Ref. Ares(2025)6262605 - 01/08/2025

Final report on the policy workshops

Deliverable n. 5.7

Funded by the European Union

Document control sheet

Project	GreenMeUp - Green biomethane market uptake
Call identifier	HORIZON-CL5-2021-D3-02: Sustainability and educational aspects for renewable energy and renewable fuel technologies
Grant Agreement n°	101075676
Coordinator	CRES - Centre for renewable energy sources and saving foundation
Work package n°	5
Work package title	Outreach
Work package Leader	ETA Florence Renewable Energies
Document title	D5.7 Final report on the policy workshops
Author	Giacomo Mezzeti / ETA Florence Renewable Energies
Reference period	1/02/2024 - 31/07/2025
Due date	31/07/2025 (Month 36)

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Table of contents

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Introduction

As part of GREENMEUP project, an annual policy workshop is planned to organized in a physical or hybrid format, bringing together policymakers and key stakeholders from across Europe. Over the course of the project, a total of three policy events are scheduled.

This deliverable presents an update to Deliverables D5.2 and D5.5, which documented the outcomes of the first and second policy workshops. D5.7 extends the coverage to include all three annual policy workshops conducted within the framework of GREENMEUP. These workshops are a central element of the project's policy engagement strategy, designed to foster dialogue among policymakers, regulatory bodies, industry stakeholders, researchers, and civil society representatives regarding the development and scaling of the biomethane sector in Europe.

Each workshop was organized in a physical or hybrid format to ensure broad accessibility and participation, with representation from multiple EU Member States. The sessions served as a platform for knowledge exchange, best practice sharing, and the identification of policy gaps and opportunities relevant to biomethane market development.

Each event was structured around expert presentations, panel discussions, and breakout sessions, enabling interactive and targeted conversations on the following key focus areas:

Policy developments: The workshops explored current EU-level initiatives and policy frameworks that support biomethane deployment, such as the REPowerEU Plan and revisions to the Renewable Energy Directive. The sessions also highlighted national-level best practices from frontrunner countries offering practical insights into effective policy instruments and incentive schemes.

Remaining Barriers and Potential Solutions: Drawing on the project's findings, persistent obstacles in countries with emerging biomethane markets were presented and discussed.

Policy measures and strategies: Drawing again on the project's findings policy measures and financing mechanisms and alignment with national energy and climate plans (NECPs) were proposed and discussed.

Innovation and R&I Gaps: The workshops also addressed the need for continued research and innovation in the biomethane value chain. Emphasis was placed on identifying key R&I gaps and exploiting future funding opportunities.

Following each workshop, a comprehensive report was prepared to document the discussions, capture stakeholder perspectives, and consolidate actionable recommendations. These reports serve both as records of the events and as strategic inputs for refining the project's policy guidance and advocacy activities.

This deliverable, D5.7, compiles the insights gained from all three policy workshops, highlighting both the evolution of stakeholder perspectives and the progress made in addressing identified challenges. The findings helped inform the overall policy roadmap developed at the end of the project.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Chapter 1: First Policy Workshop

On the 7h of June 2023 in Bologna, Italy, GreenMeUp has joined forces with the SUPEERA Project in co-organising a workshop titled "*Delivering on REPowerEU: Bringing research and industry closer to accelerate innovation and uptake of Biomethane*", as a side event of the 31st European Biomass Conference and Exhibition.

The event aimed at bringing together a group of eminent European scientists and leading industry to discuss research-industry cooperation practices and opportunities, in order to accelerate innovation in the biomethane/biogas sector and to explore their replicability potential across Europe, in particular after the recent crisis that Europe is facing after the Russian invasion of Ukraine.

With over 70 participants, 45 attending onsite and 25 participating online, the workshop provided an interesting discussion on how innovative solutions and R&I solutions will have to be incorporated into the biomethane and biogas market, in order to reach the production goal of 35 bcm/year by 2030.

This report describes the main highlights of this event. For more details, the slides of the event are available here: https://www.greenmeup-project.eu/news/greenmeup-participation-at-the-31st-european-biomass-conference-and-exhibition-eubce/.

Attendees at the workshop

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

1.1 GreenMeUp and the link with the SUPEERA Project

GreenMeUP is a Horizon Europe project that aims at providing a basis for policy-makers and stakeholders to develop more informed renewable energy policies and country-tailored market uptake measures, in order to improve and complement existing biomethane policy in Europe. In this context, GreenMeUp joined its forces with the SUPEERA Project that has the main aim of supporting two flagship initiatives of the European Union, namely the SET Plan and the Clean Energy Transition – in order to support Europe's strategic long-term vision of a Clean Planet for all.

The SET Plan is an essential framework for fostering the Clean Energy Transition in Europe: it sets a roadmap by which the EU aims to meet its Energy Union targets by 2030, helping aligning R&I priorities between the European Commission, EU Member States and the industry. Among its supporters, the European Technology and Innovation Platforms (ETIPs) and the European Energy Research Alliance (EERA), representing the research community[1] are playing a crucial role.

Over the years, within the framework of the Clean Energy Transition, the European Commission has promoted and implemented several policies aiming at achieving this ambitious goal of a net-zero GHG emissions economy by 2050.

One of the most recent and relevant EU policies is the **REPowerEU Plan**, a document which sets up a strategy for reducing EU's reliance from Russian natural gas. The plan's strategy is composed by two main objectives:

1. **Diversifying gas supplies**, with higher LNG and pipelines imports from non-Russian gas suppliers and by increasing the production and imports of biomethane and renewable hydrogen;
2. **Boosting energy efficiency**, increasing renewables and electrification by reducing the use of fossil fuels in houses, buildings and industries[2].

Within this framework, the SUPEERA project has elaborated a Policy Brief, with an analysis of the research and innovation challenges deriving from the REPowerEU measures.

While the SUPEERA Project is mainly focused on the bigger picture –supporting the EU in reaching its Energy Union targets by 2030 – the GreenMeUp Project has a specific focus on biomethane and its market uptake in Europe and aims at contributing to achieve the REPowerEU targets.

A workshop bringing together a group of eminent European scientists and leading industry to discuss research-industry cooperation practices and opportunities to accelerate innovation in the biomethane/biogas sector and to explore their replicability potential across Europe, was organised by the SUPEERA Consortium at the 31st European Biomass Conference and Exhibition (EUBCE), on 7th June 2023 in Bologna, Italy. The SUPEERA Project has teamed up with GreenMeUp, which contributed to the workshop by enriching the discussion from the policy, market and social point of view, which consist of the main pillars of the project.

[1] *Communication from the Commission: Towards an integrated Strategic Energy Technology (SET) Plan (C/2015/6317)*. Source: https://energy.ec.europa.eu/topics/research-and-technology/strategic-energy-technology-plan_en.
[2] *Communication REPowerEU Plan*, COM/2022/230. Source: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

GreenMeUp inviting card

1.2 Workshop objective and agenda

The unprecedented crisis that Europe is facing due to Russia's invasion of Ukraine has changed dramatically the global energy market: this event has brought the European Union to rethink its energy policy and the future energy system. In order to answer this new geopolitical situation, the European Commission implemented a new strategy: the REPowerEU plan, focused on reducing Europe's dependence on Russian fossil fuels through the diversification of supply.

