gas grids and EN16723-2 for transport fuel), the EU-funded BIOSTAR2C project[45] aims to remove the barriers that impede biomethane introduction into gas networks and vehicles. This can help to ensure that biomethane injection costs are optimised and increase confidence in investing in biomethane production and injection.

Biomethane can provide important energy system services in a net zero emissions energy system, as evident from studies like the 2019 Gas for Climate study.[46] This study shows that biomethane is especially valuable in end uses where electrification is difficult or costly such as high temperature industrial heat, the heating of older buildings and heavy long-distance road and maritime transport. Biomethane can, together with hydrogen, also enable an increased role of electricity in energy use, when

[43] European Commission (2021). 'Fit for 55' MIX scenario. Worksheet "EU_A", cell G25.
[44] REGATRACE (2020). Mapping the state of play of renewable gases in Europe, pages 9, 10, 58

[45] Removing Technical Barriers to Biomethane STAndaRdisation Phase 2C | BIOSTAR2C | Project | Fact sheet | HORIZON | CORDIS | European Commission (europa.eu).
[46] Navigant for Gas for Climate (2019), The optimal role for gas in a net-zero emissions energy system.

used to produce dispatchable, storable electricity that can balance the power grid with increased variation in electricity supply and demand.

1. Biomethane generates a **high greenhouse gas emission reduction** compared to natural gas (typically above 80%) and if manure is used can generate emissions saving of more than 100% compared to fossil energy because methane emissions are avoided.[47]

2. Biomethane is produced with **existing technology** that can be scaled up relatively **quickly and cost-effectively**, allowing a **fast reduction of fossil CO_2 emissions** for end consumers. The scale up has already been successfully exercised in large-scale production units in several countries, where industrial size is an established standard.

3. Biomethane is essential to provide **carbon-rich feedstock to industry** and can, with hydrogen, provide **high temperature industrial heat** where using electricity is challenging or expensive.

4. Biomethane is the most competitive renewable option for **inter-seasonal energy storage** because it can be stored in existing underground gas storages at a far lower cost than battery-storage. Demand for energy storage for the winter heating season is substantial, corresponding to over 1,000 TWh of storage.
5. Biomethane is **transported through existing gas infrastructure** without the need for any modification to gas pipelines.

6. Replacing natural gas by biomethane in industry, buildings, electricity production and LNG or CNG trucks does **not require modification of end use technologies** currently available on the market.[48]

7. Using biomethane for the heating of buildings **reduces the level of investment needed to reinforce electricity grids and insulate buildings**[49] and can **easily be combined with renewable electricity in hybrid heating solutions** such as hybrid heat pumps or smart cogeneration.

[47] JRC (2020). Well-to-Wheels Report Version 5

[48] This includes no modifications in heating technology. In France all gas consumers can already decide to consume renewable gas without any constraints. More than five energy suppliers offer contracts for up to 100% renewable gas (based on guarantees of origin).

[49] In older buildings where all-electric heat pumps would be too expensive, biomethane used in a hybrid heat pump, requiring only modest building insulation will be the most cost-efficient solution to decarbonisation. See: Gas for Climate (2019). The optimal role of gas in a net zero emissions energy system. Page 40-44.

Residential heating is one of the applications where biomethane has the highest added value in the energy transition, as it can help to decarbonise heating systems in a highly cost-efficient and rapid way.[50]

Biomethane is a viable option to reduce fossil emissions from district heating. District heating can be a good heating solution especially for urban areas. Currently, district heating is often supplied with fossil energy or fossil waste heat, and it can be challenging to ensure a constant supply of renewable energy to district heating. Biomethane is one of the options to supply peak heat demand for district heating.

The deployment of all-electric heat pumps requires substantial insulation efforts and can result in significant peak electricity demand during cold winter days. The use of biomethane in hybrid heat pumps in older houses with a gas connection offers potential for an accelerated and efficient supply of sustainable heat to the built environment. With a hybrid gas heat pump, it is possible to benefit from the electric heat pump during most of the year and to transfer the heating to a high energy performance gas boiler when the electrical system is under strain due to a cold peak, reducing the need for grid reinforcements. Also, the use of a hybrid gas heat pumps requires good rather than deep insulation, and hybrid heating solutions can make use of existing gas infrastructure. In addition, biomethane can be stored cost-effectively in gas storages to supply heat demand during winter peak demand.

