BIOMETHANE INDUSTRIAL PARTNERSHIP

BIOMETHANE INCENTIVES
AND THEIR EFFECTIVENESS

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PREFACE

Acceleration of sustainable biomethane market to 35 billion cubic meters (bcm) per year is part of the EU response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine. In May 2022, the European Commission launched the REPowerEU Plan, whose implementation is helping the EU to save energy, produce clean energy and diversify its energy supplies. As a renewable and dispatchable energy source, increasing the production and use of biomethane also helps to address the climate crisis. The investments needed to boost the biomethane production from the current 2.8 to the aspired 35 bcm per year by 2030 is estimated at €83 billion. This encompasses the total production cost of new biomethane plants capable of generating an additional 32 bcm.

To support the acceleration of sustainable biomethane production, the European Commission, Member States and the stakeholders along the biomethane value chain have formed a public-private partnership: the **Biomethane Industrial Partnership** (**BIP**). Launched in September 2022, the BIP's work is organised in five Task Forces, aligned with the Biomethane Action Plan and the REPowerEU Plan, working on specific aspects of sustainable biomethane uptake. **BIP's Task Force 1 focuses on the creation of national biomethane targets, strategies and policies.** The Task Force provides a platform for exchange of best practices to initiate a framework for bilateral collaboration and capacity building between Member States.

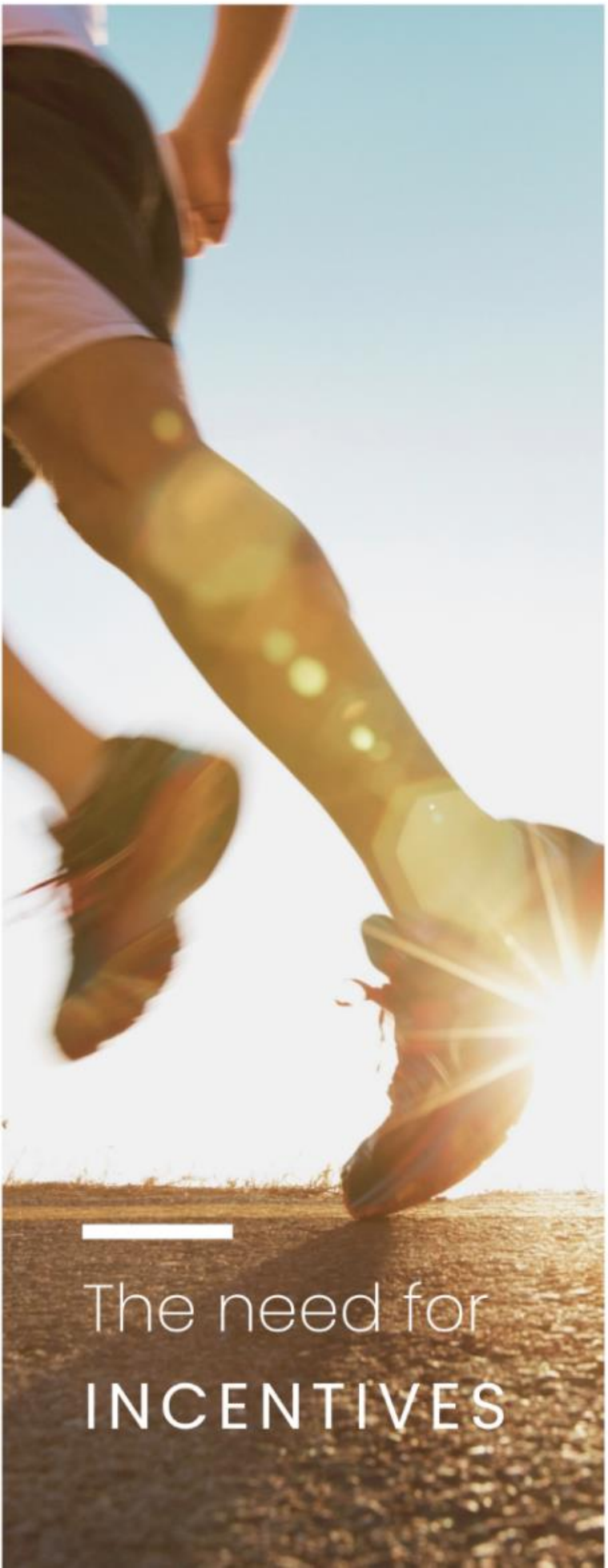
The report describes a portfolio of incentives available for Member States to encourage acceleration of the biomethane market. Incentives can help the EU countries to facilitate the deployment of renewables and the implementation of specific policy objectives and provide certainty and predictability for investors. Support schemes have a longstanding presence in Member States' renewable energy market. The experience has shown that, if these public interventions are not carefully designed, they can distort the functioning of the energy market and lead to higher costs for European households and businesses or underachieved policy efficiency. The European Commission has developed a Guidance for renewables support schemes[1] where this document complements that Guidance, capturing the evolution of incentives for biomethane market. On the policy side, there is a Communication from the European Commission – Guidelines on State aid for climate, environmental protection and energy 2022[2], that prioritises investments to achieve and reinforce the European Green Deal's objectives.