Among the objectives addressed by the REPowerEU plan, a central role has been given to biomethane: here, the main aim is reaching a production of to 35 bcm/year by 2030. This target can be considered as quite concrete: biomethane production levels in the EU can be easily scaled up, since enough sustainable feedstock are available in Member States. Although there is a large potential of biomass feedstock to produce biomethane, a series of market uptake measures for biomethane deployment, together with a strong cooperation between industry and research are fundamental.

The **workshop agenda** was mainly built around these assumptions. After a first introduction made by Maria Georgiadou from the European Commission, Directorate-General for Research and Innovation, the agenda was divided into two main sessions, each one with 4 speaking slots. The first session was dedicated to present the acceleration of research and innovation as conducted by Research Institutes and Industries, whereas the second session was focused on ways to facilitate the market uptake of biomethane in Europe.

Prominent speakers were selected based on their high-quality expertise on the topics of the event and their active involvement in relevant research projects, biomethane supportive policy analyses, standardisation processes as well as in public awareness.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

AGENDA

- ***Introduction***: The role, the EU's perspective and R&I policies for biomethane in Europe; *Maria Georgiadou from the European Commission, Directorate-General for Research and Innovation*
- ***Session 1: Research/Industry collaboration for identifying R&I needs to accelerate biomethane production.***
    - R&I to accelerate biomethane production through gasification from the industry perspective; *Marion Maheut, Engie*
    - R&I to accelerate biomethane production through upgrading of anaerobic digestion biogas from the industry perspective; *Sebastian Alber, Biogest*
    - R&I for efficient and cost-effective production of biomethane through thermochemical technologies; *Francisco Girio, The National Laboratory of Energy and Geology (LNEG)*
    - R&I to unlock feedstock potential for biomethane production; *Myrsini Christou, Center for Renewable Energy Sources and Saving (CRES).*
- ***Session 2: Cross-sectorial dialogue to facilitate the biomethane market deployment.***
    - Removing Technical Barriers to Biomethane Standardisation; *Erik Büthker, TotalEnergies and European standardisation committee for biomethane CEN PC 408*
    - Sustainability in technical, economic, and environmental terms; *Marlies Hrad, University of Natural Resources and Life Sciences Vienna (BOKU)*
    - Policy framework to facilitate biomethane market development; *Giulia Cancian, European Biogas Association (EBA)*
    - Social acceptance in socio-political and community dimensions; *Myriam Röder, Aston University.*

Both sessions had also a panel discussion and Q&A at the end.

From left: Spyridon Pantelis (EERA), Francisco Girio (LNEG), Berta Guell Matas (SYNTEF), Luisa Brega (Prodeval), Ivan Matejak (EERA), Myrsini Christou (CRES), Maria Georgiadou (EC, DG R&I)

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

1.3 Session 1: Research/Industry collaboration for identifying R&I needs to accelerate biomethane production.

1.3.1 The role, the EU's perspective and R&I policies for biomethane in Europe

Maria Georgiadou, European Commission - Directorate-General for Research and Innovation, opened the SUPEERA workshop with a general overview of current EU policies for biomethane in Europe.

At first, she mainly focused on the REPowerEU Plan and its main objectives. Then she introduced the Biomethane Industrial Partnership, in which policy makers, industry and other stakeholders' team up with the goal to support the achievement of the target of 35 billion cubic metres annual production and use of sustainable biomethane by 2030[3]. She then explained the recent Green Deal Industrial Plan, which main aim is to enhance the competitiveness of Europe's net-zero industry and accelerate the transition to climate neutrality[4]. The plan has been adopted to build the industrial capacity for the clean technologies that make up the Green Deal, including biomethane.

Her overview ended with a quick update on the delegated act to RED II: here, the focus was on the recent update made by the Commission on the list of sustainable biofuel feedstock, where the request was to add non-food crops grown on severely degraded land and intermediate crops[5].

Finally, she shortly presented a recent EU publication called "*Innovative biomethane for REPowerEU*[6]", a project info pack where the Commission summarised the most recent and relevant EU projects on biomethane. She then invited the audience to take a look at Cluster 5, destination 3 of bioenergy of HORIZON program.

[3] Source: https://bip-europe.eu/.
[4] Communication: A Green Deal Industrial Plan for the Net-Zero Age. Source: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan_en.
[5] 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. Source: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG.
[6] Innovative biomethane for REPowerEU. Source: https://op.europa.eu/en/publication-detail/-/publication/c4651f9b-eaf2-11ed-a05c-01aa75ed71a1/language-en.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

1.3.2 R&I to accelerate biomethane production through gasification from the industry perspective

Marion Maheut, from LAB CRIGEN at Engie, is the Pyrogasification and GAYA R&I Project leader.

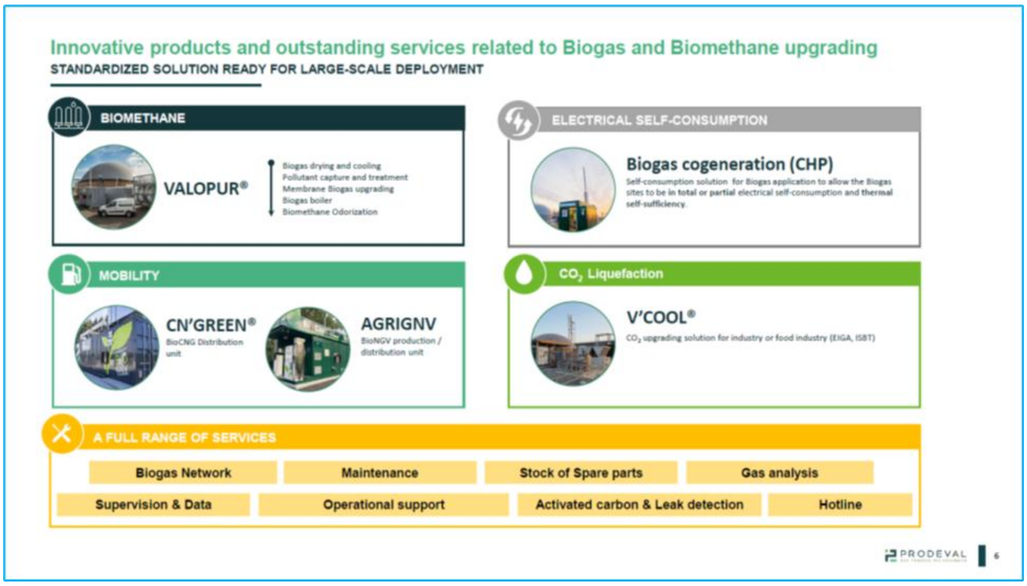
Through an overview of Engie research and industry programs, she clarified that the GAYA project on the production of biomethane exemplified collaboration between industry and research covering the whole value chain.

Through this project, Marion provided insight on upscaling of a gasification technology, from R&D lab concept (2010) to Pilot/Demo (2020) and up to Industrialisation (2026): the Salamander project, the first business venture for gasification-based SNG in France. Marion highlighted that one of the main challenges now is offering a complete solution to remove all the pollutants from the syngas before methanation.

1.3.3 R&I to accelerate biomethane production through upgrading of anaerobic digestion biogas from the industry perspective

Luisa Brega, from Prodeval, is a chemical engineer specialised in bio-digestion systems.

