EERA European Energy Research Alliance BIOENERGY

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Joint Programme Coordinator's corner

Andrea Monti
EERA Bioenergy Coordinator

Dear EERA Bioenergy members, dear eebionews readers,

We will certainly remember 2020 as a 'difficult' year, in which many of us have had to change our working 'habits' and the ways we relate to colleagues. It is also true, however, that in emergencies, humans show surprising reactions, that inevitably change our lifestyle forever. We will remain the scars of bad memories, of masks, tampons, handshakes with elbows, gels, and handwashing, but there will also remain the awareness of a technological level, which was so close at hand, yet very often and inexplicably so little used. Zoom, Teams, GoToMeeting, and the various IT tools have become extraordinarily part of our daily activity, and not only for work. Networks and hardware and software technologies have withstood the impact beautifully, allowing us to continue our program in a way perhaps even more intense than before, thanks to the effectiveness and simplicity of the connections but also the admirable sense of responsibility of our members. The important contribution of EERA, and in particular of all our SPs coordinators, to the implementation of the Clean Energy Transition (CETP, Link) to which member and associated countries have allocated 0.5 b €, is just an example of the growing role that EERA is gaining in Europe, and of the importance of being a member of this outstanding Alliance.

The combustion engine will be part of the energy transition and consequently, sustainable biofuels as well

Bioenergy continues to be the largely predominant renewable energy in Europe and worldwide, but the sector is changing rapidly; new technologies and energy carriers are rapidly evolving (green hydrogen, batteries, biomethane, CCS, etc.), leading all of us to reconsider paradigms that were solid and firm until yesterday. In a moment of impetuous interest in hydrogen and electrification, however, let me underline the importance of advanced biofuels, and I dare to say also of the conventional biofuels, which recently seem unjustifiably been forgotten, obscured by new interesting and alternatives, which however have horizons of medium or long term. In light of implementing urgent strategies towards mitigating worrying increased emissions in the transport sector, the attention to biofuels should be prioritized as they are likely the only short-term strategy to massively reduce GHG emissions. In this regard, I quote an emblematic sentence from the vision paper shared in the context of IWG 8 (bioenergy and renewable fuels) which includes EERA Bioenergy in the core-team: "The combustion engine will be part of the energy transition and consequently, sustainable biofuels as well. Renewable fuels, and especially biofuels, can contribute in the short-term to reduce the carbon footprint in transport segments that will continue to rely on internal combustion engines... Aspects like the change out rate of the vehicle fleet, the need for new infrastructure, GHG emissions from power generation, and possible scarcity of some key materials for battery production as much as the uncertainty regarding the availability and cost of renewable electricity in the future, emphasize the continuing need for advanced biofuels in the transport sector within the next decade. A more constructive approach forward would be to identify and pursue the synergies between electro-mobility, hydrogen, and biofuels". Finally, I would like to stress once again how our JP is expanding. I'm very pleased to welcome with interest the ETA team in JP Bioenergy. We all know ETA as the organizer of the EUBCE conference, but I would like to emphasize the equally important role of ETA in planning and implementing relevant projects on bioenergy, as well as its co-leadership role in the ETIP bioenergy.

Best regards,

Andrea

EERA Bioenergy news in brief

Despite the COVID-19 situation, EERA Bioenergy JP has continued with its activity mainly through the organization of webinars for collaborative project generation on the recent EU Green Deal call. Besides, EERA aisbl Secretariat is working on new initiatives to take advantage of the potential for collaboration between the EERA JPs.

EERA BIOENERGY JP CONTRIBUTES TO THE STRATEGIC RESEARCH AND INNOVATION AGENDA OF THE CLEAN ENERGY TRANSITION PARTNERSHIP

The Clean Energy Transition Partnership (CEPT) is a transnational joint programming initiative to boost and accelerate the energy transition, building upon regional and national RDI funding programmes. From summer, the different EERA Joint Programmes, along with Implementation Working Groups (IWGs), ERA-NETS (ENs), have contributed to the elaboration of the CEPT-SRIA. The SRIA is the result of a comprehensive Stakeholder Engagement as well as writing and consultation process by the interested Member States and Associated Countries, acting as a foundation for the upcoming Clean Energy Transition Partnership. The SRIA has been endorsed by all 28 Member States and Associated Countries that were interested in participating in the CETP.

EERA Bioenergy representatives actively contributed to the thematic areas of discussion (Renewable Energy Systems, H&C solutions, System Integration, Storage Systems & Fuels and Cross-cutting issues) and contributed as co-authors or commenters of the document. The final document of the CEPT-SRIA has been published last November 2020. Link

WEBINARS ON COLLABORATIVE PROJECT GENERATION

The European Commission announced the European Green Deal Call (€1 billion investment to boost the green and digital transition) within the Horizon 2020 programme framework for research and innovation projects that respond to the climate crisis and help protect Europe's unique ecosystems and biodiversity. Big industrial projects which deliver results relatively quickly and which show how research and innovation can provide solutions for Green Deal priorities were expected to be granted.

To promote the generation of consortia and the drafting of proposals on this new call, EERA Bioenergy organized several webinars for collaborative project generation within EERA Bioenergy JP members. All EERA Bioenergy members were invited to join the discussions for the following topics from four areas:

Call area 2: Clean, affordable and secure energy
- LC-GD-2-1-2020: Innovative land-based and offshore renewable energy technologies and their integration into the energy system
- LC-GD-2-3-2020: Accelerating the green transition and energy access Partnership with Africa

Call area 3: Industry for a clean and circular economy
- LC-GD-3-1-2020: Closing the industrial carbon cycle to combat climate change - Industrial feasibility of catalytic routes for sustainable alternatives to fossil resources
- LC-GD-3-2-2020: Demonstration of systemic solutions for the territorial deployment of the circular economy

Call area 5: Sustainable and smart mobility
- LC-GD-5-1-2020: Green airports and ports as multimodal hubs for sustainable and smart mobility

Call area 6: Farm to fork
- LC-GD-6-1-2020: Testing and demonstrating systemic innovations in support of the Farm-to-Fork Strategy

Since the topics cover different areas, the coordination of the webinars was distributed between the Subprogramme Coordinators depending on the area of expertise. Julien Blondeau (BERA, SP4C) and Raquel S. Jorge (NTNU, SP5C) managed the webinars for proposals on the topics LC-GD-2-1, LC-GD-2-3 and LC-GD-6-1. Wolter Elbersen (WUR, SP1C) and Raquel S. Jorge (NTNU, SP5C) coordinated the webinar on the topic LC-GD-3-2, related to the circular economy. Jaap Kiel (TNO, SP2C) and Francisco Gírio (LNEG, SP3C) deal with webinars on topics LC-GD-5-1 and LC-GD-3-1, related to industrial processes and green airports.

LAST STEERING COMMITTEE MEETING OF 2020

The EERA Bioenergy Steering Committee meeting that has taken place online through GoToMeeting on 15th of December, addressed relevant issues related to the Joint Programme interests, actions and plans.

The European Commission representatives: Maria Georgiadou (DG-RTD), Julia Walschebauer and Eric Fee (DG-ENER), informed on the last news on renewable fuels and bioenergy research and innovation, also updated on the 1st Clean Energy Transition-Technologies and Innovations Report and EU energy policy.

ETA Florence, represented by Maurizio Cocchi, was accepted as a new Associated member of the Joint Programme.

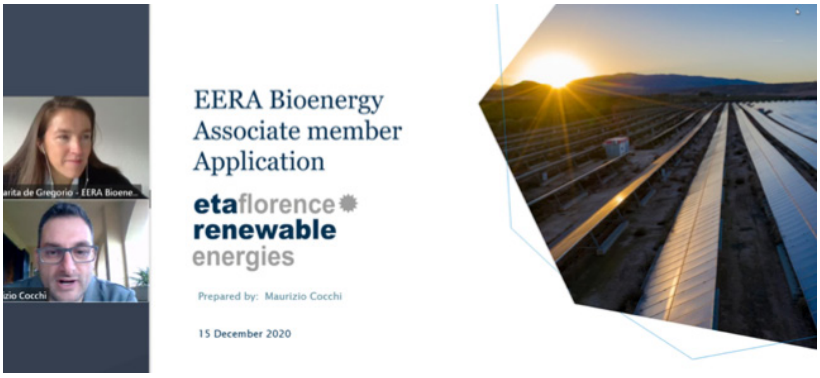

Figure 1: Capture of the presentation of ETA Florence's candidacy.