The sustainable biomethane incentives and related trade-offs were exchanged and discussed within the activities of Task Force 1 in 2023. The insights of this report were also supported by the **Horizon Europe's 'GreenMeUP' project**[3].

[1] Support schemes for renewable energy.

[2] Guidelines on State aid for climate, environmental protection and energy 2022.

[3] 'GreenMeUP' project - Grant Agreement ID: 101075676, 1/8/2022-31/7/2025, Total costs 1,999,058.75 Euro with 100% EU contribution.



HOW MEMBER STATES COULD ENCOURAGE INVESTMENTS IN BIOMETHANE?

Economic incentives shape individual and collective decision-making by providing rewards or disincentives. They influence behaviour at both microeconomic (business) and macroeconomic (government) levels, playing a significant role in driving economic activity and shaping economic outcomes[4].

Investments in sustainable biomethane production will occur only if investors have a positive business case. Not only is the return on investment important but also the required effort prior having the investment operational. Government incentives create a low-risk environment for investments that achieve desired societal benefits (as communicated in the REpowerEU Plan). Although the industry has announced an impressive starting batch of €18 billion investment for biomethane projects[5], there is a long way to the estimated €83 billion to reach 35 bcm by 2030.[6]

A **stable policy outlook for biomethane and effective incentives** are crucial for adding further investment pipeline. Biomethane production costs occasionally overlap with

[4] What are economic incentives and why they are important?, last updated 13 July 2023.
[5] EBA investment outlook on biomethane (2023).
[6] Estimated as 4,000 new installations with 4 mcm/year at €12 million CAPEX each, and 1.000 new industrial installations with 16 mcm at €35 million CAPEX each, keeping the inflation as constant. A decrease is possible with retrofitting the existing biogas CHP plants to biomethane upgrading units.

volatile natural gas prices[7]. Yet, that comparison is excluding climate cost and import risks associated with fossil gas as well as climate benefits and a multiplier effect to the European industry and rural areas from sustainable biomethane production. Incentives are needed to ensure that sustainable gas can start to replace fossil gas in a stable and de-risked manner.

Currently, it takes **3 to 6 years to develop new biomethane projects**, where the **construction part itself lasts about 1-1.5 year**. Shortening the permitting time, while keeping the projects' quality and sustainability, is crucial to achieve 35 bcm biomethane by 2030.

[7]The biomethane cost varies within the range of 54 – 91 €/MWh (or 0.54 – 0.91 €/Nm^3) depending on the plant capacity and feedstock mix. The Dutch TFF hub reports a natural gas price range of 0.27-0.78 €/Nm^3 between January and September 2023, averaging at 0.44 €/Nm^3. Biomethane costs can be reduced by valorising digestate and biogenic CO_2, two by-products of biomethane production. For more information, read the **BIP Task Force 4.2's Report 'Insights into the current costs of biomethane production from real industry data'**.

Types of INCENTIVES

Incentives[8] are typically based on the potential for gaining a benefit or avoiding a cost. Government uses incentives in shaping economic behaviour to achieve policy goals (such as climate change adaptation, energy security, prevention of GHG emissions) by stimulating a desired action. The incentives can be both rewarding and penalising.

At a microeconomic level, economic incentives are focused on individual decision-making. For biomethane production, examples could be **price incentives** aiming to make biomethane price stable and/or competitive; **income incentives** where governments give bonus to a salary if certain conditions of the plant design are fulfilled (e.g. if a plant reduces GHG emissions by a certain percent or changes from biogas to biomethane or addresses skilled work deficiency in the biomethane sector); and **tax incentives** to encourage specific behaviour in biomethane production, such as digestate utilisation, specific feedstock mix, or locating biomethane plants in rural areas with negative demographics to spur rural development.

Incentives to boost sustainable biomethane production at a business level can be various, either aiming directly at biomethane production or using biomethane production as a tool to achieve an overreaching national goal, such as revival of rural areas, local nutrient sufficiency, decarbonisation of non-ETS sector or reduction of GHG emissions from agri-food chain, etc., always **targeting individuals and businesses to engage in biomethane related activities.**

At a macroeconomic level, economic incentives affect the overall functioning of an economy. For biomethane production, some examples could be, but are not limited to, **demand side incentives**, such as stimulating production through mandates and/or GHG intensity targets; **monetary policy incentives**, such as providing loans at lower interest rates and/or tailored loans to meet the specificities of biomethane investments in a country; **fiscal policy incentives**, such as offering tax incentives to biomethane companies to promote the transition to cleaner sources of energy; and **trade incentives**, such as reducing tariffs or implementing free trade agreements to encourage exports and attract foreign investment. Establishing the Union Biofuels Database belongs to trade incentives.

Incentives can be combined, but only after impact assessments and careful monitoring of the implementation prevent market failures or policy inefficiency. **Biomethane production occurs at several policy domains** (agriculture, waste management, energy, at minimum), **which calls for cross-sectoral synchronisation of measures** to optimise the benefits and internalise the positive externalities.

[8] What are economic incentives and why they are important?, last updated 13 July 2023.

