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Joint Programme Coordinator's corner

Myrsini Christou
EERA Bioenergy Coordinator

Dear EERA Bioenergy members, dear EEBioNews readers,

With the recent geopolitical tensions, especially the conflict around the Strait of Hormuz, it is highly necessary for Europe to strengthen its energy security. One point that caught my attention during a recent survey was the global progress in renewable fuels. Liquid biofuel production reached 111 million tonnes of oil equivalent (Mtoe) in 2023, with more than half coming from first-generation ethanol. Gaseous biofuels added another 41 Mtoe. Despite these significant volumes, most of the production is still dedicated to road transport, while aviation and shipping continue to represent only a small share.

While reviewing the latest developments in renewable fuels, aviation and maritime are still among the most difficult sectors to decarbonize. At the same time, they continue to depend heavily on imported fuels, making them vulnerable to supply disruptions and price fluctuations. We have all heard in the news that airlines have reduced the number of flights, delayed the opening of new routes, or canceled less profitable connections due to higher operational costs. This situation shows the importance of developing more stable and sustainable fuel solutions, such as Sustainable Aviation Fuels. By reducing the dependence on imported fossil fuels, SAF can contribute to improving the resilience of the aviation sector and provide more stability for the future.

Therefore, I would like to focus this corner on aviation and maritime fuels. The EU has already recognized the important role of Sustainable Aviation Fuels and Sustainable Maritime Fuels through initiatives such as ReFuelEU Aviation, FuelEU Maritime, RED III and the Net-Zero Industry Act. However, current production capacity and market uptake are still far from the levels required to reach the 2030 targets.

However, the global SAF project pipeline is developing rapidly. There are currently 253 announced SAF plants and projects that could provide around 40.2 million tonnes of annual production capacity by 2031. This includes 28.1 Mt of HEFA, 8.7 Mt of bio-SAF and 3.3 Mt of e-SAF, with 126 HEFA projects, 65 bio-SAF projects and 62 e-SAF projects included in the pipeline. In Europe, the market for renewable fuels of non-biological origin (RFNBO) is still at an early stage, with current activities mainly focused on small-scale demonstration plants. However, rapid expansion is expected due to EU policy mandates. Bio-based kerosene currently represents the largest share of the European SAF pipeline, with 45 projects targeting around 1.7 Mt by 2030, although only a limited number have reached final investment decisions. For maritime fuels, e-methanol projects are progressing, including initiatives such as the Port of Gothenburg, while Europe remains less active in e-ammonia and e-methane development. At the same time, countries such as the United States, Saudi Arabia, India and China are rapidly increasing investments in large-scale green ammonia and e-fuel projects. This shows the need for Europe to accelerate the development of renewable fuel value chains, not only to achieve climate objectives but also to maintain industrial competitiveness and strategic positioning in future fuel markets.

In this dynamically changing context, I would like to take this opportunity and highlight the excellent work carried out by the EERA Bioenergy members and present a few examples of projects that are contributing to technology improvement and optimization for strengthening Europe's energy security and industrial competitiveness, particularly in the aviation and maritime sectors, while more proposals are on pipeline.

- **ICARUS** (www.icarus-biojet.eu), focused on the technology advancement of three SAF-producing value chains, biocrude-to-SAF, isobutanol-to-SAF and syngas-to-SAF.
- **HIGFLY** (www.higfly.eu) for the production of advanced bio jet fuels from abundant and sustainable biomass feedstocks.
- **GLAMOUR** (www.glamour-project.eu) aims to design, scale up, and validate an integrated process that converts waste bio-based feedstock such as crude glycerol into aviation and marine diesel fuels.
- **BIOTHEROS** (www.biotheros.eu) that develops a holistic methodology to boost the scale-up of sustainable biofuels via two thermochemical conversion technologies.
- **NextGenRoadFuels** (https://www.nextgenroadfuels.eu/) for sustainable drop-in transport fuels from hydrothermal liquefaction of low-value urban feedstocks.
- **BL2F** (https://www.bl2f.eu/) that uses "Black Liquor" to create a clean, high-quality biofuel by efficient hydroThermal application integrated to pulp mills.

I wish all EERA Bioenergy members and colleagues smooth take-offs, calm waters and safe journeys during your summer break. Enjoy the holidays, recharge your batteries, and come back with new energy for the exciting challenges ahead!

Myrsini

> **"This situation shows the importance of developing more stable and sustainable fuel solutions, such as Sustainable Aviation Fuels."**

EERA Bioenergy news in brief

EERA BIOENERGY HOLDS ITS STEERING COMMITTEE MEETING AT EUBCE 2026 AND RENEWS ITS MANAGEMENT BOARD

EERA Bioenergy held its Steering Committee meeting on 21 May during the European Biomass Conference and Exhibition (EUBCE 2026) in The Hague, bringing together members both in person and online to discuss the Joint Programme's strategic priorities and future activities.

The meeting featured updates from invited representatives of the European Commission. Maria Georgiadou (DG RTD) presented the latest developments in Horizon Europe Cluster 5, including upcoming pre-commercial procurement and co-funding initiatives for renewable fuels, while Biljana Kulisic (DG ENER) provided an overview of ongoing policy developments related to biomass deployment, biomethane and the implementation of the SET Plan. Representatives from ETIP Bioenergy (European Technology and Innovation Platform on Bioenergy) also joined the meeting to discuss the joint preparation of the Strategic Research and Innovation Agenda (SRIA) for SET Plan Implementation Working Group 8 (IWG-8), highlighting the importance of closer collaboration between both organisations in support of future European research and innovation priorities.

A key milestone of the meeting was the renewal of the EERA Bioenergy Management Board.

The Steering Committee also reviewed the main activities carried out by the Joint Programme since December 2025 and discussed priorities for the coming months, including support for new Horizon Europe initiatives, the organisation of project generation webinars and continued collaboration with ETIP Bioenergy. Members also welcomed the University of Calgary (Canada) as a new Associate Member of EERA Bioenergy.

A key milestone of the meeting was the renewal of the EERA Bioenergy Management Board. **Myrsini Christou (CRES) was re-elected as Joint Programme Coordinator, while Marcelo Domine (ITQ-CSIC), Berend Vreugdenhil (TNO) and Bernd Wittgens (SINTEF) were confirmed as Subprogramme Coordinators for SP2, SP3 and SP5, respectively. Wolter Elbersen (WUR) will continue coordinating SP1 until a new candidate is appointed. Shortly after the meeting, Raquel S. Jorge (NTNU) accepted the role of Coordinator of SP4 (Stationary Bioenergy),** completing the renewed Management Board.

EERA BIOENERGY CONTRIBUTES TO THE PREPARATION OF EUROPE'S NEW RESEARCH AGENDA FOR RENEWABLE FUELS AND BIOENERGY

EERA Bioenergy has been working with ETIP Bioenergy to prepare the **Strategic Research and Innovation Agenda (SRIA) for the SET Plan Implementation Working Group 8 (IWG-8) on Renewable Fuels and Bioenergy**.

The SRIA will define the research, innovation and deployment priorities that will support the future implementation of the SET Plan and contribute to the alignment of European, national and regional R&I activities in the field of renewable fuels and bioenergy.

EERA Bioenergy has contributed its main research priorities, building on the Joint Programme's Research and Innovation Gaps report and FP10 Position Paper. In doing so, it has focused on advancing sustainable biomass production, conversion technologies, system integration, sustainability assessment, and the development of innovative renewable fuels and bio-based technologies.

This contribution reflects EERA Bioenergy's commitment to ensuring that the future SRIA addresses the key research and innovation challenges needed to accelerate the deployment of sustainable bioenergy across Europe.

EERA BIOENERGY AND ETIP BIOENERGY SUPPORT NEW HORIZON EUROPE OPPORTUNITIES FOR RENEWABLE FUEL INDUSTRIAL VALUE CHAINS

EERA Bioenergy is working closely with ETIP Bioenergy and the European Commission to support the implementation of the **Horizon Europe topic HORIZON-CL5-2026-11-D3-04: De-risking renewable fuel technologies through transnational pre-commercial procurement of renewable fuel industrial value chains**. The topic aims to accelerate the deployment of renewable fuel technologies by supporting transnational pre-commercial procurement actions that bring together public buyers from across Europe to jointly identify, develop, and validate innovative renewable fuel solutions.

The collaboration aims to raise awareness of this new funding opportunity, facilitate networking among relevant stakeholders and support the development of strong European consortia. As part of the collaboration, EERA Bioenergy and ETIP Bioenergy organised an information webinar on 22 June, bringing together representatives from the European Commission and potential applicants from across Europe.

These activities aimed to support the preparation of competitive project proposals and promote collaboration among research organisations, industry, public authorities and infrastructure operators interested in developing renewable fuel industrial value chains across Europe.