The EERA Bioenergy Secretariat presented the activities and services provided in 2020. Financial issues were reviewed by the EERA Bioenergy treasurer, followed by the introduction of 2021 perspectives for each SP by the Subprogramme Coordinators. Furthermore, 12 European innovative funded projects on biomass, bioenergy and bioeconomy were presented by 7 EERA Bioenergy members. Lastly, the EERA aisbl Secretariat brought updated information from the EERA Policy Group.

Figure 2: Capture of some of the EERA Bioenergy members participating in the meeting.

EERA BIOENERGY NEW LINKEDIN PROFILE

To favor the flow of information between EERA Bioenergy JP and its members, and to open a new way of communication between EERA Bioenergy and related stakeholders working in biomass, bioenergy, biofuels and circular bioeconomy, a new EERA Bioenergy profile has been created in the world's largest professional network, LindedIn. The profile can be accessed and followed at this Link.

Bioenergy highlights

TOWARDS STANDARDIZATION OF BIOMETHANE POTENTIAL (BMP) TESTS

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New resources for accurate and reproducible BMP measurement

The biomethane potential (BMP) is a key parameter for substrate characterization and efficiency evaluation of anaerobic digestion (AD) plants. It is crucial for assessing the quality and monetary value of different substrate types and enables reliable process balancing. However, the inter-laboratory reproducibility of BMP measurements is dismal, with differences exceeding a factor of two in some cases. To help address this problem that affects AD research and the AD industry, a group of researchers has developed the new Standard BMP Methods website (Figure 1). It contains current recommendations based on the latest literature, along with information on BMP basics, links to selected literature and software, and free and open-access documents on methods. The content is based on input from more than 50 biogas researchers, and the group hopes to engage more people from the research and industry communities. Everyone is welcome to actively contribute to this project!

A cornerstone of this work is a detailed set of guidelines for BMP measurement, originally published in 2016. Based on analysis of a new large dataset generated in an international inter-laboratory BMP project (14 countries, 37 laboratories, 400 BMP values, 1600 bottles) new recommendations and validation criteria for BMP measurement have been described in recent open access publications. Results show that new validation criteria (part of the recommendations) can substantially improve reproducibility, leading to more accurate and useful BMP measurements.

We invite everyone interested in this topic to make use of these resources and to actively contribute to this ongoing project.

Additional Information

Standard BMP Methods website
The Standard BMP Methods website provides detailed information and numerous documents (mostly free and open-access) for accurate and reproducible BMP measurements.
Link

Original guidelines for BMP measurement
Holliger, C.; Alves, M.; Andrade, D.; Angelidaki, I.; Astals, S.; Baier, U.; Bougrier, C.; Buffière, P.; Carballa, M.; de Wilde, V.; et al. (2016): Towards a standardization of biomethane potential tests. Water Science & Technology, 74(11), 2515-2522.
Link

Results from the international inter-laboratory BMP project
Hafner, S.D.; Fruteau de Laclos, H.; Koch, K.; Holliger, C. (2020): Improving Inter-Laboratory Reproducibility in Measurement of Biochemical Methane Potential (BMP). Water, 12, 1752.
Link

New recommendations and validation criteria for BMP measurement

Holliger, C.; Fruteau de Laclos, H.; Hafner, S.D.; Koch, K.; Weinrich, S.; Astals, S.; Alves, M.; Andrade, D.; Angelidaki, I.; Appels, L.; Azman, S.; et al. (2020): Requirements for measurement and validation of biochemical methane potential (BMP). Standard BMP Methods document 100, version 1.7.
Link

Power and limitations of BMP tests

Koch, K., Hafner, S.D., Weinrich, S., Astals, S. and Holliger, C. (2020): Power and limitations of biochemical methane potential (BMP) tests. Frontiers in Energy Research 8, 63.
Link

Software for biogas research

Hafner, S.D.; Koch, K.; Carrere, H.; Astals, S.; Weinrich, S.; Rennuit, C. (2018): Software for biogas research: Tools for measurement and prediction of methane production. SoftwareX, 7, 205-210.
Link

Online Biogas App (OBA)

OBA is a free web application that runs in any internet browser. It can be used to process laboratory measurements to calculate BMP, predict biogas production based on substrate composition, and make simple conversions (Figure 2).
Link

Collaboration partners

The Standard BMP Methods website grew out of a large international project on BMP standardization mainly funded by the Swiss Federal Office of Energy (SFOE). While many individuals have contributed to the material presented, the core group responsible for project coordination, scientific evaluation and content management of the website is listed below.

- Sergi Astals - University of Barcelona, Department of Chemical Engineering and Analytical Chemistry, Martí i Franquès 1, 08028 Barcelona, Spain.
- Sasha D. Hafner - Hafner Consulting LLC, Virginia 20191, USA, USA
- Christof Holliger - Ecole Polytechnique Fédérale de Lausanne, ENAC-IIE Laboratory for Environmental Biotechnology, Station 6, 1015 Lausanne, Switzerland.
- Konrad Koch - Technical University of Munich, Chair of Urban Water Systems Engineering, Am Coulombwall 3, 85748 Garching, Germany
- Sören Weinrich - DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH, Biochemical Conversion Department, Torgauer Str. 116, 04347 Leipzig, Germany

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Swiss Confederation

Swiss Federal Office of Energy SFOE

DBFZ

Federal Ministry of Food and Agriculture

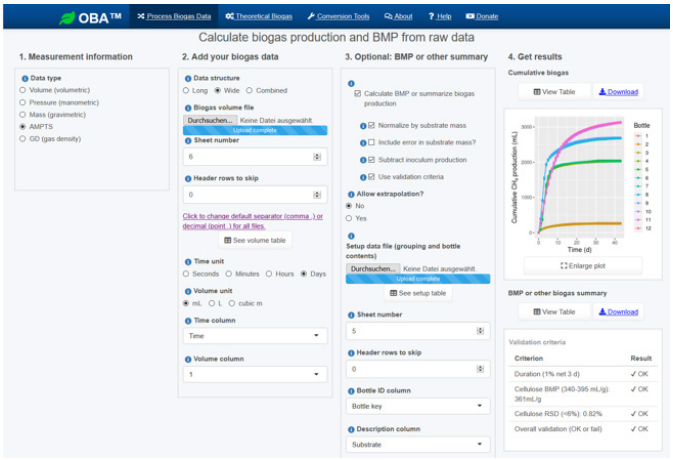

Figure 1: Screenshot of the Online Biogas App (OBA)

CO_2C PROJECT - BRINGING SUSTAINABILITY AND CIRCULARITY TO SMALL FARMERS ACROSS EUROPE

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CO_2C Is a pilot project that wants to re-think the concept of sustainability, in woody biomass exploitation. To date, burning these renewable materials is the standard sustainable way to obtain a "near-zero" CO_2 balance, but it is time to take one more step towards sustainability.

Through biomass-to-gas thermochemical conversion, wood biomass can be transformed into electricity, heat, hydrogen and biochar to be used in different stages of the agricultural production chain.
Biochar is the by-product of biomass-to-gas thermochemical conversion used as an amendment, that allows building a circular economy perspective of the rural world, improving organic matter content into the soil, decreasing greenhouse gases emissions during composting and fertilization processes, and implementing the process of BECCS (Bio Energy Carbon Capture and Storage).

Current woody biomass exploiting (direct burning) is to be considered obsolete as nowadays, technology development allows us to actualize the concept of sustainability hand in hand with the concept of the circular economy. Hence, biomass-to-gas thermochemical conversion processes are fundamental to eliminate direct burning related drawbacks, such as PM10, gaseous pollutants and a non-circular production chain.

CO_2C is a productive, economic and cultural approach to be used in different production sectors involving woody biomass exploitation: woody wastes will become products such as electrical and thermal energy, bio-hydrogen and bio-char, improving the economical and environmental value of the production chain.

Furthermore, the rural world will assume a central role, as a guide towards a more sustainable world and will stand as a cultural example for our entire society.

In each zone, a small gasification unit developed by UNIMORE will be used to produce electricity, heat and biochar from medium quality biomass residues. Producer gas from gasification will be also converted into Hydrogen using Water Gas Shift Reaction (WGSR) technology. Biochar is used as soil conditioners or it is biologically activated in a composting phase with other residues (COMBI) and then used as fertilizer.