In short[9], biomethane market incentives appear at both micro (e.g. feed-in tariff, feed-in premium, contracts for difference, CAPEX) and macro (e.g. taxations, mandates, tenders, greenhouse gas (GHG) intensity targets, EU-ETS) level. Depending on what part of the market the incentive targets, a differentiation can be made between demand and supply side incentives:

(1) **Production support**: Feed-in tariff, feed-in premium, tenders, CAPEX support, contracts for difference;

(2) **Demand side incentives**:

GHG intensity targets, EU-ETS, biomethane consumption mandates, renewable energy mandates, tax incentives;

(3) **Indirect support**: regulatory or financial incentives for biomethane feedstock providers to collect feedstock and to deliver it to biomethane plants, positive legal framework to use digestate as a local source of nutrients and industrial application of biogenic CO_2.

Indirect support is not further discussed in this report due to its complexity and national energy-agriculture-waste-environment nexus related, without indicating the less importance of indirect support measures against the direct support measures to biomethane production and use. On the contrary, indirect measures such as support to use organic fertilisers other than fresh manure in agriculture helps improving the business model for biomethane production.

1 Production support

Production support schemes offer pro rata subsidy payments directly tied to the amount of biomethane produced or help to pay for the capital investments in new production capacity.

Feed-in-tariff (FiT)

A **feed-in tariff** is a guaranteed subsidy payment to producers of biomethane for a quantity of biomethane produced and, frequently related to the amount of biomethane fed into the gas grid, over a fixed time. It is above the market price payment, based on assumed full cost of production: CAPEX and OPEX costs, feedstock cost and grid-connection costs. The producers receive a fixed price per unit of biomethane produced, unrelated to the market dynamics both on the production cost side and the price of natural gas. Typically, the subsidy period is limited to 10 or 15 years. Biomethane production benefiting from FiT typically involves selling biomethane to the energy companies at a price equal to the FiT. Subsidised biomethane is rarely freely traded and is typically sold to government-appointed gas traders. The FiT fund can be collected either from fossil energy providers, energy consumers or combined or from dedicated funds from a national or regional government.

The FiT was a major incentive to boost renewable electricity production from early 2000s and some Member States have extended that positive experience on biomethane production. Several Member States including **Denmark** (2012-2019) and **France** (2011-2020) had guaranteed FiT schemes in place. This greatly helped to stimulate investments. In France, support small production installations received between 60 €/MWh to 139 €/MWh depending on the size of

[9] The descriptions of support mechanisms in this memo are based on the work of the 'Green me up' project consortium including the European Biogas Association (EBA) and the Centre for Renewable Energy Sources and Savings (CRES), funded by the European Commission.

production plants and excluding bonus. Denmark has now a Feed-in–Premium tendering system. In France, the average price of biomethane is estimated at 109 €/MWh in 2023, and the feed-in tariff has been revised to take account of changes in electricity supply costs.

Germany and **Finland** support biomethane indirectly via a FiT for biomethane-produced electricity. Germany has had a FiT scheme for biogas to electricity since 2004, currently in the form of tendering, previously an open-access scheme.[10] Also, **Italy** has a FiT scheme; in 2022 a new scheme entered into force for biomethane plants that produce up to 250 m^3/hour.[11] Until 2021, **Austria** had a FiT scheme.

Feed-in-premium (FiP)

A **feed-in premium** (FiP) is a subsidy payment in the form of a variable top-up payment covering the difference between the biomethane production cost and the price that biomethane producers receive when selling their molecules at the price of natural gas. The payment is equal to the difference between the biomethane market value (often equal to the natural gas price) and an estimation of the biomethane production cost plus margin. The FiP is established similarly as the FiT but is connected to the energy market dynamics. Subsidy payments under FiP schemes typically differ over time as a result of varying natural gas prices and changes to biomethane production costs.

The Netherlands have had a FiP scheme for grid-injected biomethane since 2011, with diversified payments based on the feedstock mix used and on the reported greenhouse gas emission reduction.[12] **Italy** has a FiT premium; in 2022 a scheme was introduced under which installations of >250 m3/h can apply for a FiP scheme, where the premium price is based on the reference price, monthly gas price, and monthly Guarantees of Origin price.

> *"The Netherlands is now transitioning from a supply-side only incentive scheme to a more mixed set of instruments including a biomethane mandate and a targeted CAPEX-subsidy for gasification"*
>
> **Dinand Drankier, Dutch Ministry of Economic Affairs and Climate Policy**

Estonia has also a FiP scheme in which producers sell biomethane to the transport sector, receiving a premium of €100 per MWh minus the average Baltic spot price of natural gas during the previous month. From 2022 onwards, **Austria** has a FiP scheme for renewable electricity produced from biogas and biomethane. **Czech Republic** plans to introduce a FiP scheme for grid-injected biomethane.

In Denmark, the current support scheme for biomethane is a combination of a fixed and variable premium which the beneficiary receives on top of the price from selling the gas, so that the aid covers the cost difference between fossil gas and biomethane. In Denmark, tendered support is capped to a level of €13.4/GJ (about 50 €/MWh).

[10] 'GreenMeUP' deliverable 1.1, page 35.

[11] For more information, read the **BIP Task Force 4.2's Report 'Insights into the current costs of biomethane production from real industry data'**.