EERA BIOENERGY CONTRIBUTES TO THE EUROPEAN COMMISSION'S CONSULTATION ON THE POST-2030 RENEWABLE ENERGY FRAMEWORK

EERA Bioenergy has contributed to the European Commission's public consultation on the **future Renewable Energy Framework after 2030**, launched by the Directorate-General for Energy (DG ENER). The consultation forms part of the preparatory work for the next generation of European renewable energy policies, supporting the achievement of the EU's 2040 climate target and the transition towards a more secure, competitive and sustainable energy system.

EERA Bioenergy prepared a joint contribution addressing several key topics included in the consultation, such as the role of bioenergy in achieving climate and energy objectives, the sustainable use of biomass, renewable fuels for hard-to-abate sectors, innovation, investment and the future policy framework for renewable energy.

The contribution builds on EERA Bioenergy's recent strategic publications, including the Research and Innovation Gaps report and the FP10 Position Paper, and reflects the Joint Programme's view on the research and innovation priorities needed to support the long-term development of sustainable bioenergy and renewable fuels in Europe.

By participating in the consultation, EERA Bioenergy contributes to the ongoing discussion on the future of European renewable energy policy, ensuring that the perspectives of the research and innovation community are considered as the post-2030 framework is developed.

Bioenergy highlights

QUO VADIS, BIOMASS? LONG TERM SCENARIOS OF AN OPTIMAL USE OF BIOMASS IN THE GERMAN BIOECONOMY BY 2050

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Following the amendment of the Federal Climate Action Act, the German government has pledged to achieve climate neutrality by 2045 and net-negative emissions by 2050. Against this background, the German economy is undergoing a transformation from a system that is currently still largely based on fossil resources, to one that is primarily based on the use of renewable raw materials, consistent recycling and reduced overall demands. Another aspect of this transition involves offsetting residual, unavoidable greenhouse gas (GHG) emissions by expanding natural and technical CO_2 sinks. In this transformation process, biomass can make a significant contribution.

The SoBio 2 project by the German Biomass Research Centre (DBFZ) and the Helmholtz Centre for Environmental Research GmbH (UFZ) examines the cost-effective use of limited biomass resources in the energy, chemical, wood construction and peat substitute sectors in order to achieve Germany's climate protection targets. It also considers the potential for negative emissions in these sectors, for example by combining them with carbon capture and storage of CO_2 (CCS). To meet the demand in the sectors under investigation, alternative fossil and renewable options are considered alongside the biomass options. Using the UFZ BENOPT-DE system modeling and various scenario settings, the project provides robust insights into the establishment of the bioeconomy within this framework.

It shows that biomass use is competitive in the long term and cost-effective in the sectors under consideration and makes a decisive contribution to defossilisation there. However, other renewable options must be utilized alongside biomass to meet future needs and achieve long-term climate protection goals. The limited biomass is used where non-biogenic alternatives are most cost-intensive: in aviation and shipping, in high-temperature industrial applications, here largely combined with CCS, in flexible electricity generation, in peak-load heat generation in older, unrenovated buildings, and in the chemical industry for the production of olefins and aromatics. In the long term, the amount of wood used in wood construction will only increase significantly in a cost-effective manner if additional wood supplies become available through increased mobilization or imports, as most of the wood is used cost-effectively in the energy sector's submarkets that are difficult to transform. The relatively low demand for peat substitutes can be met primarily through the use of biogenic materials.

Despite extensive demand coverage in material biomass use, the largest quantities of biomass will be used cost-effectively in the energy sector in the long term, particularly in the generation of industrial high- and medium-temperature heat. In the modeled scenarios, the chemical sector is the second-largest consumer of biomass in the medium and long term. Biomass can make a significant contribution to the transformation of carbon-based organic chemistry, with lignocellulosic biomass in particular being used to produce methanol, and sugar beets being used to produce ethanol as intermediates, which are then converted into olefins and aromatics. In addition, renewable naphtha, a byproduct of electricity-based power-to-kerosene production, forms a cornerstone of the chemical sector's transformation, thereby creating significant synergy between the energy and chemical sectors.

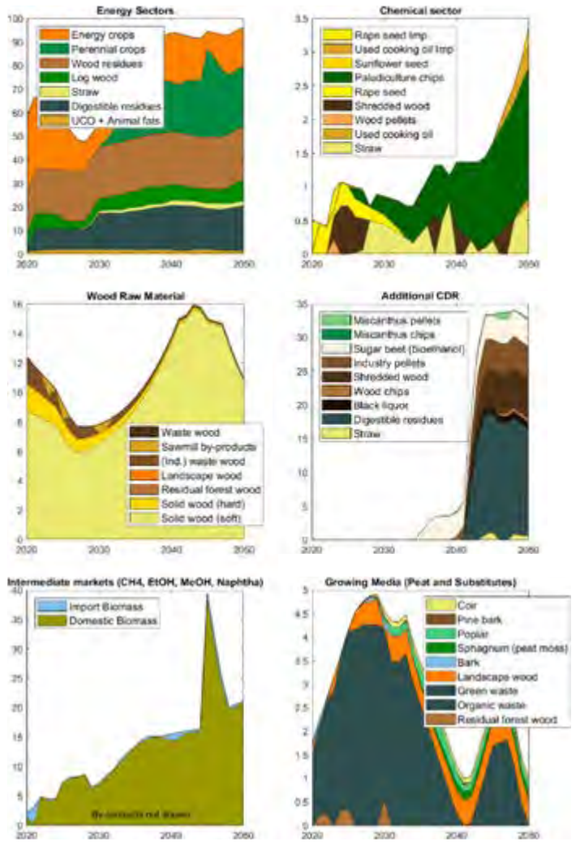

Figure 1. Optimal use of biomass in the reference scenario across the sectors under consideration. With the exception of methane, the intermediates (bottom center image) are used in the chemical sector for the production of olefins and aromatics. The chemical sector (center of the image above) involves the use of biomass to directly meet the demand for methanol, surfactants, and lubricants without the use of intermediates.

The SoBio 2 report and more information can be found on the website (free of charge)

SoBio 2 Report

BENOPT Project website

BIOREF RESEARCH & INNOVATION CENTER STRENGTHENS BIOREFINERY AND RENEWABLE FUELS INFRASTRUCTURE IN PORTUGAL

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Technical and Scientific Director
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Carolina Gonçalves
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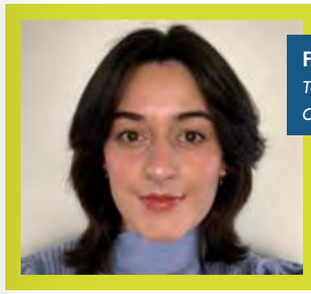

Francisca Leal
Technical Sales Engineer
CoLAB BIOREF

Biorefineries convert biomass into fuels, chemicals, materials, and energy in an integrated and sustainable manner, aligning with the circular economy, decarbonization, and the goals of the European Green Deal. However, the transition from the laboratory (low TRL) to commercial scale faces significant technical, economic, organizational, and market risks.

Pilot plants operate as scaled-down biorefineries, enabling researchers to validate equipment, test processes, and mitigate risks before full-scale industrial deployment. By working with smaller volumes of feedstock and pilot-scale equipment—while maintaining operating conditions and configurations comparable to those of commercial facilities—these installations facilitate the collection of critical data needed to optimize production processes and refine individual system components. They also allow technologies to be assessed over extended periods, supporting a safer and more efficient transition to large-scale production.

BIOREF is consolidating the full operation of its laboratory and pilot-scale infrastructure, named the BIOREF Research & Innovation Center (BRIC), reinforcing its position as a national reference infrastructure for biorefinery technologies, renewable fuels, and circular bioeconomy solutions.

A key milestone for 2026 is the full commissioning and operation of BRIC's integrated pilot facilities dedicated to the production of renewable fuels and gases. These include gasification, water-gas shift, and methanol synthesis pilot units, which together enable the validation of complete process chains under relevant operating conditions. We would like to highlight our anaerobic digestion and biomethane research capabilities, on which we are equipped from lab to pilot scale. Namely, an Automatic Methane Potential Test System (AMPTS) and Continuous Stirred Tank Reactor (CSTR) platforms, with capacities of 15 L and 1 m^3, providing advanced capabilities for the assessment and optimisation of biological conversion processes, complemented with analytical techniques to evaluate the main process parameters.

This new pilot infrastructure provides a unique platform for applied research, process optimisation, technology scale-up, and proof-of-concept demonstrations, providing testing and validation of innovative conversion pathways, to support the development of sustainable aviation fuels (SAF), biomethane, renewable methanol, and other renewable gaseous and liquid energy carriers. The infrastructure also offers valuable opportunities for collaboration with industrial partners seeking to de-risk emerging technologies and accelerate their route to market.

The combination of pilot-scale and laboratory-scale facilities positions BRIC as a comprehensive research and innovation ecosystem capable of addressing challenges across the entire value chain, from feedstock conversion and process development to fuel production and validation.

As a collaborative infrastructure, BRIC offers advanced experimental facilities, analytical services, and process development capabilities to academia, industry, technology developers, and public stakeholders. Through these activities, BIOREF is contributing to the advancement of sustainable biorefinery solutions and strengthening national and international value chains that support the transition towards a low-carbon and circular economy.