Each gasification unit can provide:

Heat:
- District or industrial district heating, heating of process fluids, production of steam for processing, domestic heating.

Electricity:
- They easily connect to the electricity grid and can be implemented within smart grids, regulating the energy flow towards the territory in which every single micro unit participates. Besides, they can be used stand-alone.

Bio-char:
- To be used as an amendment for sustainable agriculture of the future. Also exploitable in hydroponic farms.
- Sums up the direct carbon capture and storage with its properties of GHG retention and abatement (e.g. when used with animal manure, compost, etc).
- Biochar activation throughout the composting process.

Bio-Hydrogen:
- Upgrading of wood gas to produce "clean" hydrogen to be used in fuel cells, in the field of mobility and for electricity production.

The project will be able to define the actual concept of "sustainability" as inefficient and obsolete, having as a final goal, the integration of the wood biomass production chain into a new culture of sustainability.

As this new approach has to be validated, we are looking for international partners to develop this project, considering the variability of feedstocks, crops, agricultural practices, the economical and social grade of development.

As reported in the following picture, the project falls into a wide idea of the circular economy.

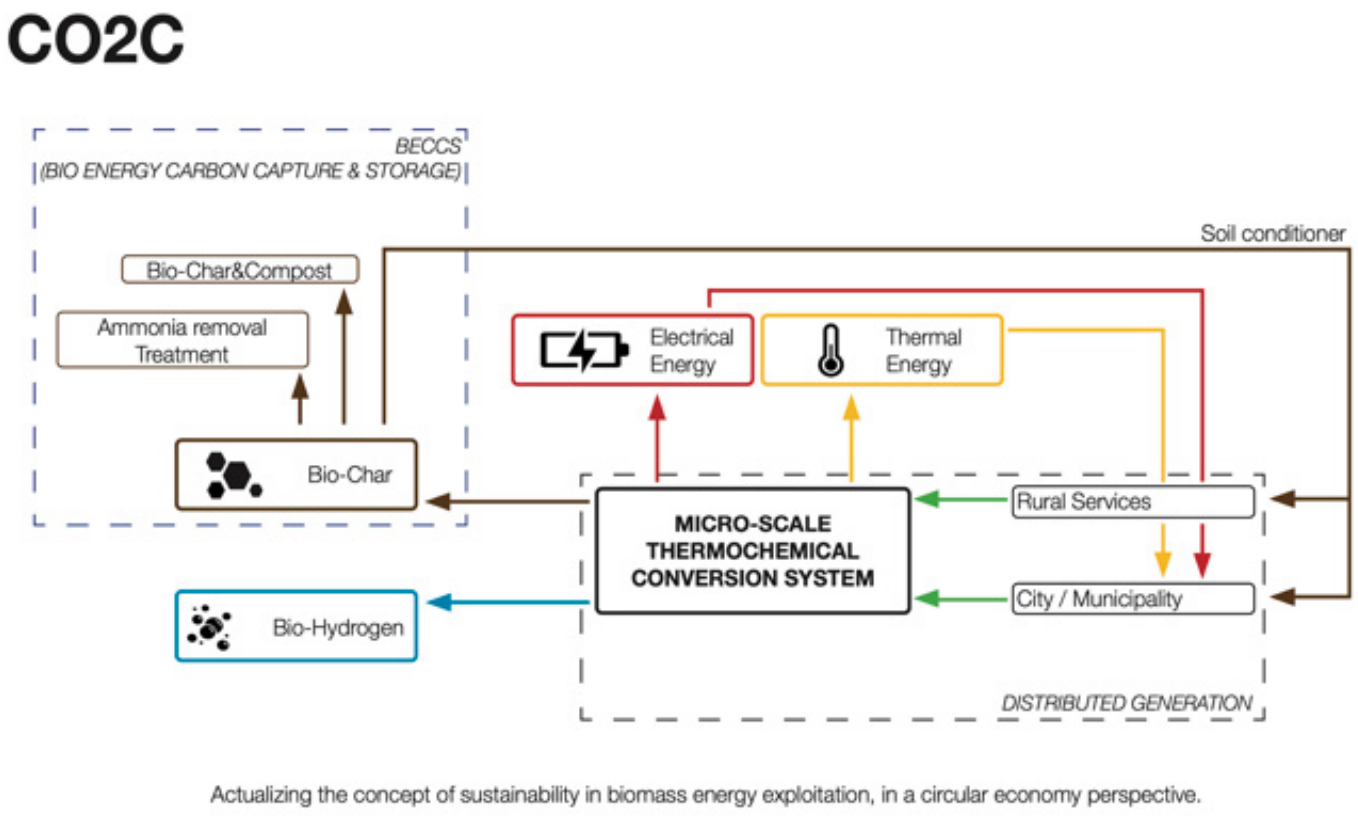

Figure 1: Actualizing the concept of sustainability in biomass energy exploitation, in a circular economy perspective (Source: CO_2C project, UNIMORE)

BEELab – Bio Energy Efficiency Laboratory – University Of Modena and Reggio Emilia – Department of Engineering "Enzo Ferrari", Via Vivarelli 10, 41125 Modena, Italy.
Link

PULVERISED FUEL COMBUSTION TECHNOLOGY FOR UTILISATION OF DIFFICULT BIOMASS FUELS

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The Institute of Power Engineering (IEn) participated in a research project whose aim was the development of technology for burning difficult waste biomass fuels. The use of waste fuels limits the targeted production of energy crops and eliminates the onerous problem of biodegradable waste management. The task of the Institute of Power Engineering was the development of the concept of a new combustion system for pulverized fuels. The fuels used in the project were focused on dried sewage sludge and wheat straw. From the economic point of view, the most important is primarily the utilization of dry sewage sludge. Three basic arguments give rise to such conclusions:

- Disposal of hazardous waste (sewage sludge) whose agricultural use is already banned
- Heat production with the possibility of conversion to electricity
- The possibility of recovering significant quantities of phosphorus from the ash obtained when burning sewage sludge

The concept of the new technology was achieved following the procedure developed by IEn for the design of new combustion systems and the use of new fuels, in the following steps:

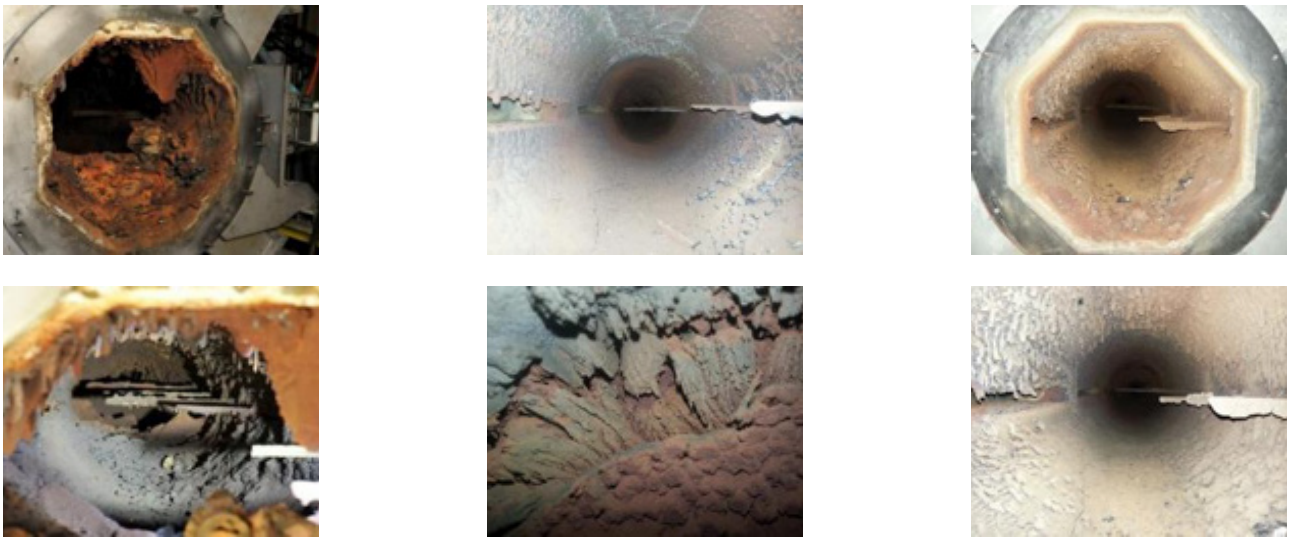
- Ignition and combustion experiments of the new fuel at the lab scale drop tube test stand
- CFD simulations of the concept of a burner and the combustion chamber
- Semi-industrial tests of a burner model
- The final development of the combustion system

Preliminary studies have confirmed that in the case of incineration of sewage sludge it is not possible to use conventional combustion methods. After analysis, it was decided that a key issue is the ease of recovery of phosphorus from the combustion by-products. Therefore, it was necessary to carry out the combustion process in such a way that the resulting ash was in a dusty form. It was decided to consider two variants - the use of recirculation of large quantities of fumes (FGR) or the use of volumetric and flameless combustion technologies to reduce the maximum combustion temperatures below the ash softening temperature.