Electricity from dispatchable, renewable power sources, like hydro, biomass and renewable or low-carbon gas will play an essential role in a net zero energy system. These sources provide the flexibility in electricity supply required to balance the intermittency of variable renewable power sources. Biomethane can directly replace the natural gas in dispatchable power plants, using existing gas infrastructure including gas storage facilities for short-term and long-term energy storage.

Industry is a challenging sector to defossilise, particularly the high temperature heat processes and feedstock consumption. The options to reduce fossil emissions from high temperature industrial heat are carbon capture and storage, low-carbon gas or renewable gas (e.g. low-carbon/renewable hydrogen and biomethane). For carbon-containing materials like polymers, the use of biomethane will be essential. Biomethane can directly replace natural gas in existing applications without additional costs to modify end use applications or transport infrastructure.

Biomethane is available and economically viable as renewable fuel to reduce fossil emission from **road freight transport**. In heavy duty road transport, the density of the fuel is more important than in other transport sectors, making electrification of truck transport above distances of 500 kilometers challenging (lower milage, lower payload, long recharging time). Recognising the role of biomethane to reduce greenhouse gas emissions in road freight transport will not jeopardise the electrification pathways in which all truck manufacturers are committed to. Especially for long-distance truck transport, biomethane is a suitable alternative to the fossil sources and to BEV trucks.

[50] Gas for Climate (2021), The future role of biomethane, page 15

Biomethane is a suitable and one of the most economically viable alternatives to diesel in road freight transport for the following reasons:

1. Standard spark ignition internal combustion engines are compatible with biomethane (CNG or LNG).
2. The existing biomethane powered truck offers comparable payload, range, refuelling time and competitive Total Cost of Ownership, ensuring no deviation in terms of mission coverage. Heavy-duty road freight is composed of several applications, with long haul being the largest portion in terms of volume, accounting for more than 60% of GHG emissions in heavy duty transport. This makes the long haul transport sector one of the most challenging to abate.
3. Biomethane is already used today and can be scaled up rapidly as fuel for heavy-duty road freight transport. A fast-growing refuelling infrastructure of over 650 LNG and 4.100 CNG stations exists across the EU, all capable to distribute biomethane.[51] This is an advantage compared to hydrogen and electricity as truck fuels.
4. The logistics sector considers biomethane as a cost competitive solution in cases where zero tailpipe emission technologies are hard to implement. Therefore, road freight transport and logistics operators (shipper & hauliers) are ready to further develop end-use applications of biomethane as one of multiple solutions to reach sustainability targets.[52]

4.4 Supply of biomethane to the transport sector

Providing a long-term perspective for the supply of biomethane to decarbonise heavy duty road freight transport can boost investments in additional biomethane production installations as it offers additional revenues for project developers and investors in biomethane. Biomethane demand in the transport sector currently offers relatively high revenues to producers. This means that it offers a relatively attractive business case. Even in a long-term scenario in which other renewable fuels would be more attractive to biomethane, the additional biomethane production capacity made possible by demand from the transport sector will still exist to meet demand from other sectors.

Providing a long-term perspective for the supply of biomethane to heavy duty road freight transport can boost investments in biomethane production

Biomethane can enable a quick and efficient reduction of transport sector GHG emissions. Examples of countries that allow the deployment of biomethane in transport to fulfill greenhouse gas reduction targets, show that the transport sector can be a major driver of project investments.

[51] NGVA (2023), Gas fuelling stations

[52] Sufficient quantities of sustainable biomethane can be produced for long distance heavy truck transport, according to a 2050 energy scenario model by NGVA. By that year, biomethane-powered HD trucks could make up 18% of the total HDV fleet, or 25% if only considering HDVs over 30 tons. To fuel the entire fleet, 15 bcm of biomethane would be needed, which is a small share of the at least 100 bcm of biomethane potential. (Source: NGVA (2023), HDV Energy Scenario Modelling at2050: Positioning of biomethane and bioLNG). Gas for Climate (2022), shows a 151 bcm biomethane potential by 2050. Other studies show a more conservative estimation of around 100 bcm. By 2030, demand for biomethane in truck transport could be 1.5 bcm (9 bcm by 2040), which is less than 5% of the 35bcm target.