With its growing portfolio of infrastructures and expertise, BRIC is becoming an increasingly important hub for accelerating innovation in bioenergy, renewable fuels, and the broader bioeconomy sector.

Figure 1. Pilot e-methanol synthesis unit installed on BRIC

Figure 2. Pilot gasification unit installed on BRIC

OBTAINING BIOCHAR FROM ANAEROBIC CO-DIGESTION PROCESS OF BIOWASTE FOR AIR DEPOLLUTION (BIOFORAIR PROJECT)

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Anaerobic co-digestion has become a widely adopted technology for the treatment of diverse organic wastes, including livestock manure, agricultural residues, food processing wastes, and agro-industrial by-products. Organic Fraction of Municipal Solid Waste (OFMSW) and sewage sludge (SS) from water treatment plants (SWT) are produced in large quantities and its management is an important issue.

By combining substrates with complementary physicochemical characteristics, co-digestion can improve nutrient balance, enhance microbial activity, increase process stability, and boost methane production compared to the digestion of a single substrate. Among the various substrate combinations, the co-digestion of OFMSW and SWT sludge has attracted increasing interest due to the large volumes generated worldwide and their significant energy recovery potential. However, despite the benefits associated with biogas generation and waste valorization, anaerobic co-digestion also produces considerable amounts of digestate, which remains one of the main challenges limiting the overall sustainability of the process. Digestate contains valuable nutrients and organic matter that can be recycled as soil amendments or fertilizers, but its high moisture content and large volume often hinder its direct application, and national or European regulations often hinder its direct application. Moreover, stricter environmental regulations and concerns related to nutrient runoff have intensified the need for innovative digestate treatment and valorization strategies. Therefore, effective digestate management is crucial for advancing the circular economy and maximizing the environmental and economic benefits of anaerobic co-digestion systems. The production of biochar materials from digestate for CO_2 capture and gas-phase pollutant removal represents a promising challenge for the development of value-added materials, in line with the principles of the circular economy

The **BIOFORAIR project** focuses on the valorisation of the biowaste obtained from the Organic Fraction of Urban Solid Waste (OFSW) and Sludge from Water Treatment plants (SWT) mixtures used in biogas production through Anaerobic co-Digestion process (AcoD), for environmental applications. With the aim of reducing greenhouse gases (GHG) emissions, biochar-based adsorbents are tailored for CO_2 capture. Moreover, advanced hybrid photocatalysts based on biochar as the adsorbent phase and a semiconductor oxide are ad hoc designed for the removal of pollutants such as Volatile Organic Compounds (VOC) in the gas phase. The development of stable and durable materials able to work under solar light conditions is pursued.

In this work, the effect of the nature of the wastes and the resulting digestates on biogas properties, as well as their potential for biochar production aimed at CO_2 capture, was investigated. The analysed digestates included those derived from sewage sludge (SS), the organic fraction of municipal solid waste (OFMSW), and their co-digestion mixtures. Based on the results obtained, the 50:50 (OFMSW:SS) mixture was selected as the optimal configuration, and a continuous digestion trial was conducted to evaluate biogas production performance. Particular attention was devoted to valorizing both the daily digestate effluent collected during operation and the accumulated digestate at reactor shutdown, mainly composed of inert solids and mineral particles (grit) that progressively settled during digestion.

Figure 1. Facilities and materials studied: a) photographs of the wastes selected; b) 5L reactor and oven; c) digestate and carbonaceous materials obtained and corresponding SEM micrographs of the solids.

Conclusions and perspectives. The continuous co-digestion of 50:50 (OFMSW:SS) resulted in a stable process with biogas production of up to 5 $L \cdot day^{-1}$. The digestates generated under these conditions showed high potential for biochar production. Although the daily effluent digestate yielded the highest CO_2 adsorption capacity, the accumulated fraction, representative of the material settling in full-scale reactors, also produced biochars with excellent adsorption performance after chemical activation, reaching 1,211 $\mu mol \cdot g^{-1}$ and surpassing the commercial activated carbon, confirming its value for circular valorization. Overall, converting these digestates into biochar offers a sustainable route for biogas residue recovery while contributing to CO_2 capture and circular economy objectives.

SUPREMAS PROJECT: ADVANCING SUSTAINABLE DECENTRALIZED SYNGAS PRODUCTION FROM BIOMASS WASTES

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SUPREMAS aims at enabling decentralized conversion of biomass wastes into energy through the production of syngas from the pyrolysis of biomass wastes, using movable and transportable gasification units. In detail, the SUPREMAS unit is designed to produce syngas and simultaneously generate electricity and heat with a Combined Heat and Power (CHP) system, which is integrated into the unit.

Figures 1-2. SUPREMAS movable unit produced by the SUPREMAS partner RESET, in Rieti, Italy (on the left) and related biomass feedstock of hazelnut shells (on the right)

The SUPREMAS unit is particularly suitable to treat hard-to-valorize biomasses such as sewage sludge, digestate, and the organic fraction of municipal solid waste. Its environmental sustainability and techno-economic viability will be validated in the demonstrators of Agroamb Waste Management Plant in Ponte de Outeiro, Lugo, Spain, and of Águas e Energia do Porto (AEdP) Wastewater Treatment Plant in Freixo, Porto, Portugal.

A deep replicability assessment is under development for 10 further demo sites across all over Europe. Co-creation workshops are being organized to promote stakeholders' engagement and communities' involvement, thus unlocking barriers and making SUPREMAS replication real.

To this aim, 2 co-creation and one replication workshops have been organized in Ponte de Outeiro (Lugo, Spain) in Freixo, (Porto, Portugal) and at the energy community of Guardabosone in Italy, reaching out to local stakeholders. The project implementation will be accompanied by other periodic replication workshops held in the Consortium partners' countries.

Figures 3-4. SUPREMAS demonstrators: Agroamb Waste Management Plant in Ponte de Outeiro, Lugo, Spain (on the left) and Águas e Energia do Porto Wastewater Treatment Plant in Freixo, Porto, Portugal (on the right)

At the time being, the SUPREMAS partners are focused on the modeling activities related to the reactor redesign and the optimization of the gasification process for bio-syngas production. The SUPREMAS activities include the investigation of the integration of the process within existing local energy systems, through the development of a Decision Support System comprising a Planning Optimizing Tool (managing the logistics of the biomass and the movable gasification units) and an Investment Tool (supporting the assessment and minimization of environmental and economic impacts). The analysis will also include the coupling with renewable energy communities (RECs), as a specific case study.

Besides investigating the direct production of heat and power by feeding the ICE (Internal Combustion Engine) integrated in the RESET solution, the SUPREMAS project will also investigate the exploitation of the bio-syngas within a SOFC (Solid Oxide Fuel Cell).

Figures 5-7. SUPREMAS co-creation and replication workshops in Ponte de Outeiro, Lugo, Spain (on the top left), in Freixo, Porto, Portugal (on the top right), and in Guardabosone, Italy (center)

Figure 8 represents the SUPREMAS concept: from biomass wastes to syngas, biochar and renewable energy.

Figures 8. SUPREMAS concept

SUPREMAS Consortium consists of 12 organizations from 7 different countries (Italy, Sweden, France, Germany, Spain, Belgium, Portugal). The multinational engineering consultancy company RINA-C coordinates the Consortium, which includes a product design and manufacturing company RESET, wastewater treatment plant and waste management companies (AEdP, Agroamb), experts in energy management ICT solutions development (Arte), in solutions adaptation to help market uptake (EnGreen, WIP) as well as stakeholders' engagement, also guaranteeing proper dissemination of project results.

The consortium also has academic and research organizations (MDU, CIRCE, CIIAE), associations (Ergar), and innovation partners (SEZ), facilitating the exchange of knowledge between complementary forces (academy and companies) and co-creation efforts.

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Visit the project website

SUPREMAS has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement no. 101160713.

HYFUELUP PROJECT: TOWARDS AN INTEGRATED VALUE CHAIN FOR ADVANCED BIOMETHANE PRODUCTION

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Meeting Europe's biomethane ambitions will require more than expanding conventional anaerobic digestion capacity. Unlocking the potential of lignocellulosic biomass through advanced thermochemical conversion will also be essential if the EU is to meet its renewable gas objectives. Complementing conventional anaerobic digestion, thermochemical conversion broadens the range of biomass resources available for biomethane production, particularly lignocellulosic residues that remain largely underexploited. This is the focus of HyFuelUp, a Horizon Europe project coordinated by BIOREF CoLAB, which is developing and demonstrating an integrated biomethane production pathway based on steam-enhanced gasification, catalytic methanation, and renewable hydrogen.

After three years of research and development, the project is gradually shifting from developing individual technologies to integrating them into a complete advanced biomethane production system. The published report, Scaling Up Biomethane Innovation: HyFuelUp's Key Achievements in Year 3, illustrates this transition, highlighting how advances achieved across the different Work Packages are now converging towards an integrated demonstration.