Prodeval represents 17% of the biogas membrane upgrading market share worldwide and provides standardised solutions for large-scale deployment, confirming a huge replicability potential across Europe to deliver the REPowerEU biomethane volumes by 2030.



Luisa presented the products and services of the company related to Biogas and Biomethane upgrading. She emphasised the effective industry and research collaboration within Prodeval's R&D department, thus facilitating the development of technologies, analysis of plant data, and addressing of environmental

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

concerns, driving advancements in adapting biomethane production to meet country-specific requirements.

1.3.4 R&I for efficient and cost-effective production of biomethane through thermochemical technologies

Francisco Girio is president of the Board of CoLAB BIOREF, from The National Laboratory of Energy and Geology (LNEG). After presenting the biogas and biomethane market in EU, and the evolution of biomethane production technologies over the past decade he emphasised the need to increase the biomethane produced via gasification. Thus, he presented the HYFUELUP project, which demonstrates an innovative pathway for the efficient and cost-effective production of biomethane in industrial environment and aims to deploy a first-of-its-kind value chain for biomethane production from low-grade biomass and sludge digestate from AD plants.

1.3.5 R&I to unlock feedstock potential for biomethane production

Myrsini Christou from the Centre for Renewable Energy Sources and Saving (CRES) - Greece, started her speech with an overview of the current feedstocks available in Europe for biomethane production. She outlined that for the moment the most common and available feedstocks are mainly agricultural residues, meaning manure and plant residues.

She then briefly illustrated the variation of feedstocks among EU countries and analysed the potential feedstocks projections in 2030 and 2050, explaining how there will be a trend change in feedstock for biomethane production where sequential cropping and lignocellulosic biomass will gain importance.

She also provided some results from the MAGIC Project, that mapped all the marginal lands throughout Europe, and the GreenMeUp Project, where she illustrated the main strategy for aligning biomethane production among EU member states, with a specific focus on target countries, meaning those countries with less developed biomethane production rates.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

In the panel discussion and Q&A section, the following subjects were raised:

- Standardised equipment, favourable political support, and cost reduction are key to replicate and commercialise plants
- In biomethane production energy dependency is an important challenge that R&I has to face
- R&I should focus on the biological fermentation process for anaerobic digestion
- R&I and industry collaboration crucial for several targets: for identifying country's specific technology requirements while prioritising environmental considerations, for industries to stay competitive, share risks, and reduce costs, as well as for facing the challenge for biomass potential by optimising the supply chain or implementing innovative supply chains on a large scale.
- The need for diversification of integrated technologies and implementation of larger-scale demonstration facilities
- The importance of EU Taxonomy as a financial framework.

1.4 Session 2: Cross-sectorial dialogue to facilitate the biomethane market deployment

1.4.1 Removing Technical Barriers to Biomethane Standardisation

Erik Büthker from TotalEnergies and the European Standardisation committee for biomethane underlined that there are no significant technical barriers at the moment for biomethane standardisation: the current standards are now available.

Furthermore, he underlined that the European Gas Research Group is currently analysing biomethane trace components and their potential impact on the European gas industry, with a specific focus on oxygen in biomethane, and their impact on different elements of the value chain.

1.4.2 Sustainability of biogas and biomethane production

Marlies Hrad, senior scientist from the University of Natural Resources and Life Sciences in Vienna (BOKU), focused her speech on the methane emissions and their impact on the overall greenhouse gas balance.

At first, she underlined the necessity to have balanced greenhouse gas emissions for upscaling and facilitating biomethane production.

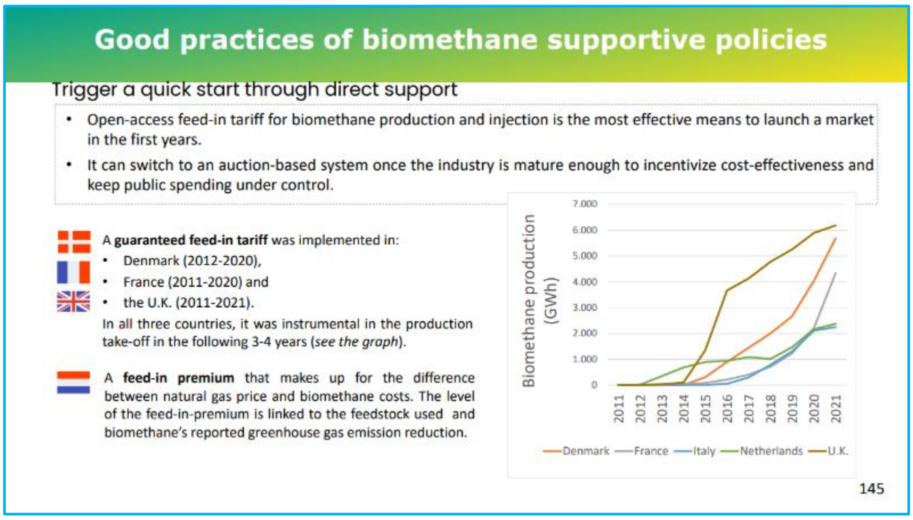
She then illustrated a study on the impact of CH_4 emissions on GHG balance substrate supply, and the impact of CH_4 emissions on GHG balance technological implementation. Her presentation also included the results of the EvEmBi project, which evaluated methane emissions.

She then concluded with a list of recommended actions for reducing methane emissions, such as selecting appropriate feedstock, choosing optimal technology options for biogas plants and ensuring regular maintenance and leak detection during self and external inspections.

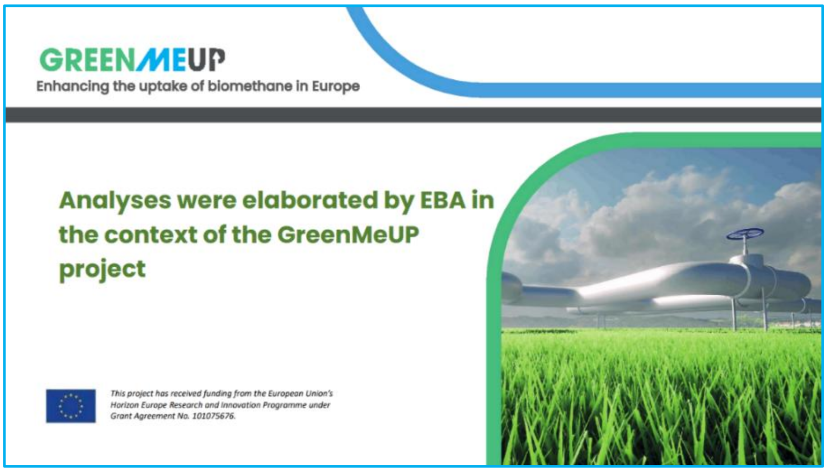
This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

1.4.3 Policy framework to facilitate biomethane market development

Giulia Cancian from the European Biogas Association (EBA) discussed two main topics during her speech: EU policies and best cases for biomethane production.



Regarding EU policies, she mainly gave an overview of the current legislation and the specific policy measures on biomethane production. Here, her main focus was on the RED III and its milestones: she illustrated how the targets on renewable energy sources have been increased from 32% to 42.5%, a meaningful increase and a significant step forward in the implementation of biomethane production[7].