[12] 'GreenMeUP' deliverable 1.1, page 36.

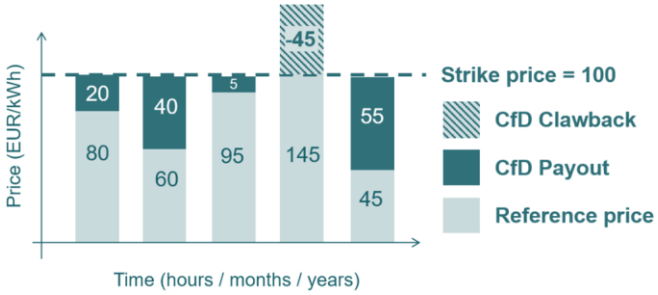
Tendering

Total available subsidy budgets are often capped. If the subsidy budget is aiming solely at renewable energy production, policy efficiency will direct the subsidy at those renewable energy sources that produce renewable energy at the lowest offering. Biomethane production is specific, the only renewable energy source that removes GHG (methane) emissions from the cycle and substitution effect and is aimed at hard to abate sectors. Separate tenders for biomethane production are crucial as biomethane is not competing at the electricity market: the government allocates subsidy payments to biomethane producers that bid for the lowest level of subsidy to produce biomethane. Tendering is possible under both feed-in tariff and feed-in premium schemes.

Contract-for-difference (CfD)

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. They can also be used to protect consumers against high energy prices.

CfD's can be financial derivative products. In the context of renewable energy, a CfD is a subsidy mechanism that is like a FiP but with the obligation for the beneficiary to make a payback if market prices go above a price level that is predefined by authorities.



Source: Florence School of Regulation[13]

The figure above explains the concept, in which the reference price is the variable market price of renewable energy (biomethane) that differs over time, also based on varying production costs. The strike price is predefined by the government and can be determined in a competitive bidding process. During times in which the reference price is lower than the strike price, the government pays a subsidy to biomethane producers equal to the gap between the reference and strike price.

During times in which the reference price exceeds the strike price, biomethane producers pay the surplus to the government. This creates price stability for producers and consumers of biomethane.

Recently the European Commission proposed to make CfD obligatory in support schemes for renewable electricity.[14] As biomethane support schemes, CfD are not yet widespread.

[13] Contracts-for-Difference, EUI, 12 April 2023.

[14] COM(2023)148, see Commission proposes reform of the EU electricity market design to boost renewables, better protect consumers and enhance industrial competitiveness.

CAPEX-support

CAPEX support is a subsidy payment to reduce the investment intensity of capital expenditures as part of the initial investment in new biomethane production installations.

Italy has a €1.7 billion CAPEX investment support scheme covering 40% of investment costs to upgrade existing biogas plants to biomethane plants and for building new plants. **Portugal** offers CAPEX subsidy to biomethane developers funded by the EU Recovery and Resilience Facility (RRF), and the domestic Environment Fund (FA, Fundo Ambiental). **The Netherlands** is currently developing a CAPEX subsidy scheme for gasification-based biomethane, the details of which are expected to be communicated in 2024. **Spain** has a €150 million investment support scheme for biogas production including upgrading to biomethane, based on tendering CAPEX support. A second round of CAPEX support is being developed. **Lithuania** has a CAPEX subsidy scheme covering up to 45% of capital investment costs.

SETTING THE RIGHT LEVEL OF SUPPORT

Production support measures aim to nudge investors to invest by enabling their business case with support that overrides the market failures that prevent to monetise fossil gas climate costs and import risks and/or the biomethane by-products and social benefits (e.g. GHG emission savings, organic waste processing, replacement of chemical fertilisers and soil improvement, provision of biogenic CO_2 and energy security of biomethane are not yet factored in the price). The incentive framework on the production side aims at bridging the gap between the cost of production and distribution of biomethane with a limited profit margin for the investor and the price of the natural gas that is being replaced[15]. Both fossil gas prices and biomethane production costs are volatile. Fossil gas prices greatly depend on geopolitical relations, while biomethane production costs reflect this volatility through fluctuations in biomass feedstock prices, either in increased fertiliser prices in case of agriculture feedstock, or in increased transport fuel prices in case of waste and residues streams of feedstock. Residues, intermediary crops and other cultivated feedstock is under climate change pressure and risk, too. Feed-in premium schemes can absorb such price swings by re-adjustments of payments over time for newly granted subsidies.

Biomethane costs do not only differ in time but also per country based on differences in feedstock, labour and fiscal costs. Feedstock mix and economies of scale play an important role where large-scale installations produce biomethane at substantially lower cost per unit of biomethane produced.

When defining the level of subsidy payments at national level, it is reasonable to consider those variations. Because of limited reliable up-to-date data on biomethane production costs, BIP Task Force 4 aims to obtain a more clear picture on typical biomethane cost items and ranges for various installation sizes and feedstock mixes. A balanced level of support would suffice to attract the investors while triggering the maximum possible increase in biomethane production within the given subsidy budget and adjusted to the market dynamics.