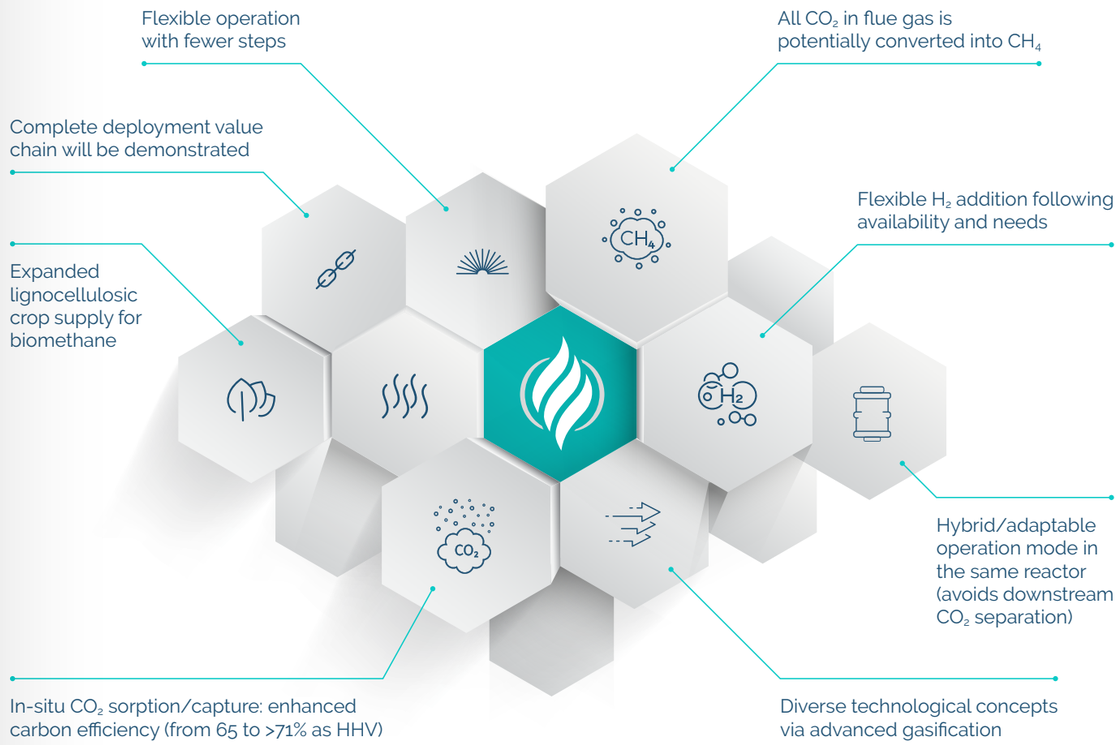

Figure 1. HyFuelUp's added value: Advances and innovations.

One area where this progress is particularly evident is feedstock supply assessment. HyFuelUp has evaluated the availability and characteristics of lignocellulosic biomass resources in Greece, Portugal, Germany, Switzerland and Spain. Based on national inventories, the biomethane potential attainable through gasification was estimated, per year, at **78.8 TWh**, with Germany representing the largest share **(36.0 TWh)**, followed by Portugal **(20.6 TWh)**, Switzerland **(11.3 TWh)**, Spain **(6.0 TWh)** and Greece **(4.4 TWh)**. The assessment covered several feedstock categories, including cereals, tree pruning, forest residues, landscape care biomass and waste wood. Beyond resource availability, the work highlighted the importance of reliable, cost-efficient supply chains to ensure the effective collection and transport of biomass to future gasification plants. This confirms that the success of advanced biomethane production depends not only on conversion technologies, but also on efficient biomass logistics.

The project has also assessed the potential for digestate production in the participating countries. Overall, total digestate potential ranges from **52.7 to 57.7 million tonnes per year**, depending on the share of agricultural wastes in the anaerobic digestion feed mix. Sensitivity analyses show that changes in this share can alter digestate quantities by up to **38 %**. This work is relevant not only for resource mapping, but also for circular bioeconomy strategies, as digestate can partially substitute synthetic fertilisers and soil conditioners.

Process flexibility has become one of the defining features of the HyFuelUp concept. Pilot campaigns conducted during the third project year demonstrated flexible operation of **steam-enhanced gasification (SEG) and oxy-SEG** at the University of Stuttgart's DFB pilot facility. Tests confirmed the feasibility of using different biomass types and tuning syngas composition for downstream methanation. The use of dried sewage sludge received particular attention, and mode switching between SEG and oxy-SEG was validated, demonstrating the process's potential to adapt to variable renewable electricity availability.

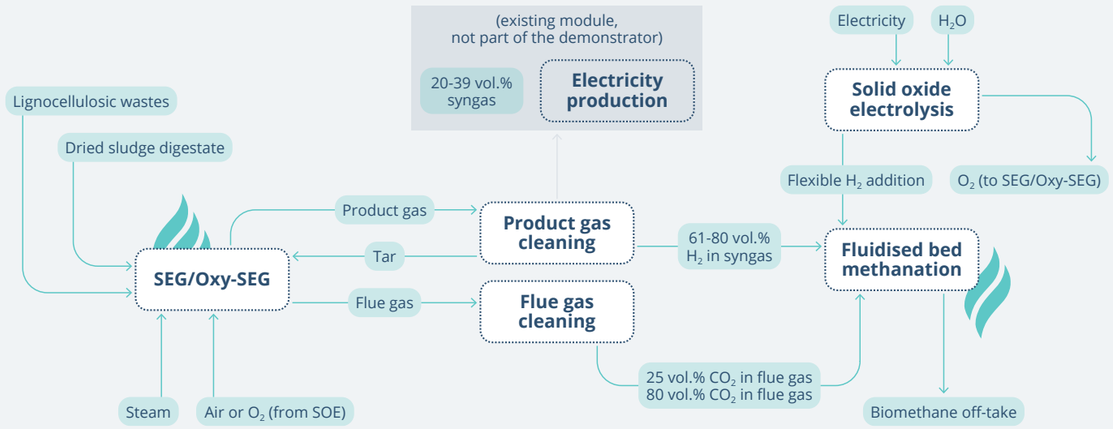

Figure 2. HyFuelUp is integrating a SEG*/Oxy-SEG process to turn biowaste into syngas or flue gas. Syngas with high H content (>65 %) and a CO_2-rich flue gas suitable for catalytic methanation are obtained as a result.

At PSI (Switzerland), it was used the **GanyMeth** pilot methanation unit for generation performance data using representative gases of different gasification routes, including SEG gas and DFB "Güssing-type" gasification with flexible hydrogen addition. The extensive instrumentation of the pilot unit enabled axial temperature and concentration profiles to be collected, providing data for model validation and future process optimisation. These datasets provide an important basis for validating simulation models and optimising reactor performance before demonstration.

The project has also advanced local ground works for the integrated demonstration plant and the scale-up of the core process, which combines an existing gasification unit with methanation and flexible hydrogen production. Engineering activities included local dismantling, gasifier refurbishment, detailed process design and procurement of key components, including the electrolyser. These activities prepare the ground for installation, commissioning and full plant testing.

Sustainability and techno-economic assessment are becoming increasingly important as the project approaches demonstration. Literature data were compiled, and a preliminary Life Cycle Assessment was carried out using SimaPro and the Ecoinvent database, following a cradle-to-gate approach and based on inputs from the four identified scenarios. These preliminary results provide valuable guidance for identifying optimisation opportunities before the integrated demonstration phase. In parallel, initial CAPEX/OPEX estimates show strong scale effects on total capital costs, confirming that plant size will be a critical factor in the future techno-economic performance.

These assessments are also helping to inform downstream deployment decisions. The project evaluated biomethane offtake pathways to assess technical feasibility, economic viability and alignment with environmental goals. One of the intermediate conclusions is that, given current biomethane quality and budget constraints, liquefaction is not feasible under the present project conditions. Under the current project conditions, compression appears to be a more suitable option to ensure technical and economic viability at this stage.

Beyond the technical work, HyFuelUp continues to contribute to the wider European biomethane community through the Biomethane Cluster, working alongside other Horizon Europe projects to exchange knowledge and develop joint policy recommendations that support the deployment of innovative biomethane solutions across Europe.

The next phase of the project will focus on commissioning the integrated demonstration plant while completing the remaining technical developments. These include finalising the integrated gas cleaning concept, validating the methanation reactor model using pilot data, refining the techno-economic assessment and launching social acceptance studies involving local communities, workforce representatives and other value-chain actors.

HyFuelUp is now entering the stage where these individual technological advances come together as a complete biomethane production biorefinery. Demonstrating how this integrated approach performs under real operating conditions will provide valuable technical, environmental and economic evidence to support the future deployment of advanced thermochemical biomethane technologies in Europe.