For what concerns the best cases in Europe, she listed those countries where biomethane production rates are already quite advanced, namely Austria, Denmark, France, Germany, Italy, Netherlands, Norway, Switzerland, Sweden and UK. She then introduced the main good practices and supportive policies that these countries adopted in order to reach these levels of biomethane production, such as feed-in tariffs, feed-in premium, and the enabling of grid injection and market recognition.

She concluded by underlining that the majority of these results were conducted within the context of the GreenMeUp project, where the main aim is to analyse the advanced countries policies in order to see if they can be replicated in less developed countries.

[7] 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. Source: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

1.4.4 Social acceptance in socio-political and community dimensions

Myriam Röder from Aston University indicated that due to the current poly-crisis (climate, ecological, cost of living and energy emergencies) one should address interconnected problems relevant to all stakeholders.

The importance of considering multiple stakeholders' perspectives, recognising the interconnections between industry, markets, public collaboration makes the need of engagement crucial if you want to build resilient systems. Myriam advocated for a community or stakeholder-based approach to maximise benefits for all and improve overall system performance.

In the panel discussion and Q&A section the following subjects were raised:

- need of a compromise in addressing the methane losses from small biogas facilities
- specific tests and assessment of the source of biogas are key in determining compliance with specifications
- recognition of strong drivers for the feedstock needed along with the existing targets and political indication at the EU level
- the institutionalisation of the carbon farming model
- clear messaging is crucial for both investment and public understanding.

1.5 Conclusions

Overall, the workshop provided an interesting occasion for experts from various sectors to exchange knowledge and discuss biomethane deployment and production in the EU.

The conclusions drawn from the event highlight the importance of:

- considering the value chain as a whole, taking into account countries' specificities, environmental challenges and different stakeholder's needs
- diversification of both feedstock and technologies
- good practices of biomethane supportive policies
- R&I and industry collaboration.

Within this occasion, the GreenMeUp project has been able to provide some key information on its future activities and achievements: the European Biogas Association outlined how this project will enrich the research and analyses on biomethane deployment in the EU, while the project coordinator, Centre for Renewable Energy and Savings (CRES) was able to provide an interesting overview on current feedstock levels and future projections.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Chapter 2: Second policy workshop

The second GreenMeUp policy workshop held in Leipzig on March 25, 2025, hosted by Deutsches Biomasseforschungszentrum (DBFZ) in co-organisation with Centre for Renewable Energy Sources and Saving (CRES) and ETA Florence Renewable Energies, as partners of the GreenMeUp project.

The workshop, titled "**From policy to action: driving biomethane market growth**" aimed to promote the growth of the biomethane market through the discussion of concrete policies and actions.

Key Focus Areas of the workshop were:

- Policy Impulse – Current EU policy efforts to enable a higher biomethane market uptake in the EU and exemplary policy measures in leading countries such as Germany, Italy and Denmark.
- Remaining barriers and potential solutions – Results from GreenMeUp´s policy design in European countries with emergent biomethane markets (e.g. Poland, Latvia, Estonia, Greece, Czech Republic)
- Market Development Strategies – Identifying pathways to scale biomethane in diverse sectors such as heat, electricity, and transport.
- Innovation and R&I Gaps – Addressing technological advancements and research priorities to enhance biomethane production and integration.

Topic experts and stakeholders from the biomethane sector were gathered to discuss the current state, challenges, and opportunities for increasing biomethane production and usage in Europe, with a particular focus on the results of the GreenMeUp project. Several presentations addressed crucial topics, from support policies to technological and market developments. In total 36 stakeholders attended the workshop, in presence and online.

Through expert presentations, panel discussions, and interactive dialogues, this workshop aimed to provide actionable insights and foster cooperation between key stakeholders to ensure biomethane becomes a competitive and reliable energy source across Europe.

The full-day workshop was structured as the following: the first half was dedicated to the policy theme, while the second half delved into technology topics. A panel discussion was held in the middle part to also give the possibility to attendees to present questions, making the event more interactive and engaging.

AGENDA

- ***Welcome and opening of the event;*** *Dr. René Backes – Head of Bioenergy Systems department – DBFZ*
- ***Session 1: Policies.***
    - ➢ Current EU policy development for the biomethane markets; *Marco de Benedictis, DG Energy, EU Commission*
    - ➢ EU Biomethane market today: Role of policies and support schemes; *Anthony Lorin, European Biogas Association*
    - ➢ Biogas and biomethane – policy status in Germany; *Uwe Welteke, Fabricius- Flexperten-Network*
    - ➢ Biogas and biomethane – policy status and development in Italy; *Carlo Pieroni – Project manager – Consorzio Italiano Biogas.*
    - ➢ Policy design in EU's emergent markets: results from target country analysis in GreenMeUp; *Christos Tourkolias, CRES*

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

- **Panel discussion**:
  - ➢ What are remaining barriers for a greater biomethane market development in the EU and national context?
  - ➢ What has to be done to overcome them? Good practices and necessary developments

- ***Session 2: Research and Development.***
  - ➢ European strategy for biomethane innovation and market development; *Maria Georgiadou DG R&I, EU Commission*
  - ➢ Technological and market developments in Germany; *Jaqueline Daniel Gromke, Working group leader in Biochemical Conversion, DBFZ*
  - ➢ Innovative biomass production systems - Sequential cropping; *Guido Bezzi, Head of Agronomic Area, Consorzio Italiano Biogas*
  - ➢ Innovative uses of digestate; *Ahto Oja – Estonian Biogas Association*
- **Wrap up of the R&I session**

2.1 Policy session

The Deutsches Biomasseforschungszentrum (DBFZ), supports the transition towards a climate-neutral society by 2050 through bioeconomy research. And it actively contributes to biomethane research through various projects and policy analyses, assessing key indicators for its nationwide implementation. This work aligns with GreenMeUp's objectives of fostering sustainable energy solutions within the European framework. Link to presentation.

Dr. René Backes from DBFZ during his presentation.

2.1.1 Unlocking the biomethane market: the role of incentives

The European Union has set a binding target of 42.5% renewable energy by 2030. Within the REPowerEU plan, biomethane is recognized as a key resource for decarbonization and reducing reliance on imported natural gas. In 2022, biogas production reached 18.7 bcm, with 2.77 bcm injected into the gas grid, and Member States are aiming for a total of 30-32 bcm. However, realizing this potential is hindered by authorization timelines exceeding four years. The adoption of biomethane necessitates a strategic

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

combination of financial support for both existing and new investments alongside non-financial measures. These include synchronizing sectoral policies and enhancing the efficiency of permitting processes. Research and innovation, backed by EU funding, are fundamental for advancing biomethane deployment within the GreenMeUp project. Link to presentation.

George Osei Owsu and Anthony Lorin discussing their presentations

2.1.2 How policies and support schemes influence the European biomethane market

The European biomethane market is now going through a substantial growth, contributing with 7% to the overall gas demand in 2023 alongside biogas. Production reached 4.9 bcm in Europe (4.1 bcm in EU-27) in 2023, supported by over 1,500 operational plants (>1300 in EU-27). Italy and France are at the forefront of this expansion, demonstrating significant annual increases mostly due to targeted support policies such as specific decrees and feed-in tariffs. Policies that successfully drive market expansion include establishing a clear vision and stable targets, providing direct (feed-in tariffs, auctions) and indirect (digestate marketing, organic waste management) financial support, facilitating gas grid access through injection rights and cost sharing, and implementing strong demand signals like mandatory targets and tax exemptions. Link to presentation.