For example, Germany introduced the Biofuel Sustainability Ordinance (Biokraft-NachV)[53] to implement the EU REDII requirements on advanced fuels. It sets quotas for fuel suppliers to reduce the GHG intensity of transport fuels, with a €600 per tonne of CO_2 penalty for non-compliance. This has led to a rapid development of bioCNG and bioLNG in Germany.[54] In Italy about 1 bcm of biomethane use in transport (both bio-CNG and bio-LNG) has been incentivised through production subsidies since 2018 (Decreto 02 Marzo 2018).

The use of biomethane in the transport sector can thus increase project investments throughout the EU. However, some barriers exist for the consumption of biomethane in the transport sector to fulfill GHG reduction targets. This relates to the ability to use biomethane to reduce GHG emissions from (heavy duty) road transport and as an advanced transport biofuel.

4.4.1 Biomethane as renewable truck transport fuel

A major obstacle to greater use of biomethane as a fuel in road transport is the possible phase out of internal combustion engines for heavy-duty vehicles. To reduce greenhouse gas emissions from road transport, the EU has introduced increasingly strict CO_2 emission limits on vehicles, based on a tailpipe emissions approach. In such an approach, the vehicle's emissions are measured for a vehicle type before placing it on the market, thus not considering the lifecycle CO_2 reduction potential from sustainable renewable biomethane when used as truck fuel. Considering a tailpipe approach only, a truck that will run on biomethane during its lifetime will have the same measured CO_2 emissions as a truck running on natural gas which will lead to a situation in which truck manufacturers reduce the share of gas-powered vehicles they produce and sell. This represents the biggest potential hurdle for the uptake of biomethane in heavy duty trucks.

To overcome this obstacle, some stakeholders have proposed to use a Carbon Correction Factor (CCF) which would reduce the calculated CO_2 emissions at tailpipe for a heavy-duty vehicle by a certain percentage, according to the actual, average share of renewable and low carbon fuels in the fuel mix.[55]. This would continue to enable the use of biomethane to reduce emissions in heavy duty truck transport, without changing the core design of a tailpipe-based approach.

In addition, the CountEmissionEU initiative[56] proposes the creation of a strong, harmonised EU framework for reporting and communicating on the CO_2 emissions of all transport operations, to help end users and their customers to choose sustainable vehicles and fuels..

[53] Ordinance on the Establishment of Further Provisions for the Reduction of Greenhouse Gas Emissions from Fuels ("38. BImSchV")

[54] Biomethane used in transport in Germany is mostly produced from manure, which generates GHG emission reduction of more than 100% compared to natural gas.

[55] More information on the proposal for a CCF can be found on the Eurogas website.

[56] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13217-Count-your-transport-emissions-CountEmissions-EU/public-consultation_en

4.4.2 Limits to biomethane to count as advanced transport biofuel

Another barrier for biomethane in transport would be restrictions imposed on feedstocks for advanced biofuels. In the draft Delegated Act amending Annex IX of Renewable Energy Directive 2018/2001, sequential crops, highly sustainable biomethane feedstocks with low land use change risk, are included in Part B of the Delegated Act, hence capped at 1.7% of the total energy supplied to transport. This means that the contribution of biomethane produced from intermediate crops (sequential crops) are limited to a very small percentage even though countries such as Italy and France have a large biomethane production potential based on sequential cropping.[57][58]

[57] Gas for Climate (2022), Biomethane production potential in EU, p. 8

[58] In Italy, biomethane produced from sequential crops is already categorised as an advanced biofuel, based on its sustainability profile including the fact that sequential crops do not compete with existing food and feed production.

The EU internal market FOR BIOMETHANE

5 The EU internal market for biomethane

Biomethane can be transported through existing gas infrastructure without the need for any modification to gas pipelines and end use facilities linked to it. This makes it possible to transport biomethane from producers to consumers across the EU. A single EU market for biomethane links producers and consumers across the EU.