Lessons learned

Past experience records market failure examples in the attempt to support biomethane production. Those are related either in the tendering price being too low to de-risk investment or changing conditions of inputs (feedstock) or output (biogas, digestate, CO_2). When the tendering price is too low experience shows either no bids or the winning bids are blocking a biomethane production quota with unlikely fruitful investments.

A tender could be also aiming at economies of scale to support either one or few large biogas plants. However, if that economy of scale is not reflecting the profile of the national sustainable biomethane potential, it is unlikely that this tendering will be successful.

Assigning value to only manure as a way of incentivising the replacement of fossil-based fertilisers, without including digestate, also leads to biomethane market failure.

Unbalanced tendering conditions, such as tendering criteria, eligibility and price that is not considering the GHG intensity of the end-use, will likely lead to biomethane market failure.

Public support needs to achieve de-risking and safeguarding investments while achieving societal targets of security of supply, GHG emissions savings and rural development.

This aligns well with the discussions within the Task Force that demand side incentives (such as GHG intensity reduction targets) have important benefits, in particular to scale up biomethane in mature markets.

[15] CAPEX support is an exception because it aims to help paying for the initial large capital investment rather than bridging the cost gap between biomethane and fossil energy.

Thoughts on pros and cons of production support measures

Hypotheses on pros and cons have been formulated with inputs from the 'GreenMeUp' project to be discussed with the Member State representatives at the Madrid workshop held in March 2023. The trade-offs discussion has reached its first milestone at the Rome workshop (31 August-1 September 2023), summarising the impact and efforts in an Action matrix. The records below reflect those discussions.

Feed-in tariff, feed-in premium & contracts for difference

Pros

- Direct production support is supportive for investments and business cases from an investor point of view. It provides investment certainty for biomethane developers and producers. This is especially relevant in emerging biomethane markets.
- Feed-in premiums could be flexible and could move both upwards and downwards on an annual basis, thereby ensuring cost-effectiveness for taxpayers and shielding producers from inflation impacts. Tendered support is especially cost-effective.
- Feed-in premiums can take into account the level of greenhouse gas savings achieved by providing higher support for biomethane that generates high GHG savings, thereby maximising the contribution of biomethane in meeting climate targets.
- Contracts for difference can be a cost-effective way to provide support, with limited risk of over or under subsidisation.
- Subsidised biomethane is a direct investment in increased energy security and EU strategic autonomy with additional benefits e.g., reduced ammonia emissions when using manure as feedstock.

Cons

- Subsidised biomethane is often not allowed to be traded freely and traded across borders within the EU common market. This limits the creation of a pan-EU biomethane market.
- Government budgets to provide subsidies are limited; investments to increase biomethane production are capped by the available subsidy budget.
- Introducing production support must be balanced to ensure that a certain target level of production will be achieved, although the support mechanism can be made more attractive to investors in case of lower-than-expected interest.
- Feed-in tariffs could result in increased cost for the end-user/consumer.
- The level of feed-in tariffs and feed-in premiums are based on an estimation, usually calculated by government agencies, under a risk of either suboptimal information, political influence or lobbying. Tendered support offers an additional mechanism to ensure cost-effectiveness. Contracts for Difference can avoid this risk provided the predefined price level is close to accurate. There is a risk though that producers will align their pricing with the assumed market price or strike price.

- Often, a significant investment is required to become eligible for the subsidy as a guarantee. These investments are futile if the no subsidy grant is obtained and drive the investments to less risk exposure areas.
- Risk of increased feedstock prices, especially linked with feed-in premium schemes.
- The process and time required to obtain a subsidy grant can slow down project development.
- Risk that subsidies will lead to cannibalisation: new plants (with higher subsidies) will take the feedstock from the existing plants.

CAPEX support

Pros

- Provides instant revenues.
- Relatively simple to administer.
- Well suited to stimulate higher risk large investments and to foster innovation, e.g. gasification-based biomethane.
  Well suited to stimulate biomethane investments in emerging markets.
- CAPEX support can be often funded through various EU or regional funds, such as the RRF, EU structural funds, climate change programs related to the emission trading systems, among others. This proves beneficial, especially when securing funds from national budgets proves challenging.

Cons

- Biomethane has significant operational costs (OPEX) mostly related to labour and feedstock costs. In many cases, CAPEX support alone may not be enough.
- If digestate use as a local source of nutrients is not regulated, digestate management becomes an additional cost (both CAPEX and OPEX) item, which is related to all incentives in question.

Other considerations on production support measures

Support schemes should allow for flexibility to fluctuations in biomethane and biomethane feedstock market prices, enabling regular adjustments to the scheme as necessary. Flexibility to the market dynamics can be achieved with feed-in premium and contracts for difference types of biomethane production support. Production support measures are often combined with usage support measures, in the form of mandates or reduction targets for natural gas consumption. For instance, producers could opt-in and opt-out of a feed-in premium monthly. When opting-out, producers can produce 'for the market', helping to fulfil a mandated biomethane consumption target at market prices and allowing allocation of biomethane funds to a wider pool of producers than originally planned. It is also noted that direct long-term Biomethane Purchase Agreements (often including biogenic CO_2) are being made particularly between the industry and the biomethane producer. At the Madrid workshop, Task Force 1's members mentioned that CAPEX support might help to kick-start investments, convincing investors to invest in relatively new biomethane markets. Yet, given the high operational costs of the biomethane business model, the level of CAPEX support must be carefully determined to avoid futile support and block other types of production support measures due to the double subsidy rule.