Concerning the German biomethane market, it has stagnated at a low-level growth rate over the past decade, partly due to economic inefficiencies arising from competing policies (EEG and GHG quotas) and high gas grid connection costs. Flexible biogas combined heat and power (CHP) plants, envisioned as "storage power plants," are crucial for providing dispatchable power and heat, covering residual load in a future electricity market dominated by fluctuating renewables. The recent Biogas Package (Bundestag resolution of January 31, 2025) introduces measures to incentivize this flexibility by increasing the flexibility premium (up to €100/kW) and promoting the construction of new satellite plants, ideal for heat valorization and funded for 20 years. The goal is to drive plants to operate more demand-responsively to ensure grid stability. Link to presentation.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Dr. Uwe Welteke-Fabricius participating online

2.1.3 The State of biogas and biomethane policy and growth in Italy

Concerning Italy, one of the European leading countries in the biomethane deployment, it has over 1,800 biogas plants (80% agricultural), exceeding 1,000 MWel capacity, mostly built before 2012 under a feed-in tariff.

The analysis focused on two very important ministerial decrees. The first supported biomethane production specifically for the transport sector, resulting in numerous operational plants utilizing both waste and agricultural feedstocks. The second decree introduced a new support mechanism with a significant budget and completion deadline for projects, aiming for a significant increase in biomethane production for diverse applications. Italy's national energy and climate targets outline a progressive increase in biomethane production over the coming years. [Link to presentation.]

Carlo Pieroni from CIB, holding the presentation remotely

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

2.1.4 GreenMeUp's analysis of policy design in emerging EU markets

Key findings on the framework of the GreenMeUp project address both production and policy/demand. Production-side recommendations include facilitating agricultural and industrial waste utilization, promoting advanced upgrading technologies, enabling biomethane injection into grids and off-grid applications, ensuring long-term sustainable feedstock supply, and transparent environmental management. Policy and demand-side recommendations for biomethane focus on meeting climate targets, promoting advanced biofuels, streamlining communication, and addressing technical, economic, and bureaucratic barriers through infrastructure, training, finance, and coordinated policy. This also includes public engagement, internalizing environmental benefits, expanding biomethane's uses, and adopting stricter national CO_2/RES targets. Link to presentation.

2.2 Research and development session

2.2.1 Europe's strategic approach to biomethane innovation and market growth

The Clean Industrial Deal aims for industrial decarbonization via renewables, clean tech, investment (Innovation Fund/InvestEU), and streamlined rules. Key EU policies (Green Deal, Fit for 55, REPowerEU with Biomethane Action Plan/Partnership, Net-Zero Industry Act) and the 2040 90% emission reduction target were noted.

Funding via Horizon Europe (Cluster 5) and InvestEU supports this. Horizon Europe's 2025-2027 strategy backs sustainable energy like biomethane, with upcoming Work Programme calls. The Biomethane Industrial Partnership (BIP) targets 35 bcm/year renewable gas by 2030, addressing barriers via Task Forces, including TF5 on innovative production technologies, identifying RDI needs for scaling. Link to presentation.

Marco de Benedictis during a Q&A session

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

2.2.2 An overview of biomethane market progress in Germany

Germany upgrades some biogas to biomethane for its gas network and power plants. While exports have decreased, transport use is growing, favoring waste-based feedstock. EU biogas forms a noticeable part of gas consumption. Germany uses various upgrading technologies, with CO_2 capture becoming more common. Driven by renewable energy laws, the sector is adapting to integrate with other renewables. Biomethane's future lies in urban power, niche transport, and industrial heat, targeting areas where other renewables are less suitable. Long-term planning and incentives are also very important for growth and infrastructure. Link to presentation.

Jaqueline Daniel-Gromke during her presentation

2.2.3 Novel applications for biogas digestate

Biogas production transforms biowaste into valuable resources like gaseous fuel and digestate, which can be used as liquid and solid fertilizers. A key issue raised is the challenge posed by current waste regulations. The classification of certain feedstocks as "waste" creates regulatory hurdles for biogas producers and farmers, hindering the efficient use of digestate and the implementation of circular economy principles. Changes to the EU waste directive to reclassify biodegradable residues used in renewable energy production as "secondary raw materials" were highlighted, together with the need for harmonization of digestate legislation. Furthermore, technological options to enhance digestate processing and utilization was emphasized, including solid-liquid separation and pyrolysis. Link to presentation.

Ahto Oja presenting

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

2.2.4 Innovative biomass production: the sequential cropping system

An interesting concept to be addressed is the implementation of sequential cropping, which aims to boost soil fertility and carbon dioxide capture, ultimately leading to more sustainable and efficient agricultural systems. This transition involves a shift from traditional NPK fertilization to a CNK approach, emphasizing the importance of closing the carbon cycle and nutrient recycling. Examples of sequential cropping systems tailored for Northern and Southern Italy are provided, along with a case study from the Po Valley. Link to presentation.

2.3 Conclusions

The main insights and conclusions drawn from the workshop are summarised below, highlighting the critical role of policy alignment, research, innovation, and cross-sector collaboration in advancing biomethane deployment and achieving the EU's energy and climate goals.

- Biomethane is a strategic pillar for Europe's energy transition

Biomethane is essential for meeting the EU's 2030 renewable energy targets and reducing dependence on fossil gas imports, as outlined in the REPowerEU plan. With targets of 30–35 bcm/year by 2030, biomethane is positioned as a flexible, dispatchable, and renewable energy source, particularly relevant for hard-to-decarbonize sectors.

- Policy alignment and support are critical enablers of market growth

Countries with targeted support schemes (e.g., Italy and France) demonstrate rapid biomethane expansion, underscoring the importance of coherent, stable, and incentivizing policies. Key policy tools include feed-in tariffs, investment grants, tax exemptions, injection rights, and clear long-term targets. Non-financial support, such as streamlining permitting processes, is equally crucial. In contrast, countries like Germany show stagnation due to policy fragmentation and economic inefficiencies, illustrating the negative impact of misaligned or competing incentives.

- National case studies highlight different policy approaches and their impact

Italy has effectively used policy instruments to scale up biomethane for transport and broader applications, supported by dedicated decrees and a focus on circularity and agricultural feedstocks. Germany, while having a mature biogas sector, shows limited biomethane growth due to structural and regulatory challenges. Recent policy updates (e.g., Biogas Package 2025) aim to boost flexible power generation and heat valorization.

- The GreenMeUp project provides a valuable framework for emerging markets

GreenMeUp emphasizes a dual focus on supply and demand: supporting feedstock mobilization, upgrading technologies, and grid integration, while also calling for stronger demand-side measures. The project recommends reducing bureaucratic hurdles, promoting public engagement, ensuring financial viability, and internalizing the environmental benefits of biomethane.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

- Research and innovation are key to unlocking future potential

The EU supports biomethane R&D through Horizon Europe, InvestEU, and strategic initiatives like the Biomethane Industrial Partnership. Task Forces within the BIP, particularly TF5, are addressing innovation bottlenecks and helping scale up novel technologies.

- Technology developments point toward a more circular, integrated system

Innovations in biomass production, such as sequential cropping, offer pathways to sustainable feedstock supply while enhancing soil health and carbon capture.