A single EU market links producers and consumers across the EU, allowing cost-efficient and robust supply of biomethane and sufficient revenues for producers

This offers consumers at locations with a high biomethane demand the possibility to source biomethane from regions where it can be produced at competitive costs. This allowes end use sectors to apply robust and cost-efficient greenhouse gas reduction strategies. It also offers producers the possibility to sell their product to offtakers across the EU and thus to generate sufficient revenues. This can help to de-risk investments in new biomethane production capacity.

However, currently less than 1% of biomethane is traded cross-border, the rest is being sold within the country of production. In this chapter we look at the main obstacles preventing the creation of an EU internal market for biomethane:

1) Structure of national subsidy schemes;

2) Biomethane quota for energy suppliers limited to national production;

3) Non-harmonised implementation of EU mass balancing rules for interconnected gas infrastructure;

4) Limits to trade towards end use sectors not yet covered by the UDB;

5) Non-harmonised certification procedures.

5.1 Structure of national subsidy schemes

The national focus of biomethane markets is mainly a result of the fact that almost all biomethane produced today is subsidised by national governments. Governments usually do not allow producers to sell subsidised biomethane to consumers in other countries.

Many Member States have introduced production subsidies for biomethane to kick-start markets (see section 2). The renewable value and greenhouse gas reduction value of biomethane produced under these schemes can usually not be exported to other Member States. Subsidised biomethane is used to fulfil national

renewable energy and climate targets. Either subsidies are specifically connected to national consumption in an end use sector or they require producers to inject biomethane in the gas grid and governments take the Guarantees of Origin, meaning that this biomethane cannot be freely traded to end use sectors across the EU.

Subsidised biomethane can often not be freely traded to end use sectors across the EU

Where national production subsidies exist, their restrictive effect on the ability to sell to various end use sectors and to trade to other EU countries can be reduced through three types of good practices:

1) flexibility mechanisms in subsidy schemes, allowing producers to choose whether to produce under the subsidy scheme or market their products freely,

2) support schemes without export/import restrictions and

3) common funding mechanisms. These good practices and corresponding barriers are explained below.

5.1.1 Opt-out and opt-in mechanism for subsidies

Some Member States have introduced opt-in/opt-out mechanisms in subsidy schemes, allowing producers to choose whether or not to offer their products on national marketplaces under the subsidy scheme on a term-to-term basis. In Denmark, for example, the biomethane producer has to apply at the regulator for the payment of the subsidy for the produced amount of biomethane in one month, by the 6th working day of the next month. Any additional produced quantity can easily be sold as unsubsidised biomethane and traded freely.

5.1.2 Incentives without restrictions on cross-border trade

A German court confirmed with a definitive legal ruling that biomethane reaching the German market via the interconnected gas system must be accepted in the transport sector for compliance with REDII. This means that imported biomethane can be used towards the German greenhouse gas intensity reduction obligation.

Some national incentives currently allow for exports of subsidised energy, in particular in electricity markets where EU law obliges Member States to open their capacity mechanisms to generation from neighbouring countries.[59]

5.1.3 Common funding mechanisms

Different market conditions between Member States, might require the need for different support schemes. However, at EU level, this can hamper cross-border trade, potentially resulting in inefficiencies and a less attractive business case for investors. National implementation of support schemes can also be time-consuming and complex for project developers. EU-level subsidy schemes, e.g., joint auctioning, have shown to avoid competition between Member States, and thus can facilitate cross-border trade– i.e., where the financial burden is not directly on national tax payers, there would be little reason for Member States to set export restrictions. One recent example is the European Hydrogen Bank, which will be auctioning production subsidies in the form of a feed-in premium for producers.

[59] Articles 21, 22 and following of the Regulation (EU) 2019/943.

5.2 Biomethane quota and cross-border trade

As discussed in Chapter 3, some Member States introduce biomethane quota (or mandate) for energy suppliers. This means that energy companies are obliged to supply to their customers a certain volume of biomethane as part of total energy supplied. While such mechanisms create additional demand for biomethane, there are examples in which such mandate may be open only for domestic production, which would hamper cross-border trade.