Funded by the European Union

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ONE STEP, TWO PRODUCTS: SIMPLIFYING MICROALGAE BIOREFINERY WITH AQUEOUS TWO-PHASE SYSTEMS

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Microalgae are a promising feedstock for third-generation biofuels, but unlocking their full potential goes beyond lipid extraction. These microorganisms also contain substantial amounts of proteins and carbohydrates that, if efficiently separated, could be redirected to other applications such as food and biopolymers while improving fuel quality by lowering the nitrogen content (which is linked to proteins). The concept sounds good… but what is the challenge? Conventional fractionation methods often rely on toxic solvents or extreme pH, which clash with the principles of sustainable biorefining.

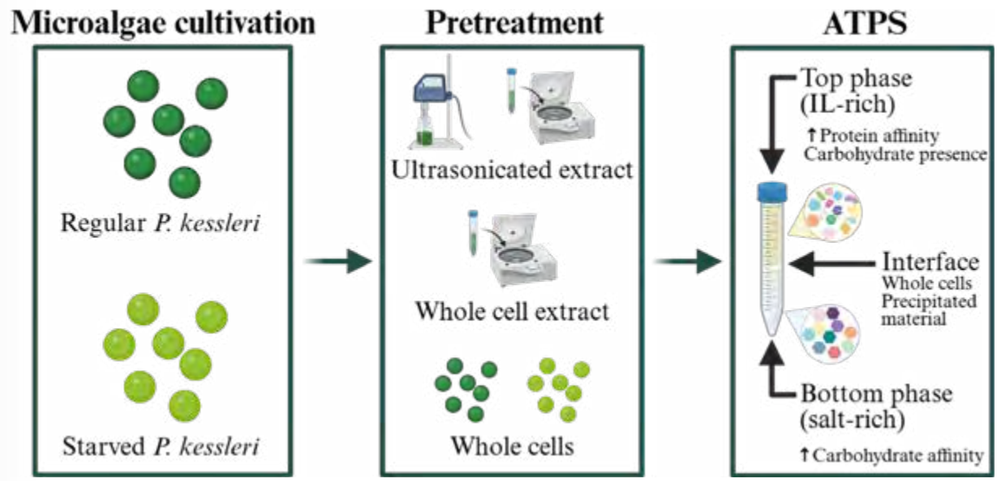
In our recent study published in Algal Research, we explored a gentler alternative: aqueous two-phase systems (ATPS) based on an ionic liquid (IL) and a salt. ATPS spontaneously form two immiscible water-rich phases when the IL and the salt are mixed above critical concentrations. We used 1-butyl-3-methylimidazolium bromide ([bmim][Br]) and dipotassium hydrogen phosphate (K2HPO4) to fractionate proteins and carbohydrates from Parachlorella kessleri, a freshwater microalga with strong potential for biofuel production.

The results were encouraging. Proteins consistently partitioned towards the IL-rich top phase, while carbohydrates preferentially accumulated in the salt-rich bottom phase, all under mild conditions at ambient temperature.

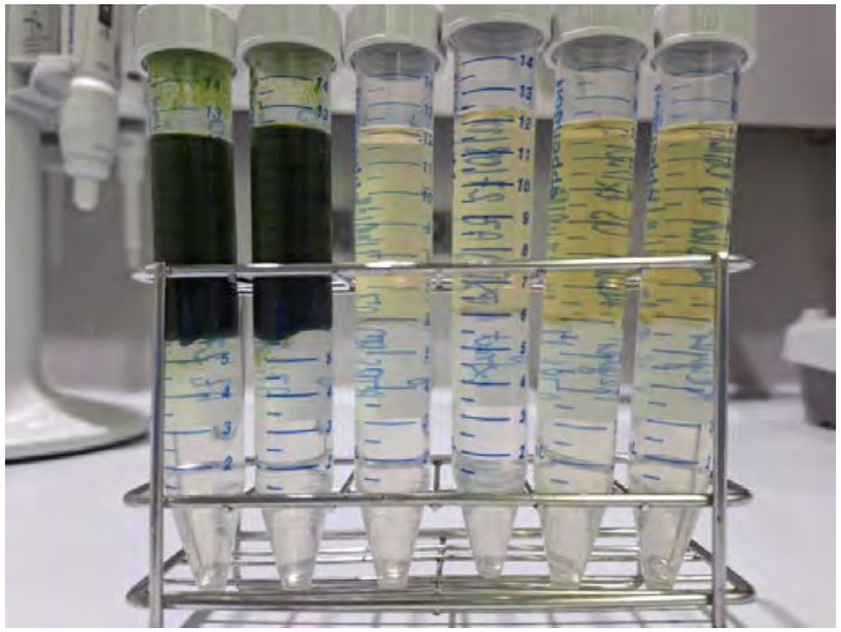
Pretreatment mattered significantly. Intact whole cells yielded protein recoveries below 7 % and carbohydrate recoveries under 25 %, as P. kessleri's cell wall kept biomolecules inside, limiting their release. Ultrasonication was essential to release intracellular material and unlock ATPS efficiency, as it allowed the recovery of up to 90 % of proteins in the top phase and 70 % of carbohydrates in the bottom phase. Shorter tie-line lengths (less concentrated phase-forming agents) outperformed more concentrated ones, as higher IL levels promoted protein precipitation rather than clean partitioning.

We also evaluated how nitrogen deprivation, a common strategy to boost lipid accumulation for biofuel applications, affected separation performance. Interestingly, starved cells showed lower protein recoveries than their nitrogen-repleted counterparts, suggesting that both cultivation strategy and downstream processing must be co-optimised in integrated biorefineries.

From a sustainability perspective, ILs offer a key advantage: negligible vapor pressure. This feature enables their recovery and recycling, which is crucial for economic viability at scale. In this regard, we outlined three possible biorefinery configurations integrating ATPS, including an ATPS cascade to maximise biomass valorisation.



This work was framed within the EU Horizon project COCPIT - Scalable solutions Optimisation and decision tool Creation for low impact SAF Production chain from lipid-rich microalgae strain (Grant Agreement No. 101122101). By demonstrating that protein-carbohydrate fractionation can be achieved in a single mild separation step, we hope to contribute to the development of more efficient and feasible microalgae biorefineries able to deliver multiple products from one single feedstock.



Read the full article: Zurita et al. (2026) Algal Research 95, 104662. DOI

COCPIT
Co-funded by the European Union

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101122101. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

RENEWABLE ENERGIES IN TRANSPORT – MONITORING REPORT MoVeE

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Many countries want to become climate-neutral within 25 years. The transport sector, which accounts for an average of 20 % of annual greenhouse gas emissions, has a key role to play in this regard. Today, the global transport sector is still dominated by fossil fuels - over 800 oil refineries process fossil crude oil primarily into fuels, producing 102 EJ. Currently, renewable fuels and electricity cover only around 5 % of the energy required for transport.

The report Renewable Energies in Transport focuses on renewable biomass- and electricity-based fuels and electricity for direct use under various aspects. In the first chapter, an outlook on the necessary energy transition in transport is given. The future demand for renewable energy carriers in a climate-neutral world is compared with the supply and the opportunities to meet the required amounts via a reference refinery with specific resources and technical supply systems.

In order to meet the future climate-friendly demand, there must be an increased reliance on renewable electricity and hydrogen. This will require a significant expansion in the supply of new technologies, such as wind power, photovoltaics and water electrolysis, as well as the conversion of unused biomass into energy carriers.

To meet a fully renewable energy supply by 2050, there are many challenges to be addressed. In order to provide renewable energy sources on the scale required, many new plants will need to be built, or existing ones will need to be transformed. Also, the infrastructure for supplying hydrogen, carbon dioxide or biomass must be established, promising technologies must be commercialised and integrated, and new technologies must be developed.

The report outlines various recommendations for action and identifies gaps in research:

- Electric powertrains must be prioritised in all suitable transport sectors. Liquid and gaseous renewable fuels should be reserved for sectors that are difficult to electrify.
- International cooperation must be strengthened to promote opportunities and address risks for value chains and facilitate knowledge and technology transfer.
- Promotion of public acceptance of the energy transition as part of the transformation process must be increased by social participation and suitable communication measures.
- Existing refineries must play a central role in energy transition plans, as they will remain important for security of supply.
- Regulatory instruments and long-term measures to promote technologies must be put in place and aligned with climate protection targets. Continuous monitoring of policy decisions' impact on technology and market development is important.
- R&D&D in innovative biofuels and synthetic fuels must be strengthened. Progress in process development is reported, but market readiness remains a challenge. This also requires the mobilisation of more suitable biogenic resources, the expansion of electricity, hydrogen and carbon dioxide, and viable concepts to ensure the financial viability of commercial plants.

Other topics of the report are shown in Figure 1. The report and more information can be found on the website (free of charge).