Digestate valorisation is gaining attention as a way to improve nutrient recycling and reduce environmental impact. However, regulatory changes (e.g., redefining waste) are necessary to unlock its full potential. CO_2 capture and upgrading technologies are becoming more prevalent, enhancing the climate benefits of biomethane and supporting integration with other renewable energy systems.

- Cross-sector collaboration and knowledge-sharing are essential

The workshop provided a valuable platform for stakeholders from policy, research, and industry to exchange insights and solutions. Interactive formats, such as panel discussions and audience engagement, help bridge the gap between strategy and implementation.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Chapter 3: Third and last policy workshop

3.1 Biomethane landscape in the EU and technological progress

The last GreenMeUp policy workshop was organized in Brussels the 3rd of July 2025 as a hybrid event, by ETA and CRES and brought together numerous experts from both the technology sector and the policy landscape to provide a comprehensive overview of the biomethane landscape in Europe, highlighting key challenges as well as the progress and achievements made over the three years of the project.

Background image of the GreenMeUp policy workshop in Brussels

From left: Maria Georgiadou (EC R&I), Prof. Yannis Maniatis (MEP), Myrsini Christou (CRES, GreenMeUp project coordinator), Kyriakos Maniatis (Advanced Biofuels, former EC)

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

AGENDA

- ***Welcome and opening of the event;*** *Myrsini Christou, Project coordinator, CRES*
- ***Session 1: Biomethane technologies***
  - European strategy for biomethane innovation and market development; *Maria Georgiadou DG R&I, EU Commission*
  - Innovative technologies for biomethane production; *Andrea-Maria Rizzo, RE-CORD*
  - Innovative feedstock for biomethane production; *Myrsini Christou – CRES*
  - Technology providers for biomethane production;
    - *Federico Capra - AB Gruppo*
    - *Katja Lyons – BIOGEST*
    - *Peter Kemink – Bright Renewables*
    - *Bruno Mattheeuws – Dranco*
    - *José Vale Machado – President – SYSADVANCE*

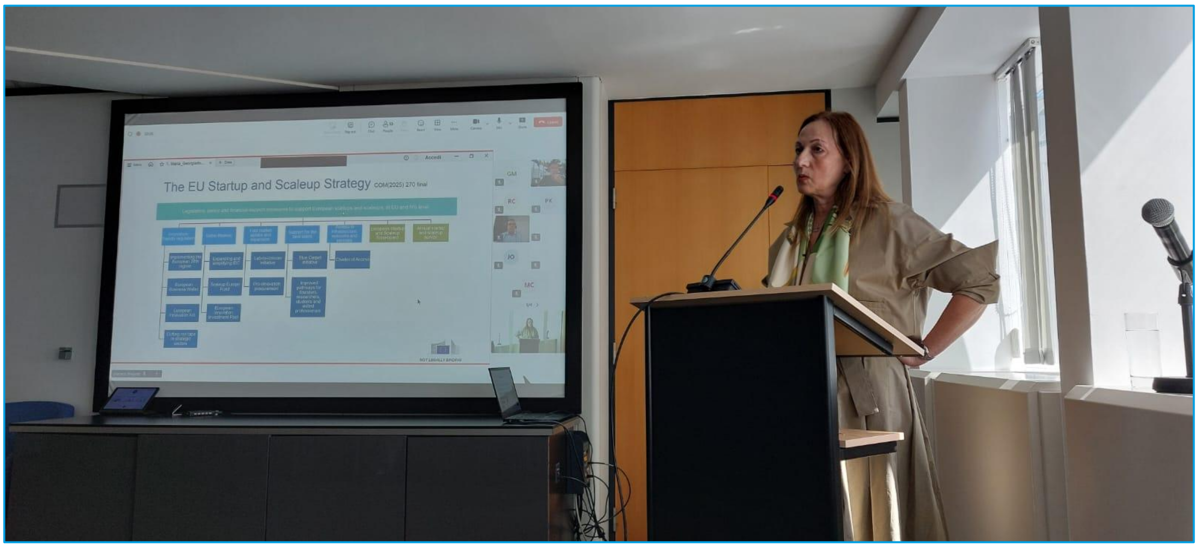
- ***Session 2: Biomethane Policies***
  - Welcome; *Prof. Yannis Maniatis, Member of the European Parliament, Vice President of the S&D Group, f. Minister of Environment and Energy*
  - Current EU policy development for the biomethane markets; *Franciszek Madler, DG Energy, EU Commission*
  - EU Biomethane Market: Current trends and Lessons Learnt from national policies; *Anthony Lorin, European Biogas Association*
  - Policy design in EU's emergent markets: results from target country analysis in GreenMeUp; *Christos Tourkolias, CRES*

- ***Session 3: International Cooperation***
  - Lessons for policymakers from IEA Bioenergy Task 37 Collaboration Programme; *Bernhard Drosg, BOKU*
  - Biogas and biomethane – policy status in Mission Innovation Countries;
    - *Ramakrishna Y.B (Working group on Bio-Fuels at Ministry of Petroleum and Natural Gas Govt of India)*
    - *Shizhong LI (Tsinghua University, Division of Biofuels & Biochemicals, P.R. CHINA)*
    - *Nicolas Abatzoglou (Professor and ex-Head of the Department of Chemical & Biotechnological Engineering of the Université de Sherbrooke, Warren Mabee (Canada Research Chair for Renewable Energy Development and Implementation)*

- **Panel discussion**:
  - What are remaining barriers for a greater biomethane market development in the EU and national context?

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

3.2 Session 1: Biomethane technologies



Maria Georgiadou presenting the latest updates of the EU biomethane landscape

Maria Georgiadou from European Commission (DG R&I), stated that 2025 EU work program includes initiatives like the "Competitiveness Compass," "Clean Industrial Deal," and "Action Plan on Affordable Energy," all relevant to biomethane. EU policies such as the European Climate Law, Green Deal, Fit for 55 package, and REPowerEU plan support biomethane, and the "Clean Industrial Deal" aims to accelerate industrial decarbonization through affordable energy, leading markets, increased funding, circularity, global partnerships, and simplified procedures. The Horizon Europe Strategic Plan 2025-2027 prioritizes efficient, sustainable, and competitive energy supply, including biomethane, and funding programs like Horizon, LIFE, CEF, and the Innovation Fund have contributed €152 million. (Link to presentation)

Myrsini Christou (CRES), as coordinator of the GreenMeUp project, held a presentation on European biomethane production, saying that it increasingly uses agricultural residues, organic municipal solid waste, and industrial waste, moving away from monocultures. Research focuses on sequential cropping, intercropping, minimal tillage, perennial crops, and using marginal lands for phytoremediation, while gasification is expected to accelerate post-2030, enabling a wider range of feedstocks. (Link to presentation)

Myrsini Christou presentation: "Innovative feedstock for biomethane production"

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Getting more into detail about **technological advancements**, during this session, innovations addressed by technology providers for biomethane production were discussed:

Andrea Maria Rizzo from RECORD presented the integration of anaerobic digestion (AD) with pyrolysis: this process offers synergies, as pyrolysis of digestate produces biochar, a higher-value, carbon-negative product compared to digestate. This integration reduces contaminants like PFAS and increases carbon stability. (Link to presentation)

Andrea Maria Rizzo from RECORD during his presentation

Then, Katja Lyons presented BIOGEST, promoting biomethane from agricultural residues, transforming them into renewable energy and biofertilizers. Their circular model integrates anaerobic digestion, reforming, and Fischer-Tropsch synthesis to produce biomethane, biogenic CO_2, and biofertilizers, achieving a carbon-negative lifecycle.