CAPEX support has also the ability to support the auxiliary equipment related to improve biomethane practises (e.g. covering the open digestate storage, implementing automated and handheld leak detection) and support the investment for capital intensive agro-ecological practises related to sustainable biogases production (BiogasDoneRight concept). These levels of support can be either sourced from the European EAFRD or from the Energy budget.

2 Demand side incentives

Biomethane can also be scaled up by stimulating its consumption through mandates, greenhouse gas (GHG) intensity targets and tax incentives.

Biomethane mandates

Biomethane mandates are specific consumption targets for biomethane within a specific timeframe. Mandates can cover grid-injected biomethane, as well as non-grid bound biomethane, consumed either as a share or target in the overall natural gas supply or in a specific end-use targeted sector where natural gas use will be replaced (e.g. residential, industry, transport). Obligated parties under biomethane mandates are usually natural gas suppliers that sell biomethane through their existing markets. The cost of the mandate is paid for by biomethane end use sectors along the natural gas consumers.

Italy has had a mandate for advanced biomethane since 2018, which helped (alongside a production support scheme) to substantially increased investments in new biomethane capacity.[16] **Austria**, **Ireland** and **the Netherlands** plan to introduce a mandate that requires a certain minimum quantity of biomethane to be injected into gas grids. In the case of the Netherlands, the mandated quantity will gradually increase from the year it takes effect (probably 2025) towards 2030. Ireland is considering an initial fixed obligation rate with no increase across the first 3 years followed by an annual rate increase from year 4. Austria will also include hydrogen in the mandate. **Lithuania** has a mandate related to the biomethane supply to the transport sector. **Denmark** has an ambition to replace total fossil gas supply with biomethane by 2030.

Greenhouse gas intensity targets

Greenhouse gas intensity (GHG) targets oblige companies to reduce the GHG intensity of the energy they consume. Examples include the EU-ETS which obliges operators of large industrial installations and electricity producers to reduce their emissions or to purchase emission allowances. Companies purchasing biomethane to replace their natural gas consumption do not have to purchase emission allowances for the usage of biomethane, driving the demand for biomethane. Another example of GHG intensity reduction target is achieving the share of renewable energy in transport (advanced biofuels) under the EU RED[17] and the Governance Regulation[18] on reduction of GHG emissions from non-ETS sector, by including sequential and cover crops as feedstock and reduced use of inorganic N-fertilisers due to the use of digestate as local source of nutrients.

Germany has had a GHG intensity reduction obligation for road fuel suppliers[19], for which biomethane can be used since 2018. This has proven to be a great incentive for biomethane investment, producing bio-CNG and bio-LNG at very high market price levels. The price per tonne of greenhouse gas emission reduced reached a very high level of over €800/tonne CO_2, which equals around €160/MWh biomethane in case 100% greenhouse gas reduction is achieved

[16] GreenMeUP deliverable 1.1, page 38.

[17] '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', so called RED II, and 'Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652'.

[18] Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.

Pros and cons of DEMAND SIDE INCENTIVES

compared to the fossil fuel comparator. During 2023, the CO_2-price under this scheme reduced, although maintaining a high value. **Ireland** is building its biomethane market around GHG intensity reduction in agriculture. **Italy** has developed the BiogasDoneRight concept to reduce the GHG intensity across both the agriculture and energy sectors.

Tax exemptions

Tax exemptions as a driver for biomethane investments are mainly confined to the heavily taxed road transport sector.

Germany exempts biomethane purchased as fuel for CHP plants from taxes plus offers a tax reduction for heat generation from biomethane.

Sweden exempted biomethane from carbon tax and excise duty between 2011 and 2023. Following these measures, 95% of gaseous transport fuels in Sweden now consist of biomethane. This measure is discontinued for the time being.[20] In

Finland, biomethane used for fuels has a lower excise duty than natural gas.

Thoughts on the pros and cons of demand side incentives

Hypotheses on pros and cons have been formulated with input from BIP Task Force 1's co-chairs and have been discussed with Member State representatives at the Task Force 1's workshop in Madrid, held in March 2023. The thoughts presented here reflect those discussions.

[20] 'GreenMeUP' deliverable 1.1, page 38.

Mandates

Pros

- High policy certainty that the desired/anticipated scale up of biomethane will be achieved, provided effective (high enough) penalties are in place for non-compliance.
- Mandates provide an incentive for mandated parties (e.g. energy suppliers) to mobilise funding to invest in new biomethane production.
- Mandates provide long term predictability about demand and therefore investment stability, thereby helping to de-risk investments.
- Biomethane can be scaled up independently from government budgets.
- Demand side mechanisms will lead to higher costs for the end user and thereby incentivise energy savings.
- Gradual increase of the mandated quantity of biomethane can keep additional energy costs low as over time energy efficiency will increase.
- The price of biomethane is set by supply and demand, which helps to create a more mature biomethane market.