The exhaust gas recirculation system reduced the combustion temperature by about 100oC in the case of sewage sludge and even 150°C for wheat straw compared to the case without exhaust gas recirculation. Lowering the maximum combustion temperature to approx. 1,090°C for sewage sludge enabled the combustion chamber to operate below the ash melting point (around 1220°C).

The ultimate idea was to be able to carry out the combustion process bypassing the expensive exhaust gas recirculation system. Therefore, the volumetric combustion technology was applied by dispersing the substrates and combustion products with the simultaneous intensive mixing in the whole volume of the combustion chamber.

Photographs of the interior of the combustion chamber - Fig.1c - after testing with the use of a volumetric combustion system, indicate a significant reduction in the slagging process of the chamber walls. The view of the combustion chamber is comparable to the case of exhaust gas recirculation – Fig.1b.



a) without FGR b) with FGR c) volumetric combustion

Figure 1: Interior views of the combustion chamber after tests carried out under various combustion methods

The volumetric combustion system enabled obtaining temperature profiles at a similar level as in the case of recirculation of significant quantities of exhaust gases, and even in most points of the combustion chamber below these values. Because the volumetric combustion system does not require an expensive system for exhaust gas recirculation, from the point of view of obtained experimental results it is the preferred method of utilization of municipal sewage sludge. The fly ash generated in this process has a convenient form for the recovery of significant amounts of phosphorus (about 23% P_2O_5 in ash).

BIOFLEX! project (Clean and flexible use of new difficult biomass fuels in small to medium-scale combustion) was carried out under the 9th ERA-NET Bioenergy Joint Call by an international consortium. More about the project you can find at Link

MARKET UPTAKE SUPPORT FOR INTERMEDIATE BIOENERGY CARRIERS - THE MUSIC PROJECT (HORIZON 2020)

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The MUSIC project (Link) is a HORIZON 2020 initiative that aims to facilitate the market uptake of **intermediate bioenergy carriers (IBC),** namely torrefied biomass, pyrolysis oil, and microbial oil, by developing **feedstock mobilization strategies, improved logistics, and IBC trade centers.**

Key activities in the MUSIC project include: Setting up **case studies across Europe,** working with large industries and SMEs, to determine the most cost-effective routes for biomass and IBC mobilization. Evaluating **policy framework conditions, technologies, and markets** for torrefied biomass, pyrolysis oil, and microbial oil. **Involving, engaging, and supporting regional stakeholders** by sharing knowledge on intermediate bioenergy carriers. Assessing **regional biomass flows,** using supply chain and optimization software and tools, to stimulate and facilitate regional biomass mobilization. **Improving the trade** of IBCs both regionally and on the EU level. **Disseminating** project results and findings, especially as an input to policy development.

Early project results show that IBCs are intermediates inside complex value chains and that it is their final use that drives the specific collocation inside the biomass, biofuel, and bioenergy EU legislation. Promising applications of IBCs include the substitution of fossil fuels in existing power and CHP plants (torrefied biomass and pyrolysis oil), the co-feeding with mineral oil in refineries (pyrolysis oil, microbial oil) for the production of advanced biofuels and bio-based products, as well as the replacement of coal as a reducing agent (torrefied biomass) in blast furnaces in the steel industry.

A MUSIC case study investigates the logistics and techno-economic feasibility of a long-distance supply chain scenario comprising **decentralized production of pyrolysis oil (PO) in Sweden/Finland, transport of PO to a Dutch seaport, and centralized upgrading of PO to an advanced drop-in marine transport fuel.** The first results indicate that the investigated supply chain is economically viable and that there seem to be no insurmountable show-stoppers. Landed costs for PO at a Dutch seaport are within an acceptable price range and logistical challenges (e.g. due to sub-zero outdoor temperatures) are manageable. Regulatory issues are not yet fully settled but will be further addressed within the project.

The MUSIC consortium consists of sixteen partners from seven European countries: Sweden, Finland, The Netherlands, Belgium, Germany, Italy, and Greece. The partnership has strong industrial participation, comprising three industry-driven network organizations and seven industry partners, including Europe's leading IBC technology developers, and is capable to achieve broad relevance and transferability of all results in the European bioenergy sector.

In three **Industrial Working Groups (IWGs)** MUSIC will organize a series of events on IBC prospects in selected markets i.e. torrefied biomass in energy-intensive industries, pyrolysis oil for maritime transport, and microbial oil for heavy-duty transport. Both **industrial and non-industrial stakeholders** are warmly invited to participate in these Industry Working Groups.

Figure 1 Using renewable feedstock from Nordic forest industries to produce pyrolysis oil and upgrading it to advanced, drop-in marine biofuel (Source: Biofuel Region, Sweden)

THE PRODUCTIVITY OF CAMELINA (CAMELINA SATIVA L. CRANTZ) AND CRAMBE (CRAMBE ABYSSINICA HOCHST. EX R.E. FRIES) IN MARGINAL SLOPY LAND OF ITALY

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The development of a sustainable and circular bioeconomy is widely supported by the EU policy as a key part of a multisector strategy aimed to transform the European economy into a resource-efficient and low-carbon economy. Consequently, the demand for renewable feedstock for industrial (non-food) applications increased in the last years, and a debate regarding land-use change and food security emerged. On the other hand, a recent European Commission study reported that 20 million hectares of agricultural land are at high risk of abandonment in the EU in the period 2015-2030 due to several factors, such as biophysical land constraints.

In this context, the MAGIC European project (Link) aims to cultivate industrial crops in marginal lands to help satisfy the demand for renewable feedstock, while avoiding land competition between food and non-food applications (iLUC risk). According to JRC's report (Van Oorschoven et al., 2014), marginal land means agricultural area seriously affected by biophysical constraint (e.g. steep slope).

Within the MAGIC project, a case study has been performed in the hilly agricultural area of Bologna (Italy) to test camelina and crambe productive performances in marginal lands affected by steep slope constraint (>12%). Camelina and crambe are promising oilseed crops for the novel European bioeconomy thanks to their unique fatty acid profile (adapt to multiple industrial applications), low input requirements, and wide environment adaptability (Fig. 3). The study includes fields with moderate (20%) and severe slopes (30%) (Fig.3). In the steepest slope, seed yield of both crops dramatically decreased (<0.4 t DM ha-1), whereas, under a moderate slope, camelina reached a remarkable seed production (2.4 t DM ha-1), thus close to the yield reached under favorable conditions (2.7 t DM ha-1). Crambe seed yield was instead below the average yield reported by the literature for Italy (2.5 – 3.2 t DM ha-1) both under the milder slope and under the favorable condition (Fig. 1). The decrease of seed yield under marginal land was only moderately offset by a higher seed oil content (Fig. 2). Fatty acid profile was never affected under marginal conditions.

Both camelina and crambe were confirmed to be resilient crops with concrete perspectives of being grown on marginal land; however, satisfactory yields could not be achieved under extreme slopes (30%); thus, marginality should be better contextualized to help identify the most suitable crops for different marginal areas.