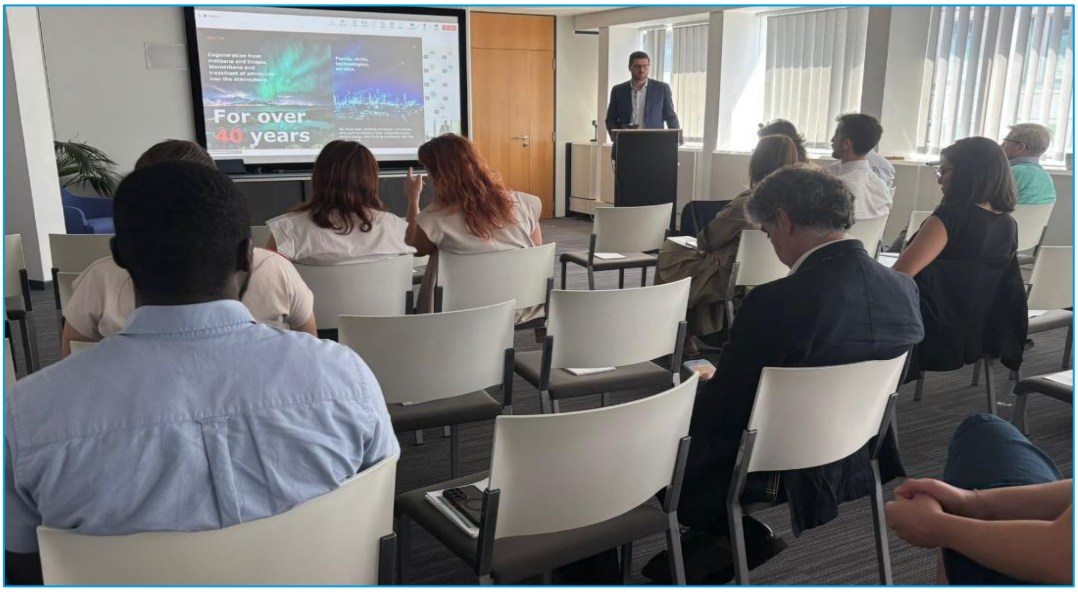
Katja Lyons from BIOGEST presenting

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

Bright Renewables was introduced by Peter Kemink, providing "Biogas-to-X" systems for renewable natural gas, bio-LNG/bio-CNG, and food-grade liquid CO_2. Their PurePac biogas upgrading technology offers high methane recovery (99.5%) and availability (97%+). Their Bright Cryogenics for CO_2 liquefaction uses CO_2 as a refrigerant, improving carbon footprint and reducing methane losses. (Link to presentation)

Peter Kemink presenting "Bright Renewables"

Federico Capra explained what AB group offers: "One-Stop Shop" integrated solutions for methane and biogas cogeneration, biomethane, and emission treatment. Their BIOCH4NGE® system uses membrane technology for flexible, scalable, and low-energy biogas upgrading. They also offer CH_4LNG for biomethane liquefaction and DISCO$_2$VERY for CO_2 liquefaction, transforming emissions into usable resources. ECOMAX® cogeneration solutions power the entire system, creating a complete sustainable energy system.



Federico Capra presenting AB Group during the session dedicated to technology providers

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

DRANCO, presented by Bruno Mattheeuws, is specialized in continuous dry anaerobic digestion for solid organic matter. Their SORDISEP technology post-treats residual household waste, increasing material recycling and reducing landfill waste by separating digestate into quality compost, clean inerts, and a high-calorific dry fuel. (Link to presentation)

Bruno Matheewus introduction to "DRANCO"

SYSADVANCE was the last technology provider introduced during this event. Presented by Joaquim Cunha, SYSADVANCE is a leader in Pressure Swing Adsorption (PSA), offering METHAGEN systems for purifying biogas from various feedstocks. Their Vacuum Pressure Swing Adsorption (VPSA) technology offers low energy consumption, no water/chemical/heat requirements, low OPEX, high biomethane recovery, and simple operation. Biomethane is seen as crucial for energy independence and the circular economy.

Joaquim Cunha presenting "Sysadvance"

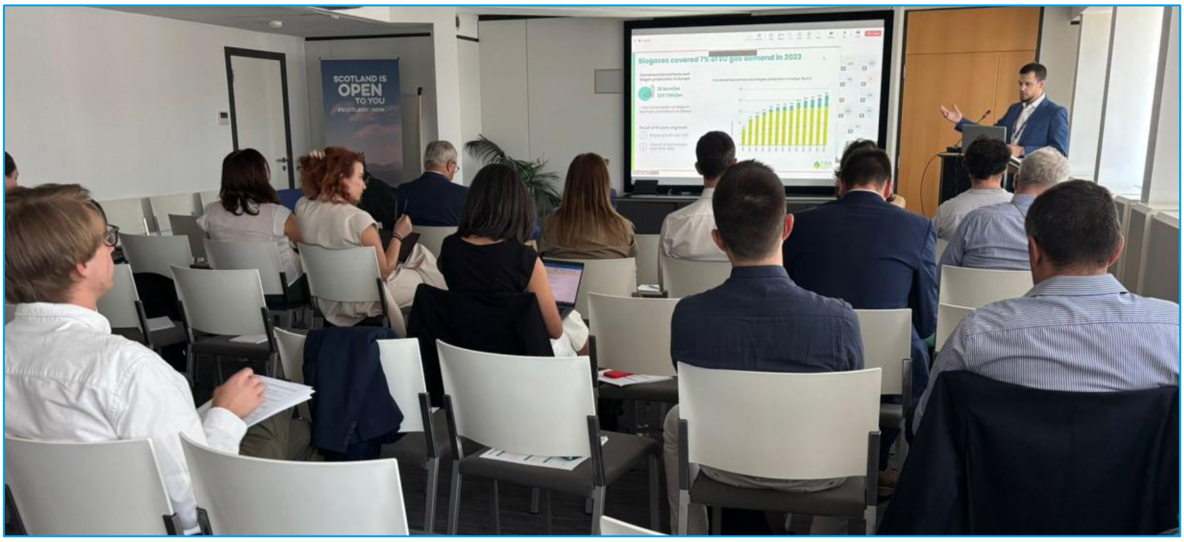
This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

3.3 Session 2: Latest biomethane policy development at EU level

After the technological session, it was time for the "political" theme, welcomed by Professor Yannis Maniatis (Member of the European Parliament, MEP) recently highlighted Europe's significant progress in biomethane production, reaching 234 TWh in 2023—an "interesting" 7% of total natural gas consumption. However, he emphasized that Greece's biomethane efforts are still slow and need to accelerate. Greece currently has 90 biogas plants producing 1.4 TWh of energy, generating 624 GWh of electricity annually. Looking ahead, Greece's national energy plan aims for 2.1 TWh of biomethane by 2030 and 4.6 TWh by 2050, requiring the upgrade of 38 existing plants and the construction of 45 new ones to add 1.2 TWh annually. Maniatis's intervention provided a clear picture of both achievements and challenges in advancing biomethane as a key sustainable energy source.