Cons

- Investors must estimate the prices resulting from a mandate, which poses a risk to their business case, especially in the early market stages.
- Mandates can create market distortions and force the fulfilment of the quota by inefficient production or solutions not at the lowest price.
- A mandate should be balanced with the biomethane production levels. A high mandate may reduce the incentive for cost efficiency in biomethane production, while a low mandate fails to capture the market potential. This risk can be mitigated by setting a longer-term (vision) target mandate with a stepwise approach towards the target, allowing for competition between biomethane producers and adjusting to the market growth potential.
- Differentiating between various types of feedstock or production techniques is more challenging compared to production side incentives. This differentiation would require sub-mandates that would trace down biomethane to its origin.
- Introducing mandates as a stand-alone measure is not necessarily guaranteeing security for a bankable business case, especially when there is still uncertainty regarding the biomethane price.
- A not well-formulated mandate runs the risk of increased cost for the end consumers.

Greenhouse gas intensity reduction – EU-ETS / EU RED transport target

Pros:

- Biomethane can be scaled up independently from government budgets.
- Demand side mechanisms will lead to higher costs for the end user and thereby incentivise energy savings.
- The gradual increase of the reduction target can keep additional energy costs low as over time energy efficiency will increase.
- The price of biomethane is set by supply and demand, which helps to create a more mature biomethane market.
- Recently, EU-ETS prices have increased to €100/tonne CO_2 which equals €20/MWh of natural gas or about €0.20 per m^3 of biomethane. On top of the increased natural gas price (futures prices of around €40/MWh in June 2023[21] compared to €15-20/MWh before Q3 2021), this creates an increasingly attractive 'floor price' for biomethane used in industry and for electricity production.
- Mandatory renewable energy shares in transport often represent a high monetary value, thereby creating an attractive market for biomethane.

Cons:

- A variety of measures can be implemented to reduce emissions (e.g. either investing in energy efficiency, hydrogen or biomethane). Therefore, the instrument is aimed at the most efficient reduction of GHG emissions, to which biomethane must compete. While driving the biomethane business model towards maximisation of GHG emission savings, it does not offer certainty that the 35 bcm (or national target based on this overall target) of biomethane will be achieved.
- The current EU ETS price is too low to support biomethane investment at the moment. However, in the future (post-2030), the CO_2 price is anticipated to increase to a point where the EU ETS will become a strong driver for biomethane investments.
- Currently not a driver for biomethane in the buildings sector and heavy transport; this could change with the revised ETS currently under discussion. However, the price cap under the 'ETS2' will hamper its effectiveness in generating biomethane investments.
- Although the contribution of advanced biomethane is capped under the EU RED, the current vehicle fleet that is using gaseous transport fuels could absorb about 4.56 bcm of biomethane, just by injecting it to the existing gas grid infrastructure and filling stations, reporting the end-use in renewable energy in transport via the Union Biofuels Database, without multipliers. In 2021, the use of biomethane in transport was 0.05% or 0.12 Mtoe or 0.14 bcm[22]. Energy balances record 2.41 of biomethane injected in the grid in 2021. In 2022, in its statistical report, industry reports an EU uptake of biomethane in transport, excluding multipliers, of 0.8 bcm.

[21] On 5 June 2023, natural gas contracts for the calendar year 2025 had a price of €41/MW (source: Dutch TTF Natural Gas Futures).

[22] Eurostat: Energy Balances 2021.

Tax incentives

Pros

- Can be an effective mechanism to scale up biomethane in the highly taxed road transport sector and within residential use.

Cons:

- Likely insufficient as a stand-alone financial driver for investments steered at biomethane consumption in sectors outside road transport.

Other considerations on demand support measures

During the Rome workshop (31 August – 1 September 2023), Italy highlighted that biomethane is the only renewable energy source that is actually removing a GHG (methane) from the cycle, in addition to the substitution effect that all other renewable energy sources provide when replacing fossil fuels.

As such, biomethane production has an opportunity to evolve into a carbon removal solution. Italy has developed the BiogasDoneRight concept incorporating over a decade of monitoring soil carbon increase resulting from digestate utilization and sequential cropping, as well as evidence-based data supporting GHG emission removals.

To benefit from GHG emission savings along the biomethane value chain, including digestate and biogenic CO2 usage, relevant metrics must be adjusted for reporting GHG emission savings in the National Inventory Reports submitted to the IPCC.

According to Italy, it still represents a challenge to fully capture the total GHG emission savings occurred from all parts of biomethane production, including its by-products and use.

SELECTING FITTING INCENTIVES TO MAXIMISE IMPACT

Upon the collected information from the Task Force 1's members and bilateral talks with the Member States within the 'GreenMeUp' project, it looks like 10 Member States had introduced production subsidies for biomethane by September 2023 (Austria, Denmark, Estonia, Finland, France, Germany, Italy, Lithuania, the Netherlands, Sweden) and 14 Member States[23] have injected biomethane in the grid in 2021 (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Italy, the Netherlands, Poland, Romania, Spain, Sweden). In Member States with a longer presence of support schemes for biomethane, such as Denmark, Germany, France and Italy, this has resulted in a substantial scale-up of biomethane production. The positive policy framework facilitated the formation of a biomethane market, fostering the growth of project developers, specialised engineers, and producers within the industrial sector. Production subsidies seem highly suited to scale up biomethane in emerging markets, especially if this is linked with GHG emission intensity reduction.