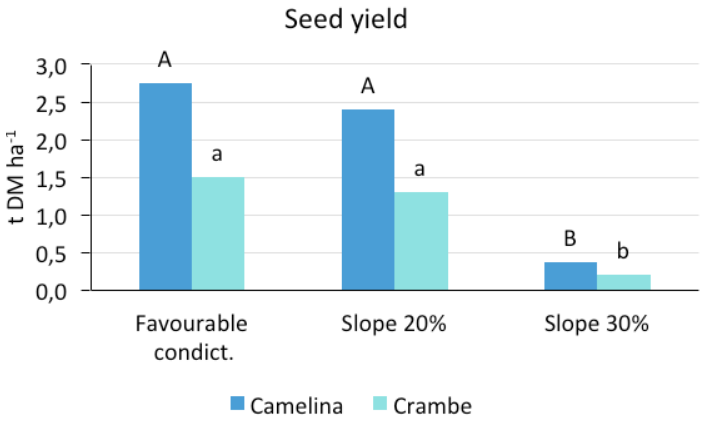

Figure 1: Seed yield of camelina and crambe under different land conditions.

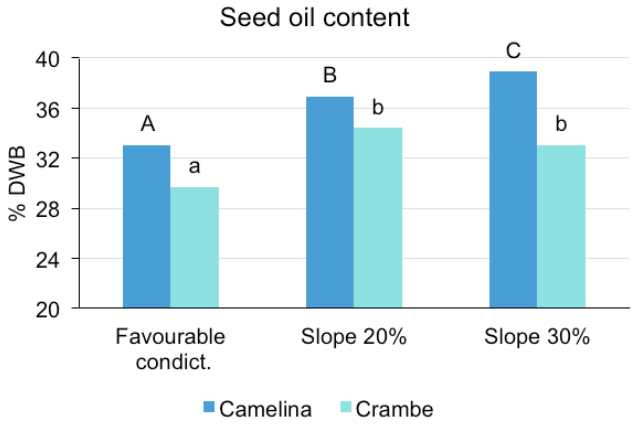

Figure 2: Seed oil content of camelina and crambe under different land conditions..

Figure 3: A) crambe flower detail; B) camelina flower detail.

Figure 4: A) preparation of seedbed; B) sowing equipment.

AGROBIOHEAT: PROMOTING AGROBIOMASS HEATING SOLUTIONS IN EUROPEAN RURAL AREAS

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Agrobiomass, e.g. biomass originating from agricultural residues, agro-industrial residues, or non-edible lignocellulosic crops, is an underexploited resource with great potential to support the European Energy and Climate targets, supporting rural development and the bioeconomy principles.

Some agricultural residues have been used traditionally as animal bedding and fodder, directly left in the field as a soil improver or, unfortunately, disposed of in open fires on the field. However, the agricultural sector is evolving and their business models are increasingly aligning with the circular economy; consequently, agrobiomass has also found a place in new market niches, including its energetic valorization for heat and/or power production. Nonetheless, even though there is a great potential for agrobiomass, only a part of it is being used for bioeconomy-based purposes.

AgroBioHeat project was conceived to steer the agrobiomass consumption in small and medium-scale heating solutions, producing a mass deployment of improved and market-ready agrobiomass heating solutions in Europe.

Why small and medium scales? The rural environment is synergetic and the proximity to the resource allows the generation of additional local value. That fact is more emphasized in the case of smaller scales, linking the agrobiomass resource locally available and the activities related to the whole supply chain (collection, treatment, supply, and use) with its further use for different applications (e.g. residential heat, agro-industries, farms, greenhouses, municipal heat networks, among others). And why heating? Because heat is consumed all over Europe and the decarbonization of the sector requires significant efforts, is still dominated by fossil fuel consumption.

AgroBioHeat actions mainly take place in 6 European countries (Croatia, France, Greece, Romania, Spain, and Ukraine), representing a wide range of conditions in terms of available agrobiomass resources, the structure of the heat sector, and socio-economic conditions. In each of these countries, a unified approach for enhancing the role of agrobiomass heating in the energy transition is followed, including among others direct contacts and support to potential adopters, identification and promotion of success cases, public perception surveys, development of policy recommendations and dedicated promotion, communication and dissemination actions (e.g. site-visits, workshops, training, matchmaking events).

At the EU level, specific policy recommendations addressing the efficiency and emissions of agrobiomass heating solutions are being developed. These would be provided to relevant bodies for the update of regulations, such as the Ecodesign Directive for solid biofuels boilers. For this purpose, several agrobiomass types (e.g. olive stones, nutshells, sunflower husks, prunings, miscanthus, and others), are being tested by some of the partners (BIOS, CERTH, and CIRCE), in different commercially available, state-of-the-art combustion technologies.

The project consortium is formed by 13 participants from 9 European countries. CERTH is the project coordinator, leading also the work package in charge of showcasing identified success cases for guidance. Moreover, CERTH leads the compilation of the technological state of the art of combustion systems, is involved in the combustion tests, and has developed an online mapping tool called "Agrobiomass Observatory" that visualizes info about existing agrobiomass value chains, technology, and fuel providers and other key actors.

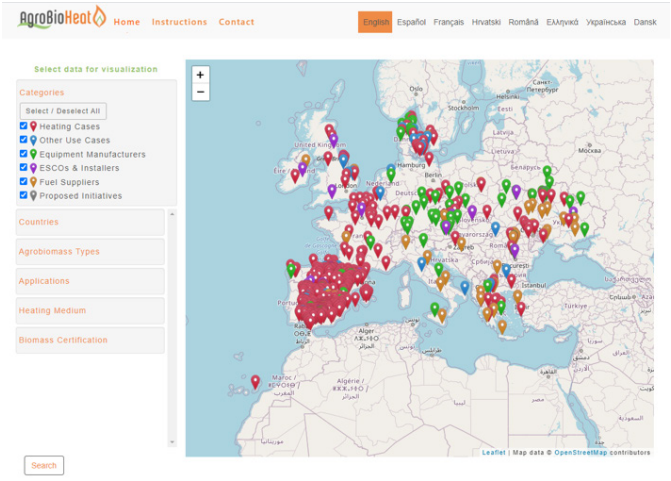

Figure 1. Screenshot of Agrobiomass observatory

Furthermore, CIRCE leads the work package related to the stakeholders' engagement and the identification and accompaniment of new innovative initiatives using agrobiomass in the 6 aforementioned. Moreover, CIRCE is also involved in the combustion tests activities and will organize several capacity training for installers, ESCOs and others.

Both CERTH and CIRCE support their respective national multipliers in Greece and Spain (INASO-PASEGES and AVEBIOM respectively) for the promotion of agrobiomass heating solutions.

Figure 3. Agrobiomass from olive tree pruning

Figure 4. Agrobiomass from orchard uprooting

Figure 5. AgroBioHeat's consortium and some project network stakeholders visiting the success case of Bodegas Torres in Vilafranca del Penedés, Spain (February 2020)

Acknowledgments and disclaimer

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VARIABLE PRODUCTION OF BIOFUELS MAY LEAD TO INCREASED FOOD SECURITY

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The use of biofuels is possible without jeopardizing food security. Under the right conditions, it can even lead to increased food security. This is one of the conclusions from an international panel of multi-disciplinary experts, including researchers from Wageningen University & Research. The findings are published in the Biofuels, Bioproducts, & Biorefining (Biofpr) Journal, an international source for scientific information on sustainable bio-based products and fuels. The paper is available at the Biofpr-website.

The experts used a survey, an expert panel, and a literature review to study the effects of variable biofuel production. In the EU and other jurisdictions, biofuels are currently blended in a fixed proportion with conventional fuels. According to the experts, the production of bioethanol from sugars and starch or biodiesel from fats and oils can be increased during periods when these raw materials are abundantly available. During such times of plenty, prices for these commodities are depressed. Conversely, the production of biofuels can be reduced if the availability of the raw materials is low and the prices of these raw materials are high. Raw materials for biofuels can thus form a 'virtual feedstock reserve' that can be used for food production if there is a need for it. Dr. Iris Vural Gursel, a researcher at Wageningen Food & Biobased Research, is one of the authors of the article in Biofpr. She proposes that if biofuel production is adjusted in response to biomass feedstock availability and prices, this variable demand can offer a feedstock supply cushion to help meet needs for food, materials, and chemicals.

Positive effect on productivity

According to 58% of the experts participating in the survey, the variable demand for biofuels can have a positive effect on agricultural productivity. A significant minority (28%) disagree. Some respondents noted that a positive effect is possible because variable demand for biofuels has a stabilizing effect on the crop market: it provides an additional channel for farmers to sell abundant crop yields, absorbing supplies that exceed demands for other uses. Since the primary feedstocks for biofuels are widely traded with existing logistics and infrastructure, this mechanism can function at multiple scales. Having an assured market provides increased security to growers and facilitates investments. Investments in improved seeds, equipment, and technology, in turn, increase farm operation efficiencies and productivity, generating effects for the agricultural sector that extend beyond the biofuel supply chain.