Figure 1. Topics of the monitoring report Renewable Energies in Transport

Figure 2. Overview of the involved institutes and financing of the monitoring report

ICARUS - SYNGAS TO OLEFINS TO SAF

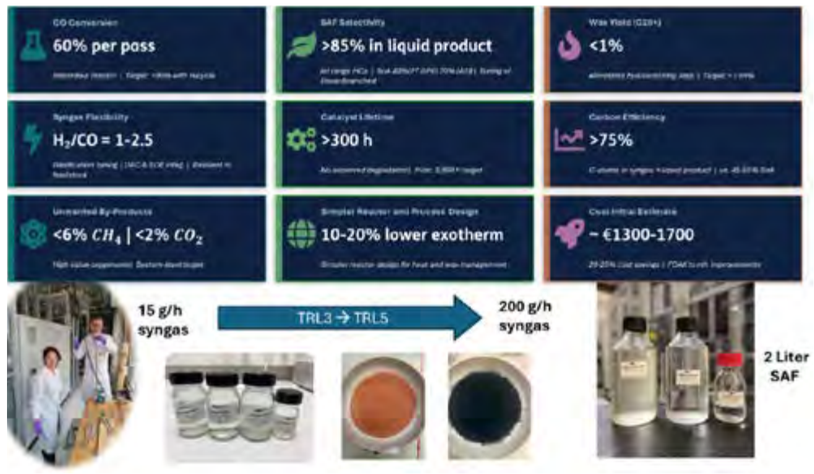
Evert Boymans
Scientist specializing in the development and scale-up of catalytic processes for sustainable (bio-)fuels production
TNO

Within the **ICARUS project** (International Cooperation for Sustainable Aviation Biofuels), partners are developing and validating three value chains to accelerate the production of sustainable aviation fuel (SAF) from renewable resources. A central focus is the SOSAF route (syngas to olefins to SAF), an innovative pathway designed to improve efficiency, flexibility, and scalability compared to conventional technologies.

In the SOSAF process, by first converting syngas into olefins and then upgrading these into jet fuel range hydrocarbons, the process creates a flexible platform where product distribution can be tailored to meet fuel specifications.

The project has progressed from catalyst innovation to pilot scale demonstration, successfully producing representative fuel precursors and validating the concept under realistic conditions.

Overall, SOSAF shows strong potential as a scalable and decentralized SAF pathway, particularly suited to connect with biogasification systems and unlock sustainable fuel production from diverse biomass resources, supporting the transition toward low carbon aviation.



ICARUS project website

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101122303. The information and views set out in this report are those of the author(s) and do not necessarily reflect the official opinion of the European Union. Neither the European Union institutions and bodies nor any person acting on their behalf may be held responsible for the use which may be made of the information contained therein.

M²ARE ADVANCES BIO-CO_2-BASED METHANOL FOR MARITIME DECARBONIZATION

Henrik Schlösser
Air Liquide Forschung und Entwicklung (ALFE) GmbH
Germany / Project coordinator

Michael Bampaou
Centre for Research and Technology Hellas (CERTH)
Greece

The Horizon Europe M²ARE project (GA 101136080) is developing a low-cost, low-carbon methanol synthesis process based on biogenic CO_2 and renewable hydrogen to support the decarbonization of the shipping sector. Running from December 2023 to May 2027, the project covers the full value chain: from bio-CO_2 feedstock challenges, capture and conditioning to methanol synthesis and purification as well as engine validation and scale-up assessment.

M²ARE has already completed successful CO_2 sampling and capture campaigns at different industrial biogenic CO_2 sources, providing valuable data on feedstock availability, impurities and conditioning requirements. The project is now operating the methanol synthesis demonstration plant to produce renewable methanol at the facilities of Air Liquide in Frankfurt, which is subsequently purified and tested in marine engines to assess fuel compatibility, performance, emissions and injector durability at the testing stations of Everllence.

In parallel, M²ARE is developing an intensified next-generation, cost-effective methanol reactor concept that will be demonstrated on a pilot scale. In addition, M²ARE is developing a simplified purification process for maritime methanol, and value-chain models to support future deployment in port and shipping ecosystems. Furthermore, the project recently co-organized a joint workshop with the EU project Cocpit at the European Biomass Conference & Exhibition to strengthen the commitment of EU projects to decarbonizing the maritime sector, also involving Seafairer, NextFuel, and Poseidon. On June 19th, M²ARE held a webinar entitled "Advancing sustainable maritime fuels: M²ARE value chain optimization and impact analysis".

Figure 1. Newly commissioned crude methanol distillation column for tailor-made Maritime Methanol. © Air Liquide (coordinator of the M²ARE project).

www.m2are.eu
LinkedIn: m²are-project

Co-funded by the European Union

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DOC2026 | 9th Doctoral Colloquium BIOENERGY AND BIOBASED PRODUCTS

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Dear colleagues and members of the EERA Bioenergy community,

DOC2026
9TH DOCTORAL COLLOQUIUM
BIOENERGY & BIOBASED PRODUCTS

We are delighted to invite you to participate in our 9th Doctoral Colloquium on BIOENERGY AND BIOBASED PRODUCTS (DOC2026), taking place from 23rd to 24th September 2026 at the DBFZ in Leipzig, Germany. As host and patron of this event, we are committed to providing a platform for young researchers to present their work, exchange ideas, and engage with experts in the field.

DOC2026 is proudly supported by the European Alliance for excellent research in sustainable bioenergy (EERA Bioenergy), which recognizes the importance of this colloquium as a forum for early-career development, collaboration, and knowledge sharing within the European bioenergy research community. We are grateful for their support, which underscores the significance of nurturing the next generation of bioenergy/bioeconomy researchers and driving innovation in the field.

Over the years, our Doctoral Colloquium has evolved into an international platform, convening talented young researchers to share knowledge, address challenges, and explore opportunities in bioenergy and biobased products. Building on this foundation, we have recently expanded our scope to encompass cutting-edge research in biotechnology and bioeconomy, aligning with the shifting global landscape and the increasing demand for sustainable, innovative, and economically viable solutions.

As the only renewable carbon source available, biomass requires novel and innovative approaches to ensure its sustainable and efficient utilisation. Research on bioenergy and bio-based products, as well as system integration, demonstrates the potential of biomass and bio-based resources to transform various sectors (chemical, pharmaceutical, construction, etc.) into high-quality processes and products.

The research in this area is already diverse and of high quality, with significant contributions from experts across Europe and beyond. However, there are still many challenges to be addressed, and we need to strengthen our collaboration and knowledge sharing to drive innovation and progress.

Our Doctoral Colloquium provides a unique opportunity for young researchers to present their work, receive feedback from experts, and engage with peers. This year, we have received over 50 contributions for talks and posters, carefully reviewed and selected by our Programme Committee.

The programme will feature a mix of oral and poster presentations, keynote speeches, and networking opportunities, including our interactive "Get-in-Touch" session and visits to technical and pilot sites of the DBFZ. Our Programme Committee has carefully curated the papers with guidance from our esteemed Scientific Advisory Board, comprising 50 renowned scientists from Germany, Austria, Switzerland, Italy, and Norway, representing 39 research and higher education institutions working on bioenergy and biobased products.

DOC2026 will cover all aspects of the biomass conversion chain, from feedstocks to resulting products and services, as well as overarching themes like economics, environmental and social aspects, system analysis, and system integration. We will also delve into biological principles and knowledge, providing a comprehensive overview of the current state of research in the field.

We invite you to join us at the DBFZ in Leipzig, Germany, from 23rd to 24th September 2026, and be part of the young international community shaping the future of bioenergy and biobased products. Registration and more information can be found on our website.

We look forward to welcoming you to DOC2026 in Leipzig and engaging in a productive and stimulating exchange of ideas and expertise!

New members

ASSOCIATE MEMBERS

UNIVERSITY OF CALGARY

Prof. Nora Szarka
Associate Professor
Schulich School of Engineering
nora.szarka@ucalgary.ca
https://profiles.ucalgary.ca/nora-szarka

University of Calgary

The University of Calgary is Canada's entrepreneurial university in this country's most enterprising city. The youngest top five research university in Canada, UCalgary is a leader in startup creation and research innovation. With groundbreaking discoveries in child health, quantum computing and water sustainability, we're transforming bold ideas into real-world impact. Curious and determined, our 38,000 students are using hands-on learning to forge bright futures for all.

Figure 1. University of Calgary

Schulich School of Engineering

Established in 1965, the Schulich School of Engineering at the University of Calgary has grown from two faculty members and 59 students to a community of more than 200 faculty members and over 6,600 students across undergraduate, graduate, and Master of Engineering programs. The School comprises six departments: Biomedical Engineering, Chemical and Petroleum Engineering, Civil Engineering, Electrical and Software Engineering, Geomatics Engineering, and Mechanical and Manufacturing Engineering. Schulich offers 11 undergraduate majors, including Engineering Physics, Sustainable Systems Engineering, and the revitalized Oil and Gas Engineering program, reflecting its commitment to addressing current and emerging engineering challenges.