As subsidised biomethane typically stays within the national borders, the scale-up of biomethane pathway was individual for each Member State resulting in the creation of several unconnected national biomethane markets. The integration of biomethane markets into a single EU market, where numerous market players can participate, producing and trading sustainable biomethane

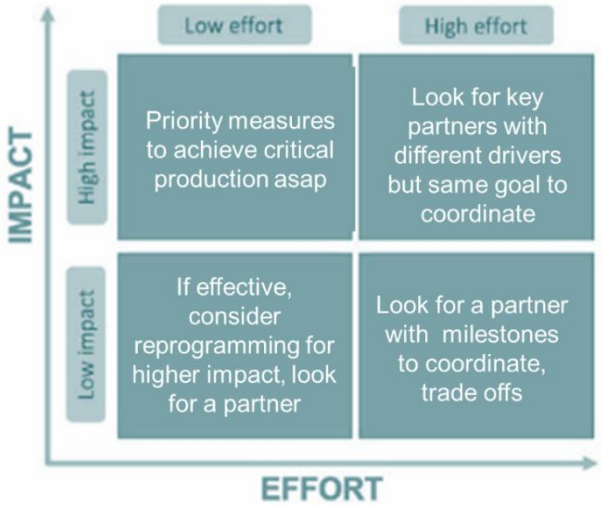
[23] BE, CZ, DK, DE, IE, ES, FR, IT, LU, HU, NL, AT, FI, SE.

at competitive price levels, would be the next step. Relying on meeting the 35 bcm target of sustainable biomethane by 2030 purely through subsidies would require a large budget allocation. Denmark, France, Finland, Germany, Italy, the Netherlands and Sweden are Member States with more mature biomethane markets that have introduced or are planning to introduce demand-side incentives, to further drive investments in new biomethane production capacity. Those demand-side incentives are often accompanied with supply side incentives.

In general, policy stability is the crucial element of incentive measures, as they allow for a longer-term certainty to investors. A biomethane investment requires 3-6 years to become operational, which calls for a strategic vision by governments on the longer-term perspective on the role and value of biomethane in the future energy system, towards and beyond 2030. This helps to provide clarity and confidence to the market.

Deciding on one or a portfolio of support schemes for biomethane production, including not only direct but also indirect support measures, could be overwhelming for a leading ministry, especially for the emerging markets.

Within a participatory approach in the various workshops and meetings, the pros and cons of incentives were discussed. Furthermore, the Action priority matrix or Eisenhower matrix[24] was introduced to spur the discussions and familiarise with the effort and impact estimation of the various measures.



BIP Task Force 1 will continue to collect the perspectives on the effectiveness of policy measures to support the development of the biomethane market as the experience builds and markets evolve.

[24] For more details, please investigate available literature on strategic management.

ANNEX: OVERVIEW OF MEMBER STATE INCENTIVES

The table below shows a snapshot of biomethane direct support measures per Member State by the end of August 2023, excluding incentives solely related to biogas. Absence of direct biomethane production support is indicated by '–'.

Member State	Production support	Demand support
Austria	Feed-in premium for electricity from biomethane	Mandate (planned)
Belgium (Flanders)	-	Biomethane in gaseous transport fuel mandate
Bulgaria	*Unknown*	*Unknown*
Croatia	*Unknown*	*Unknown*
Cyprus	*Unknown*	*Unknown*
Czech Republic	Feed-in premium	*Unknown*
Denmark	Feed-in tariff	GHG intensity reduction target in transport, exemption from motorway toll and parking fees for low emission cars including those using biomethane, mandate to replace natural gas imports with biomethane by 2027
Estonia	Feed-in premium	-
Finland	Feed-in tariff for electricity from biomethane	Fuel excise duty reduction, biomethane included in transport fuel mandate
France	Feed-in tariff	-
Germany	Feed-in tariff	GHG intensity reduction target in transport
Greece	*Unknown*	*Unknown*
Hungary	*Unknown*	*Unknown*
Ireland	-	-
Italy	Feed-in tariff, CAPEX support	Mandate planned. Biomethane in transport fuel mandate
Latvia	Feed-in-tariff	GHG intensity reduction target in transport, building of public biomethane injection points in natural gas transmission grid and issuing of certificates of origin
Lithuania	CAPEX subsidy	Biomethane included in transport fuel mandate
Luxembourg	*Unknown*	*Unknown*
Malta	*Unknown*	*Unknown*
The Netherlands	Feed-in premium	Mandate planned, biomethane in transport fuel mandate
Poland	Subsidy scheme planned	Fuel excise duty exemption
Portugal	CAPEX subsidy	-
Romania	-	-

Slovakia	*Unknown*	*Unknown*
Slovenia	*Unknown*	*Unknown*
Spain	CAPEX subsidy	Planned inclusion of biomethane in transport fuel mandate and possibility of quota
Sweden	CAPEX subsidy Production, upgrading and liquefaction receive support	Excise duty reduction

BIP Europe

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