On the contrary, other experts expressed concerns that variable demand for biomass will lead to a drop in investment in the biofuel industry or could increase competition for scarce resources. One striking observation from survey respondents was that agricultural and environmental experts were more positive about the favorable effects than economists and chemists.

Effects on land use

A major concern surrounding the production of biofuels is that the land requirements for growing biofuel feedstocks will compete with other crops, to the detriment of food security and the environment. If biofuel crop production displaces other essential products, it could contribute to agricultural expansion and deforestation, or "indirect land-use change." However, researchers identified several studies, including some in Brazil, that show how policies on biofuel production can lead to more efficient and sustainable production methods, with a net positive impact on land use.

Appropriate policies needed

The findings of the expert panel show that there is a strong need for an appropriate policy. As reported in the paper, biofuel policies should consider the availability of raw materials and their prices. The authors recommend that a mechanism be established to allow temporary adjustments in biofuel production to prevent potential food crises. Such virtual buffer systems could help buffer fluctuations in the availability of raw materials.

Dr. Vural Gursel notes, "In particular, the experts agreed that low prices for agricultural products are bad for food security: farmers then invest too little in their farms because the margins on their products are simply too low – they do not have the money. This leads to lower yields in the following years and, in the long run, can end up requiring more land. Variable demand for biomass is an interesting idea that may help prevent oversupply leading to too low prices. It then leads to more security for the farmer, who will be more likely to invest in improving productivity, in the end requiring less land for the same production."

The authors emphasize that more research is needed to convert the principle of variable biofuel production into effective policy. The paper concludes that "If through research, it can be confirmed that variable production is not at the expense of food security but, on the contrary, can contribute to increased food security, then this is an important step towards sustainable biofuel production."

In addition to Wageningen UR, scientists and experts from AgriQuest, Biomass Research, Oak Ridge National Laboratory (USA), the University of Nebraska-Lincoln (USA), and the Netherlands Enterprise Agency, also contributed to this study.

MULTI-STR3AM – PAVING THE WAY TO A SUSTAINABLE AND ECONOMICALLY VIABLE MICROALGAE-BASED BIOREFINERY TO CREATE HIGH-VALUE PRODUCTS FOR FOOD, FEED AND FRAGRANCES

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Current agricultural and manufacturing practices are causing irreparable environmental damage. Although microalgae are a promising solution to this problem, they are underexploited as a crop. This is because microalgae products struggle to achieve the same economies of scale as conventional products.

MULTI-STR3AM (A sustainable multi-strain, multi-method, multi-product microalgae biorefinery integrating industrial side streams to create high-value products for food, feed and fragrance) is a 2019 BBI-JU's project directed to the development of robust microalgae biorefineries led by A4F – Algae for future, S.A. (PT). MULTI-STR3AM is driven by a critical need to shift to a sustainable means of producing food, feed and raw materials.

Microalgae represent a promising solution to address the growing recognition that current agricultural and manufacturing practices are causing irreparable environmental damage. Microalgae have a vast biosynthetic potential and are a rich source of lipids, protein and high-value compounds such as pigments. Despite these advantages, they are underexploited as a crop. This is due to barriers of scale, which means that microalgae products struggle to achieve the same economies as conventional products, such as palm oil or soybean.

MULTI-STR3AM addresses these challenges by scaling up and lowering costs, providing valuable products for large end-users in the food, feed and fragrance sectors. The project reduces costs, increases the scale and boosts sustainability, through i) constant improvement of strains through non-GM methods, to increase their productivity and meet end-user needs; ii) design and engineering improvements to cultivation and harvesting technologies to reduce CAPEX and OPEX of biomass production; iii) exploitation of industrial and own side streams during cultivation in a circular economy design; iv) synergistic integration of different technologies in a multi-strain, multi-method, multi-product biorefinery ('MULTI-biorefinery'); and v) valorization of every fraction of the microalgal biomass in a zero-waste approach (Figure 1).

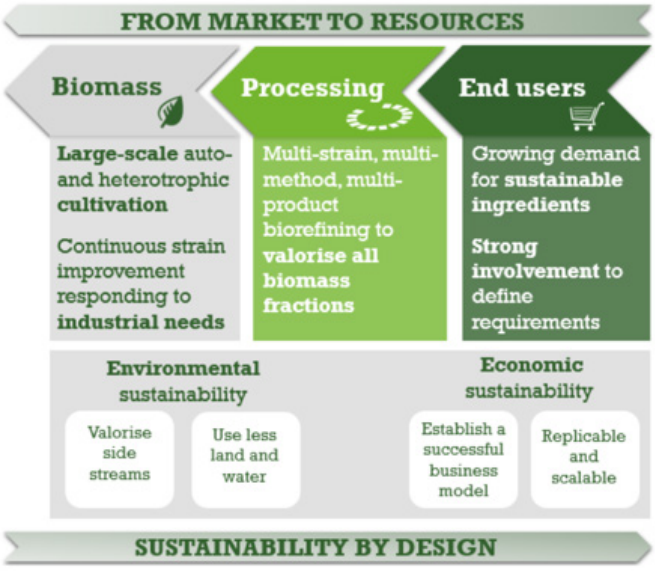

Figure 1. Conceptual framework of MULTI-STR3AM

MULTI-STR3AM will demonstrate 7 consumer products, 6 of which are new, including lipids for edible spreads; protein, carbohydrates and lipids for feed ingredients for poultry, pigs and ruminants; and protein and small organic compounds as building blocks for the fragrance industry (Figure 2). By engaging global actors from the industrial, academic and non-profit sectors, MULTI-STR3AM creates a roadmap for economically viable industrial-scale microalgae cultivation, towards a sustainable future for European bio-based industries.

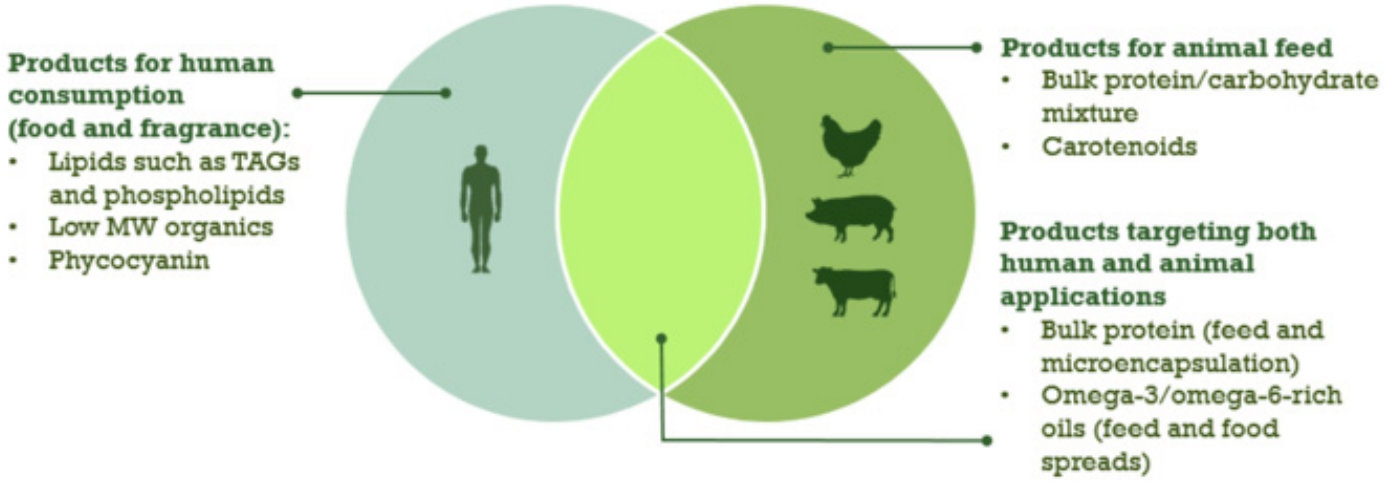

Figure 2. Products demonstrated in MULTI-STR3AM target both human and animal applications, with some overlap, especially for bulk protein and omega-3/omega-6-rich lipid fractions.