Figure 2: Schulich School of Engineering

Bioenergy at the Schulich School of Engineering

The University of Calgary, through the Schulich School of Engineering, is actively engaged in research and education supporting the sustainable development of bioenergy and the broader bioeconomy. A particular strength lies in systems analysis approaches that integrate environmental, economic, social, and technical dimensions of biomass-based systems. This expertise is reflected in the graduate course *Systems Analysis of the Sustainable Bioeconomy*, led by Prof. Szarka, which provides advanced training in sustainability assessment, bioeconomy transitions, and decision-support methodologies. Research activities span the entire biomass value chain, from resource assessment and mobilisation to technology evaluation and policy support. Current work includes the development of biomass resource databases, biomass potential assessments, regional bioeconomy strategies, bio-based carbon dioxide removal (BioCDR) pathways, sustainability monitoring systems, and circular bioeconomy solutions. The group also investigates the role of biomass in climate mitigation, carbon management, and sustainable regional development.

Building on this systems perspective, research at the University of Calgary combines expertise in sustainable systems engineering, bioresource valorization for agriculture, food, energy and material applications, industrial ecology, bioenergy technology assessment, and climate innovation to develop integrated solutions for the transition toward a circular and net-zero economy. Activities connect biomass resources with emerging bio-based products, renewable energy systems, carbon management pathways, and circular economy strategies, while addressing challenges ranging from biomass supply and conversion technologies to sustainability assessment, stakeholder engagement, and policy design. Particular emphasis is placed on evaluating trade-offs among competing biomass uses, identifying sustainable pathways for biomass utilization, and supporting evidence-based decision-making for resilient regional and national bioeconomy transition.

The University of Calgary contributes expertise in:

- Sustainable mobilisation of biomass residues.
- Biomass supply chain analysis and optimization.
- Bioenergy technology assessment.
- Biomass production and use linked to landscape restoration, wildfire mitigation, and rural development.
- Life cycle assessment (LCA) using the latest databases (ecoinvent, SoCa), techno-economic assessment (TEA), and multi-criteria decision analysis (MCDA) of bioenergy and bio-based value chains.
- Integrated assessment of biomass allocation among energy, materials, fuels, and carbon dioxide removal pathways.
- Scenario modeling of future bioenergy and BioCDR systems under uncertainties.
- Sustainability indicators and monitoring frameworks.
- Community and Indigenous engagement.
- Circular bioeconomy strategies.
- Digitalisation, data-driven methods, and emerging AI-supported approaches for sustainable bioeconomy planning.
- System dynamics modelling.

The Canadian context offers complementary expertise to European research through extensive forestry resources, agricultural residues, large-scale biomass logistics, and practical experience in managing biomass systems under climate-related pressures such as wildfires, droughts, and land-use change. Through these activities, the University of Calgary contributes to advancing sustainable biomass mobilisation, bioenergy deployment, carbon removal strategies, and resilient bioeconomy transitions in collaboration with international partners.

Useful information

COMMISSION LAUNCHES NEW INITIATIVES TO ACCELERATE THE EUROPEAN BIOECONOMY

The European Commission has launched three new initiatives as part of the implementation of the EU Bioeconomy Strategy. Together, they focus on three areas considered essential for the further development of the European bioeconomy: market uptake, investment and policy coordination.

The first initiative is the Bio-based Europe Alliance (BEA), which will bring together producers of bio-based products with public and private buyers. The objective is to increase demand for bio-based products and help bring new technologies closer to the market. The Commission expects the Alliance to mobilise up to €10 billion in purchasing commitments by 2030.

The second initiative is the Bioeconomy Investment Deployment Group (BIDG), established in cooperation with the Circular Bio-based Europe Joint Undertaking (CBE JU). The Group brings together investors, financial institutions, industry and the bio-based sector to discuss investment barriers and improve access to finance for bio-based projects, particularly those moving from pilot or demonstration scale towards commercial deployment.

The third initiative is the creation of a new Expert Group on Bioeconomy, which will support the implementation of the EU Bioeconomy Strategy and improve coordination between the European Commission and Member States.

Together, these initiatives provide new instruments to support the development of the European bioeconomy, complementing existing research and innovation programmes and helping create better conditions for bringing bio-based technologies to the market.

Source: European Commission

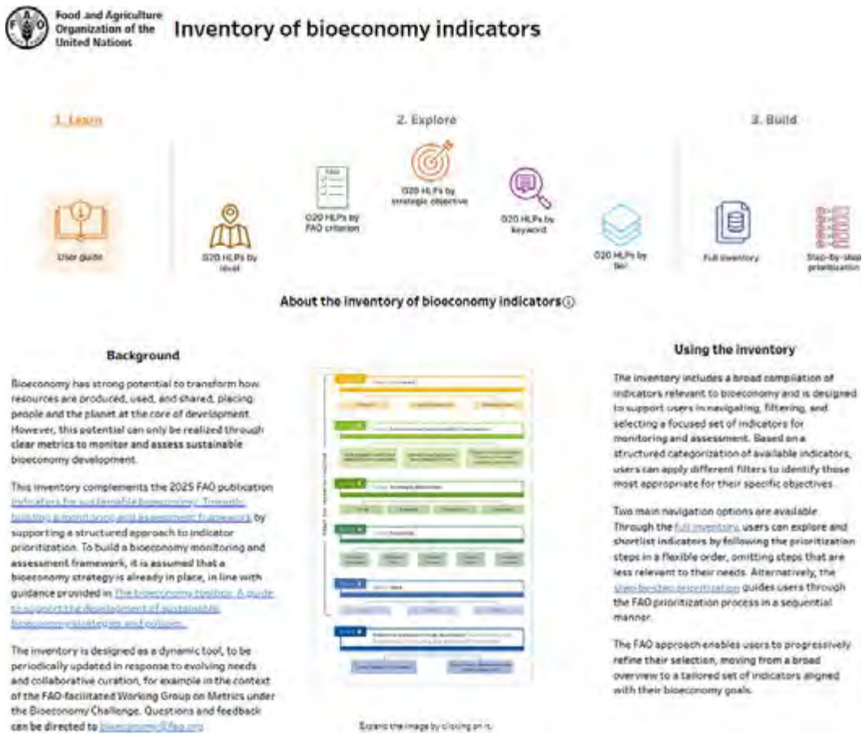
FAO INTRODUCES NEW TOOL TO MONITOR BIOECONOMY STRATEGIES

The Food and Agriculture Organization of the United Nations (FAO) has launched the Inventory of Bioeconomy Indicators, a new online resource designed to support countries, policymakers, researchers and other stakeholders in measuring progress towards sustainable bioeconomy objectives.

The new Inventory complements FAO's 2025 publication Indicators for Sustainable Bioeconomy: Towards Building a Monitoring and Assessment Framework by translating its methodological approach into a practical, user-oriented platform. It is based on a database of around 3,000 indicators covering environmental, economic and social dimensions of the bioeconomy, allowing users to navigate a broad range of existing metrics and identify those best suited to their specific policy objectives and national contexts.

The platform offers a flexible approach that can be adapted to different monitoring needs and governance levels. It is intended to support the design, implementation and evaluation of bioeconomy strategies while encouraging greater consistency in monitoring practices.

The Inventory was presented during the inaugural meeting of the Bioeconomy Challenge Metrics and Indicators Working Group (WG-METRICS), established under Brazil's COP30 Presidency. The Working Group aims to advance international cooperation on bioeconomy metrics and contribute to the development of common approaches applicable across countries and regions.



Source: Food and Agriculture Organization of the United Nations (FAO)

EUROPEAN COMMISSION LAUNCHES THE BIOMETHANE MECHANISM

The European Commission has launched the Biomethane Mechanism, a new voluntary platform under the EU Energy and Raw Materials Platform that connects biomethane buyers and suppliers across Europe.

The platform is intended to facilitate the development of new biomethane projects by helping market participants identify potential business partners and access information on regulatory requirements, financing opportunities and market developments. It will also support cross-border cooperation and contribute to the further development of the European biomethane market.

Registration is now open to biomethane producers, buyers and other interested stakeholders. The first matching round is planned for September 2026, providing participants with an opportunity to establish new contacts and explore potential business opportunities.

The Biomethane Mechanism is one of the actions included in the REPowerEU Plan, which identifies biomethane as a key renewable energy source to strengthen Europe's energy security and reduce dependence on imported fossil fuels.

Source: European Commission

Publications

Mobilization of industrial capacity building for advanced biofuels

PDF

Directorate-General for Research and Innovation, European Commission

The objective of the project "Study on how to mobilize industrial capacity building for advanced biofuels" is to identify and propose ways to realize the essential industrial value chains of advanced biofuels including the technical, financial, business and feedstock-related aspects, in order to reach the defined 2030, 2040 and 2050 EU targets. The approach aimed to create a record of the essential industrial value chains of advanced biofuels, analyse the actual needs and bottlenecks of each industrial value chain, develop a business model for each industrial value chain, interview relevant industrial stakeholders and financial sources and collect inputs to validate the identified data and business models through external experts and propose a plan for financing and realizing the industrial value chains, collectively.