The Netherlands plans to introduce a biomethane mandate which may not be open to imported biomethane. The reason for this would be the interpretation of UNFCCC[60] guidelines on greenhouse gas emissions accounting of biomethane, which would state that emissions reductions from biomethane should be counted in the CO_2 inventory of the producing country because biomethane production belongs to the LULUCF sector and thus, emissions savings would not be counted in the CO_2 inventory of importing country. It is important that this point will be clarified.

5.3 UDB and single mass balancing facility

The Union Database (UDB) is a system which is developed and managed by the European Commission to ensure tracing of eligible liquid and gaseous transport fuels for being counted towards the share of renewable energy in the transport sector in any Member State. The EU 'RED III' Directive will expand the scope of the UDB to all end use sectors.

Economic operators (producers, traders, suppliers, retailers) can upload the Proof of Sustainability (PoS) of produced biomethane to the UDB via national PoS registries. Once uploaded the PoS will become transferrable to other economic operators, and the underlying biomethane volumes are counted in the 'single EU mass balancing facility', the latter is the sum of all EU interconnected gas infrastructure (gas grids, storage facilities, LNG terminals). This means that it is sufficient to verify compliance with the mass balancing principle only once at the point of injection and once at the point of withdrawal of the EU gas system and no longer at each gas grid interconnection point. This facilitates cross-border trade of biomethane.[61]

However, some economic operators still experience hurdles. Many Member States do not yet have a national registry for PoS in place (especially emerging biomethane markets), and if a national PoS registry exists, it is often not yet practically connected to the UDB. In order to lift these barriers, national registries should be developed in such way that they are compatible and practically connected to the UDB. Also, EU Member States should implement in a harmonised way, the existing EU-wide mass balance requirements as included in the EU Renewable Energy Directive.

At a later point in time, the UDB may be integrated with a functionality to track biomethane transactions across borders via the EU gas grid, to avoid the duplication of trading infrastructure.

[60] United Nations Framework Convention on Climate Change

[61] The same mass balancing system applies to interconnected infrastructure (including interconnected gas infrastructure), as described in article 18(3) of the Commission Implementing Regulation (EU) 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria.

5.4 Supply of biomethane to sectors not yet covered by the UDB

As described above, the EU REDIII will extend the scope of the UDB to all end use sectors. Economic operators await this extension which can allow them to transfer biomethane and related certification across markets, and where relevant, perform a mass-balancing verification based on the concept of the single EU mass balancing facility, covering all EU interconnected gas infrastructure. This would be relevant in any compliance sector, in particular for sectors covered under the EU Emissions Trading Scheme (EU ETS). The EU ETS Directive allows operators of industrial installations and power plants to use biomethane to comply with their emission reduction obligation. According to the Monitoring and Reporting Regulation (MRR) and the Guidance on biomass use,[62] which provides details for the implementation of the EU ETS, biomethane should be considered a zero-emission fuel, if both the production facility and the end-use application are connected to the grid, plus there is a proof of purchase and a proof of sustainability.

5.5 Sustainability criteria and certification

A liquid European biomethane market relies on the ability of market participants to trade biomethane cross border in an easy and efficient way while ensuring full compliance with sustainability criteria and avoiding double counting of biomethane.

A number of voluntary sustainability certification schemes for biomethane have been approved by the European Commission. However, some Member States and voluntary schemes set additional criteria to sustainability certification, requiring additional audits for imported biomethane. Also, in some cases, criteria between different certification schemes vary. To stimulate mutual recognition and harmonisation of sustainability certificates, the EU has defined minimum criteria. Member States can still introduce more stringent criteria for national production if desired, but the use of biomethane imported from other Member States must be approved when meeting the EU criteria.

An important step that can help to create an EU internal market could be that only voluntary certification schemes that are recognised by the European Commission and notified national schemes, in a first step, can issue proof of sustainability (PoS) and Guarantees of Origin (GOs), [63] and if issued by a voluntary scheme, the certificates can be used also in countries with a national scheme in place. An important next step would be that only voluntary schemes recognised by the European Commission issue PoS and GOs.

[62] European Commission, "Biomass issues in the EU ETS", MRR Guidance document No. 3, Updated Version, 17 October 2022.

[63] It is understood that full compliance with all sustainability criteria should be ensured for all biomethane GOs.

BIOMETHANE INDUSTRIAL PARTNERSHIP

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