With a total budget of 9.18 million €, this project has received 6.59 million € funding from BBI JU under EU H2020. The project partners are A4F, Algae for future (Portugal), IMIC, Institute of Microbiology – Centre Algatech (Czech Republic), For Farmers (Netherlands), IBET (Portugal), International Flavours and Fragrances (Netherlands), Phycom (Netherlands), Upfield (Netherlands) and LNEG (Portugal).

Developments of this project can be accessed at Link

This project has received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement N° 887227

SMART TOOLS FOR THE DEVELOPMENT OF A SUSTAINABLE BIOECONOMY

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After three years of intense research, the H2020 project STAR-ProBio is coming to an end, delivering a set of smart tools to support stakeholders of the EU Bioeconomy.

The transition process to bioeconomy will be strongly associated with the growing use of raw materials to manufacture bio-based products that can be wholly or partly derived from biomass. The incorporation of new bio-based products requires a reliable sustainability assessment framework and practical guidance for effective implementation in practice. The sustainability framework is an important instrument in both the general policy on bio-based products and consumer acceptance. While there are already frameworks in place for the sustainability assessment of biomass, bioenergy and bio-based products on a standard level, initiatives for sustainability claims for bio-based products are still very much focussed on specific sectors within the bioeconomy. Considering those preconditions, advancing the much-needed sustainability transition towards a circular bio-based economy requires an inter and transdisciplinary approach, which considers all pillars of sustainability, along with potential overlaps for bio-based products.

Against this background, bio-based products shall be coherent with and contribute to the European sustainable and circular bioeconomy framework and form part of a broader framework by complying with global SGDs.

Over the last three years, the multi-actor collaborative Horizon 2020 research project STAR-ProBio (Sustainability Transition Assessment and Research of Bio-based Products), including 15 partners from 11 European countries – has worked intensively on the development of sustainability assessment tools for bio-based products, and by developing credible cases for bio-based products with the highest actual market penetration and highest potential for the future markets. The aim of STAR-ProBio was to cover gaps in the existing framework for sustainability assessment of bio-based products and improve consumer acceptance for bio-based products by identifying the critical sustainability issues in their value chains.

The results of the project, which are now available integrate scientific and engineering approaches with social sciences and humanities-based approaches to formulate guidelines for a common framework promoting the development of regulations and standards supporting the adoption of business innovation models in the bio-based products sector.

The main output of STAR-ProBio are two interlinked tools:

- The SAT-ProBio framework, aiming at assisting stakeholders of the bioeconomy in the sustainability assessment of bio-based products.
- The SYD-ProBio tool aiming at assisting policymakers to make informed decisions on the impact of policy instruments on the market uptake of sustainable bio-based products (WP9).

The SAT-ProBio framework is composed of different tools that entail the STAR-ProBio developed criteria and indicators together with relevant descriptions and methodologies for individual lifecycle phases of bio-based products and the entire value chain as well as the solutions for efficient communication either to business, consumers and governments.

The basis for the SYD-ProBio tool is a dynamic model of policy analysis for the creation of a level playing field through monitoring bioeconomy development on the European and member state level. SAT-ProBio is composed of two self-contained, smart tools to be used as an integrated framework or separately, in connection with a specific area of sustainability. The integrated assessment tool (IAT) helps to explore the scope of the integrated application of the STAR-ProBio criteria and indicators to sustainability assessment and communication. The second part, the Sustainability Certification Tool (SCT), provides linkage to current certification schemes and is composed of a set of criteria and indicator factsheets serving as building blocks (BB) of sustainability assessment, benchmarking tool and a platform (BP) to support the establishment of SAT-ProBio links to stakeholders and market actors working with the current product certification schemes and the framework rules (FR) for the real operation of the SCT.

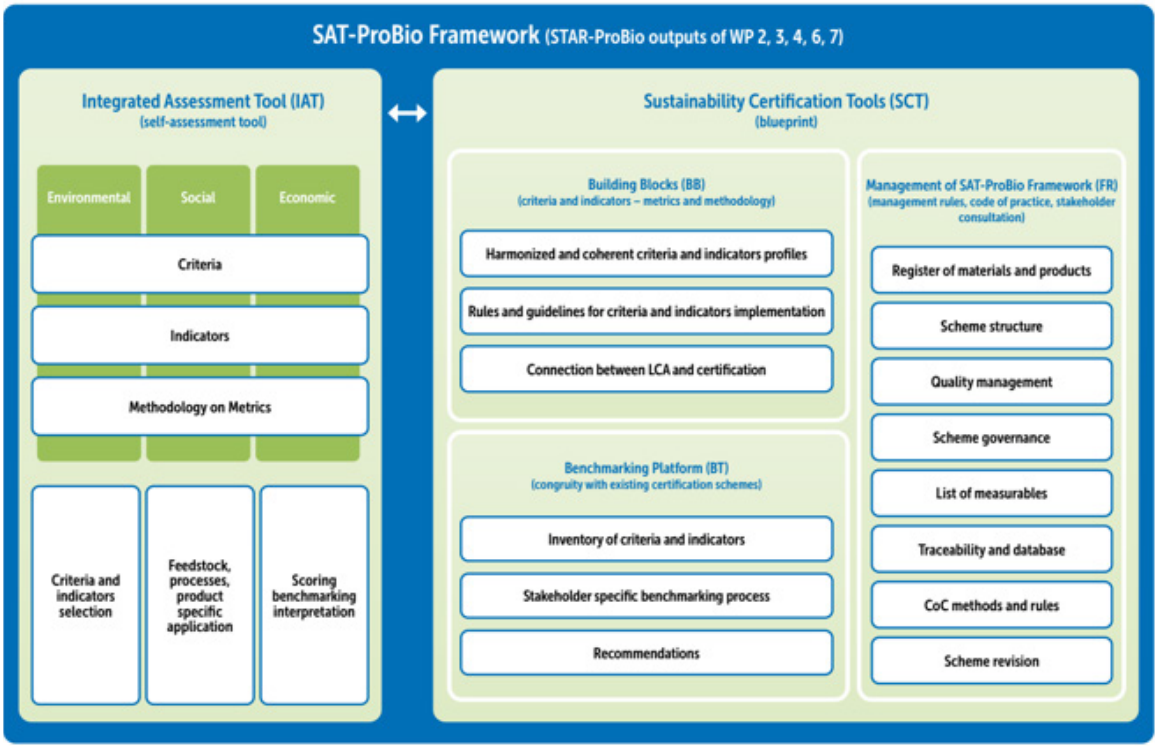

Figure 1: The smart tools of SAT-ProBio framework

According to SAT-ProBio framework architecture, the smart tools of SAT-ProBio framework and their interconnections within the framework can be characterized as follows:

Integrated Assessment Tool (IAT) is a sustainability assessment and communication tool which operationalizes the main results of the STAR-ProBio technical work packages. It includes criteria and indicators (to which principles have been associated following the EN 16571:2016) and provides a methodological framework for assessment and technical requirements. IAT is based on the combination of the following methodologies:

- LCA for the environmental pillar; integrated with a specific tool for identifying individual ILUC risks for the product under consideration and criteria related to the sustainable production of biomass;
- Social LCA, based on the methodology reported in the Handbook for Product Social Impact Assessment for the social pillar;
- Societal Life Cycle Costing (S-LCC) related to the techno-economic assessment of the life cycle costing (LCC) of a bio-based product, including external costs for society, like for instance through the monetization of environmental impacts;
- Circularity principles and metrics.

Besides, the IAT constructs the basis for standard documentation on sustainability assessment of bio-based products.

The Sustainable Certification Tool (SCT) is a blueprint integrating three smart tools, which establishes links to existing activities in the product certification landscape.

The Benchmarking Platform (BP) is complementing the assessment from the IAT with the perspective on the state of the art in sustainability certification. A stakeholder-driven BP compares the standards of existing certification schemes to define a common denominator between the compared schemes. The outcomes of the benchmarking process might be used by certification scheme operators to mutually recognize other schemes and their certified products. Additionally, the BP shall support establishing a link to different, existing stakeholder communities that could evolve with a dynamic sustainability standard development.