The State of Energy Innovation 2026

PDF

International Energy Agency (IEA)

The second edition of The State of Energy Innovation turns the spotlight on the technologies, policies and funders at the forefront of energy technology development. It provides a comprehensive assessment of recent progress and emerging challenges in energy technology innovation, drawing on over 150 innovation highlights from 2025 and a survey of practitioners across more than 40 countries. It analyses trends in public and corporate R&D spending, venture capital flows, patenting and policy, as well as providing an update on progress towards the 18 IEA Races to First in energy innovation. This data-driven approach informs policy makers, industry and other stakeholders on the state of energy innovation worldwide and the importance of sustaining innovation momentum over the long term.

The report concludes that energy innovation is increasingly driven by competitiveness and energy security.

Bioenergy in the European Union - 2025 Status Report on Technology Development, Trends, Value Chains and Markets

PDF

Joint Research Centre (JRC), European Commission

This annual report from the Clean Energy Technology Observatory (CETO) provides a comprehensive assessment of the bioenergy sector within the European Union. It considers the sector's role in achieving key EU policy objectives, including the European Green Deal, the REPowerEU plan, and the Net-Zero Industry Act. The analysis covers technology maturity, production trends, value chain dynamics, and the EU's global competitiveness, drawing on a range of data from sources such as Eurostat and the International Renewable Energy Agency (IRENA). Bioenergy is positioned as a key contributor to the EU's ambitious renewable energy targets. Centralised bioenergy heating is projected to exceed 50 % share of renewable centralised heating by 2035 and remain at this level thereafter.

Biogases: Europe's overlooked path to energy independence?

PDF

European Biogas Association (EBA)

This report assesses Europe's sustainable biogases production potential based on a new Guidehouse analysis for the European Biogas Association. Building on updated data and methodologies, it evaluates how biogases could contribute to Europe's energy independence targets across 2030, 2040, and 2050. The findings highlight biogases as a scalable and strategic component of Europe's long-term energy and climate strategy, capable of delivering both system flexibility and wider socio-economic benefits.

Economic analysis of options for improving EU legislative and regulatory frameworks with impact on access and reuse of publicly funded R&I results and of publications and data for scientific purposes

PDF

Directorate-General for Research and Innovation, European Commission

This study conducted a comprehensive economic analysis of the current practices, market economics and dynamics, as well as EU legislative and regulatory frameworks concerning the access and reuse of publicly funded research and innovation results, publications, and data. Building on that, it assessed the economic impact of policy options regarding EU-wide secondary publication right and harmonisation of the copyright exception for research.

Digestate in Europe: the state of play in 2026

PDF

European Biogas Association (EBA)

The report provides an overview of how digestate is currently produced, managed, and used across Europe. It highlights digestate's key role in the circular economy, particularly in agriculture where it can replace synthetic fertilisers, improve soil health, and recycle essential nutrients such as nitrogen, phosphorus, and potassium.

The document also examines the regulatory and market landscape shaping digestate use in the EU, including relevant policies and quality standards, as well as differences in practices between Member States. It discusses both the opportunities, such as reducing greenhouse gas emissions and supporting sustainable farming, and the challenges, including variability in quality, regulatory complexity, and the need for improved processing and valorisation technologies. Overall, the report positions digestate as a strategic resource for Europe's green transition, emphasizing the need for better policies, innovation, and market development to fully unlock its environmental and economic potential.

EERA Bioenergy in Europe

Table 1. Full members of the EERA Bioenergy Joint Programme.

Aalborg University
Department of Energy Technology
(Denmark)

BERA
Belgian Energy Research Alliance
(Belgium)

CIEMAT
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas
(Spain)

CNR
Istituto Motori del Consiglio Nazionale delle Ricerche
(Italy)

CRES
Center for Renewable Energy Sources and Saving
(Greece)

CSIC
Agencia Estatal Consejo Superior de Investigaciones Científicas
(Spain)

DFBZ
Deutsches Biomasseforschungszentrum gemeinnützige GmbH (German Biomass Research Center gGmbH)

ENEA
Italian National Agency for New Technologies, Energy and Sustainable Economic Development (Italy)

I2E3-UQTR
Institute of Innovations on Eco-materials, Eco-products and Eco-Energy, University of Quebec at Trois-Rivières (Canada)

IEN
The Institute of Power Engineering
(Poland)

KIT
The Research University in the Helmholtz Association (Germany)
KIT / BIOLIQ

LNEG
Laboratório Nacional de Energia e Geologia
(Portugal)

NTNU
Norwegian University of Science and Technology
(Norway)

PSI
Paul Scherrer Institut
(Switzerland)

SINTEF
(Norway)

TNO
(Netherlands)

TÜBITAK
Scientific and Technological Research Council of Turkey
(Turkey)

TU/e
Eindhoven University of Technology
(Netherlands)

UKERC
UK Energy Research Centre
(United Kingdom)
SUPERGEN Bioenergy Hub
(United Kingdom)

UNIBO
Universitá di Bologna
(Italy)

UPV/EHU
University of Basque Country (Euskal Herriko Unibertsitatea)
(Spain)

VTT
Technical Research Centre of Finland Ltd
(Finland)

WUR
Wageningen University & Research
(The Netherlands)

Table 2. Associate members of the EERA Bioenergy Joint Programme.

Agricultural University of Plovdiv (Bulgary)	**CNRS** Centre National de la Recherche Scientifique (France)	**CoLAB BIOREF** Collaborative Laboratory for the Biorefineries (Portugal)
Energy Agency of Plovdiv (Bulgaria)	**ETA-Florence Renewable Energies** (Italy)	**FCiências.ID** Associação para a Investigação Desenvolvimento de Ciências (Portugal)
IFK Stuttgart Institute of Combustion and Power Plant Technology (Germany)	**NIC** National Institute of Chemistry (Slovenia)	

RE-CORD Renewable Energy Consortium for Research and Demonstration (Italy)	**UNIMORE** University of Modena and Reggio Emilia (Italy)	**UNIPD** Università degli Studi di Padova (Italy)
UNITO Università di Torino (Italy)	**University of Calgary** Schulich School of Engineering, University of Calgary (Canada)	**UNL** Universidade NOVA de Lisboa, Faculdade de Ciências e Tecnologia (Portugal)
VŠB Technical University of Ostrava (Czech Republic)	**WIP** WIP Renewable Energies (Germany)	

EERA Bioenergy is open to new complementary RTD organisations.
Please contact the Joint Programme Secretariat for further details at eerabioenergy@bioplat.org

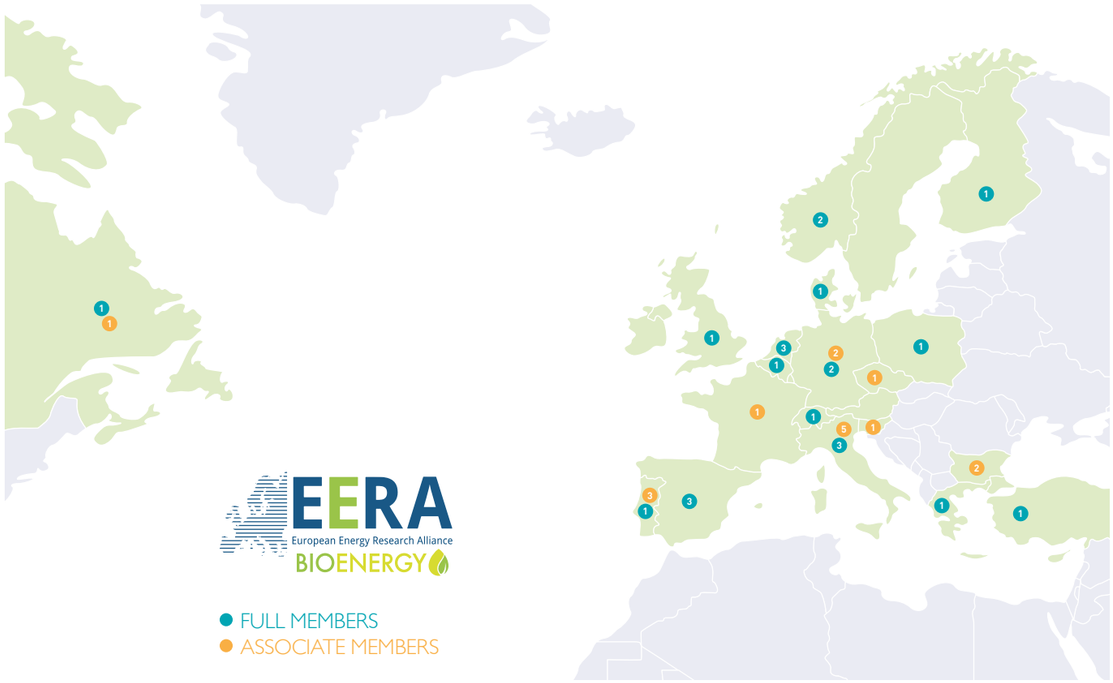


Figure 1: The EERA Bioenergy Joint Programme consists of 39 members (23 Full members and 16 Associate members) from a total of 19 countries. Link

Contacts

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