Prof. Yannis Maniatis from the European Parliament giving a speech

In 2023, biogas covered 7% of EU gas demand, with biomethane production doubling in four years to 5 billion cubic meters. Anthony Lorin from EBA, further explained that over 1,600 biomethane plants operate in Europe, with 85%+ connected to the gas grid. Key policy lessons include the importance of stable long-term visions, direct support (feed-in tariffs), indirect support (removing digestate commercialization barriers), grid



Anthony Lorin from EBA presenting the latest updates on the EU biomethane policy frameworks

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

injection enablement, market recognition, and strong demand signals. Challenges include the need for 7.3billion cubic meters/year of additional biomethane capacity by 2030 and ensuring market conditions support the 35 billion cubic meter ambition.

Then, Franciszek Madler, on behalf of European Commission (DG Energy) further explained that in 2023, biogas production reached 16 Mtoe, with a 28% increase in grid injection and a five-fold rise in biomethane use in transport compared to 2022. The EU is nearing its 42.5% renewable energy target. While significant investment is expected, biomethane project permitting times average four years. The REPowerEU Plan launched the Biomethane Action Plan and Biomethane Industrial Partnership (BIP) to reduce reliance on imported natural gas and aid decarbonization. (Link to presentation)

Figure 1. Left: Christos Tourkolias (CRES); Right: Franciszek Madler (EC DG Energy)

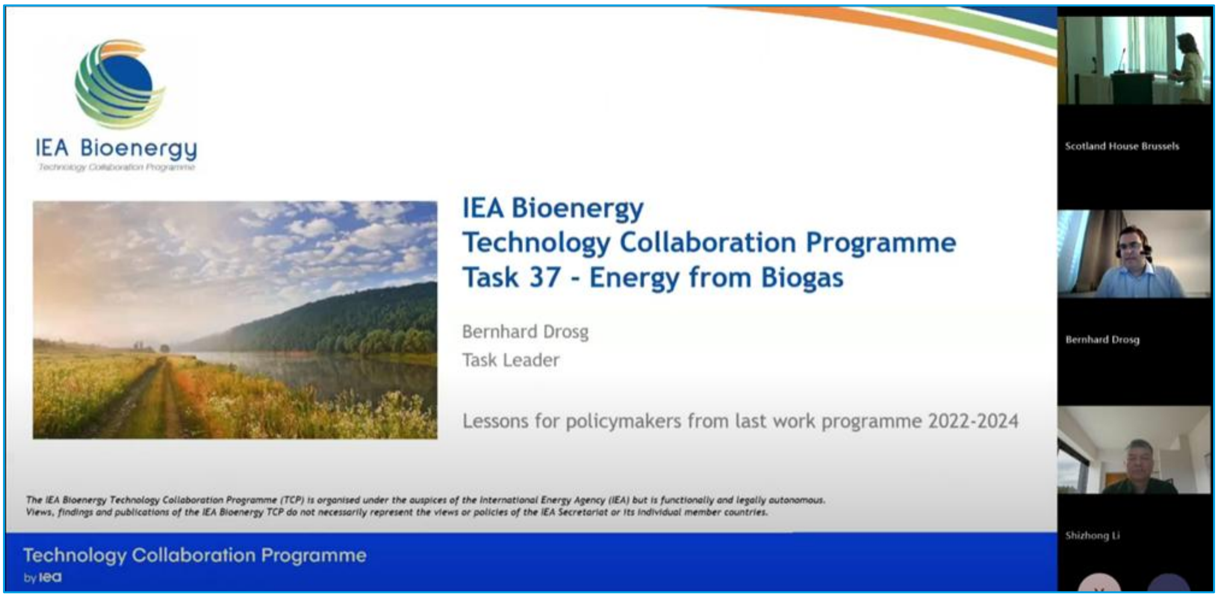
During the last presentation of the policy session, a work carried out by CRES was addressed: Christos Tourkolias introduced a survey carried out during December 2024 across 11 countries, revealing low public awareness (32% know "nothing at all") and common misconceptions about biomethane. Market acceptance and willingness to pay more for biomethane fuels are low. Socio-political and community acceptance of production facilities decreases with proximity. Policy recommendations include a holistic framework for impact quantification, a consistent biomethane strategy to 2050, a targeted action plan to 2030, and a multi-level governance mechanism. Specific country-level recommendations focus on raw material potential assessment, awareness campaigns, streamlined permitting, financial support, and supply chain development. (Link to presentation)

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

3.4 Session 3: International cooperation and future perspectives in Mission Innovation countries

During the last session named as "International cooperation", contributions from experts outside the Europe were collected, learning what are the innovations in the biomethane sector regarding China (Shizhong LI - Tsinghua University, Division of Biofuels & Biochemicals), India (Ramakrishna Y.B - Working group on Bio-Fuels at Ministry of Petroleum and Natural Gas Govt of India), and Canada (Warren McBee, Professor, Geography and Planning, Faculty of Arts and Science, Queen's University).

Bernhard Drosg, on behalf of IEA Bioenergy, BEST and BOKU University, introduced the session, stating that only a small fraction of untapped biogas potential is economically competitive. Valuing co-benefits and prioritizing local economic development strengthens the investment case. Consistent and robust policy support is crucial, as logistics and complex permitting hinder production. Industrial producers can become investors by utilizing wastewater and food/beverage byproducts for on-site biomethane production, reducing Scope 1 and 2 emissions.



Bernhard Drosg presenting "IEA Bioenergy"

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

India is developing a policy framework for compressed biomethane (CBG), covering the entire value chain with subsidies for agricultural residue aggregation, capital subsidies, priority financing, purchase incentives, and blending mandates (1% by 2025-26 to 5% by 2028-29). Challenges include lack of biomass storage infrastructure policies.

Ramakrishna Y.B. presentation on India's biomethane policy framework

China's biogas industry has shifted to large-scale anaerobic digestion. The national plan aims for 20 billion cubic meters of biomethane capacity by 2030, covering 5% of natural gas consumption. Policy innovations for 2025 include gas grids accepting high-purity biomethane, ESG integration for state-owned enterprises, and targeted subsidies. Long-term, China aims to be the world's largest biomethane producer post-2030. (Link to presentation)

Canada expects significant growth in Renewable Natural Gas (RNG) production. Supporting policies include mandates (e.g., Quebec aiming for 5% renewable content by 2025, 10% by 2030) and voluntary programs. Barriers include the need for significant tax credits, challenges with grid connections, and lack of technological understanding. (Link to presentation)

Warren Mabee from GreenMeUp international Advisory Board

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.

3.4. Conclusions

The final GreenMeUp workshop highlighted the strong momentum behind biomethane. The event showed that achieving its full potential requires a a plan addressing **three main areas**:

- **Technology:** Innovations are making biomethane production more efficient and sustainable by using diverse feedstocks, such as agricultural and municipal waste.
- **Policy:** The EU is supporting the sector with significant funding and initiatives like the **REPowerEU Plan**. However, challenges remain, including slow permitting processes and low public awareness, which must be addressed to meet ambitious targets.
- **Global Collaboration:** Countries like India, China, and Canada are actively developing their own policies and setting goals, proving that biomethane is a key component of the global shift toward energy independence and decarbonization.

In short, the path forward for biomethane is one of continued collaboration between technology, government, and the public to ensure it becomes a mainstream energy source.

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101075676.