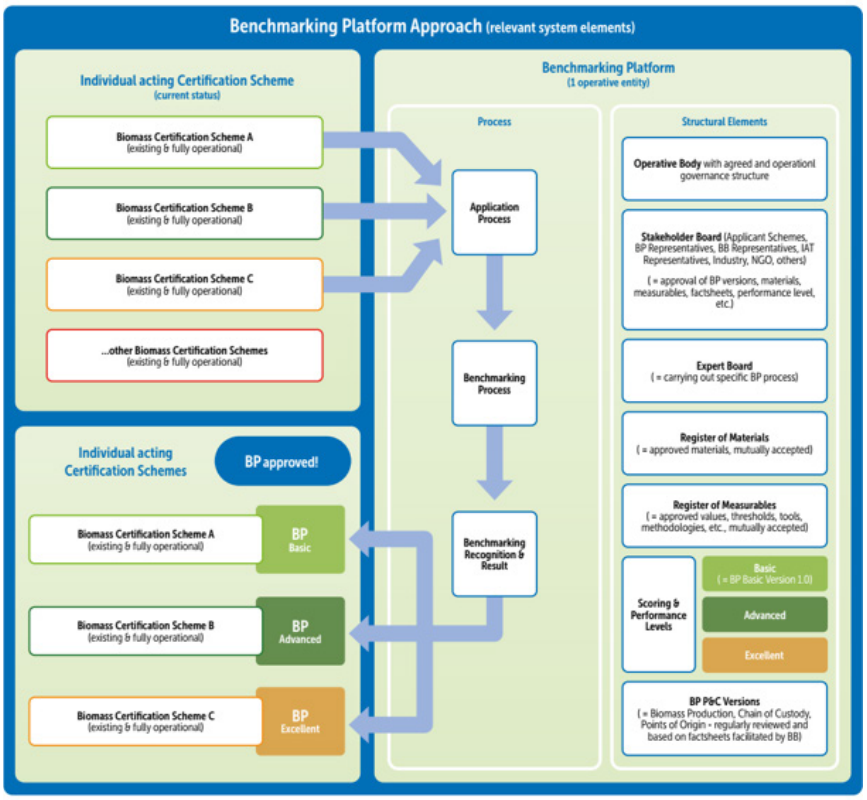

Figure 2: Structure of the STAR-ProBio Benchmarking Platform

The Building Blocks (BB) comprises an open dataset of single criteria and indicator factsheets. The STAR-ProBio principles, criteria and indicators do represent LCA & LCC as well as indicators addressing iLUC, social and circularity aspects. BB aims at organizing these criteria and indicators according to the general logic of a product certification approach and to provide their coherent and uniform presentation. Additionally, the factsheets include information on the pre-conditions for applicability or limitations of the criteria and indicators, which support the potential transfer of the results. Consequently, BB can address gaps identified by the benchmarking platform.

Framework Rules (FR) provides a set of rules for the management of the framework. This set of rules describe requirements for the practice of certification schemes.

Further information: Link

100% RENEWABLE HEATING AND COOLING IN EUROPE BY 2050 - THE ROLE OF BIOENERGY RESEARCH AND INNOVATION IN THE EYES OF RHC-ETIP

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The European Technology and Innovation Platform on Renewable Heating and Cooling (RHC-ETIP) has recently launched its Strategic Research and Innovation Agenda (SRIA) for 100% renewable heating and cooling (H&C) in cities, districts, buildings and industries in Europe by 2050 (Link), following up their Vision 2050 from 2019.

Figure 1: Cover of the RHC-ETIP SRIA on climate-neutral, 100% renewables-based, heating and cooling in Europe.

Bioenergy is by far the most important renewable energy source (RES) in Europe for heating purposes today (16.7%, in 2018), while solar thermal (0.5%), geothermal (0.2%) and ambient heat through heat pumps (2.3%) account for the bulk of the rest (Bioenergy Europe, Statistical Report 2018).

About 80% of the heating and cooling is carried out using non-renewables and replacing this is the grand challenge of the future.

The European wave of electrification these days is not believed by RHC-ETIP to be the solution to this grand challenge, i.e. in practice, it is not believed to be realistic that all our energy needs can be covered by renewable electricity in the foreseeable future, even if considering electricity storage or conversion of excess intermittent electricity to e-fuels.

Therefore, reaching 100% renewable heating and cooling in Europe by 2050 should be based primarily on non-electricity options in combination with minimizing the overall energy need for heating and cooling and utilizing excess heat and ambient heat sources. This also reduces the need for costly electricity grid investments and improves the security of the energy supply. Due to the diversity in resources, possibilities and needs on local and regional levels in Europe, no solution fits all. This is also the case in the bioenergy area. So, what could be the role of bioenergy in reaching the envisioned 2050 targets, and what are the research and innovation needs needed to achieve that?

The key messages from RHC-ETIP are:

"RHC technologies are mature, commercial, and market-ready, today. They will be continuously developed for increasing their performance and competitiveness if the required support is given to foster research, development and innovation. RHC technologies cover all applications and temperature ranges required by H&C: space heating and cooling, domestic hot water for buildings and cities, for the agriculture and the tertiary sectors, as well as industrial process heat and refrigeration."

"Today´s decarbonization strategy tends to emphasize electrification. However, a dramatic increase in electric H&C and electric mobility would require costly upgrades to distribution networks. While for mobility, this may be unavoidable, a fully carbon-neutral H&C sector is possible with currently available thermal RHC technologies. Today, H&C is thermally driven and it should remain this way in the future."

RHC-ETIP estimates that bioenergy could account for more than 50% of the total renewable heating and cooling need in a 100% renewable heating and cooling scenario and that this could be achieved already in 2040.

The RHC-ETIP SRIA says e.g. regarding bioenergy in the individual buildings (not connected to a district heating network) sector:

"Current R&D efforts are mainly focused on further technology optimization, emission reduction, increased energetic (thermal, or thermal-electric) performance, reduced costs, optimum integration or hybridization with other RE sources and technologies and energy storage solutions on a building level, stable and adaptive heat delivery and improved user interaction and satisfaction."

Five key research and innovation topics were identified for the individual buildings sector:

1. RE H&C technologies and systems for cost-effective retrofitting of old buildings
2. RE H&C technologies and systems for cost-effective retrofitting of historical and special buildings
3. RE sources, fuels, technologies and systems for new buildings and their integration and external connectivity
4. CHP technologies and systems and their integration in old/historical and future buildings and external connectivity
5. Energy systems, education, training and certification for different building categories

I.e. it is crucial to consider the retrofitting of existing buildings as well as new buildings, hybridization and bioenergy as an integral part of the building's energy system, including its external connectivity.

In addition, key messages are provided on a number of transversal topics: technologies of heat and cold storage and distribution; policy and social innovation; digitalization, operation and system flexibility; innovative financing schemes and new business models; circularity; and health. E.g. the use of thermal storage is considered pivotal to integrate different heating and electrical solutions that cope with price fluctuations and seasonality, for thermal technologies such as solar thermal, geothermal, and biomass. These transversal topics underline that renewable energy for heating and cooling is not only about the technologies but in principle all connected aspects covered by the sustainability umbrella.

Hence, the role of bioenergy is believed to remain very important in the foreseeable future. However, there is a significant improvement potential throughout many bioenergy value chains to increase performance, reduce emissions and reduce costs. This is where EERA Bioenergy has a very important role to play, through facilitating for needed research, as defined in its recently launched SRIA, and bringing key research actors in Europe together in a joint effort to develop and optimize the use of biomass for various energy purposes, including heating and cooling.

RHC-ETIP is not the only actor paving the way towards increased and improved use of bioenergy to reach climate neutrality in Europe within 2050. The Clean Energy Transition Partnership recently launched its SRIA, also with a focus on bioenergy. SET-Plan implementation workgroups are working on bioenergy (IWG8) and energy efficiency in buildings (IWG5). Another ETIP, Smart Networks for Energy Transition (SNET), has a working group (WG3) on flexible generation, including bioenergy. And on the international level, IEA Bioenergy, through a number of tasks, contributes to knowledge generation and exchange in the bioenergy area. These are examples, and in general, there is a big and broad focus on bioenergy as a part of a future 100% climate-neutral energy sector in Europe.

While EERA Bioenergy as well as national energy research alliances (e.g. BERA) has an important role to play towards this future through research and development as a key in optimizing the sustainability of bioenergy technologies and value chains, and in the search for new technologies of the future, in parallel increased implementation of current bioenergy technologies will be very important to reach the 100% climate neutrality goal.

The work of RHC-ETIP now continues with the next deliverable focussing on developing a deployment and implementation strategy to reach the envisioned targets. For more information about RHC-ETIP: Link

Useful information

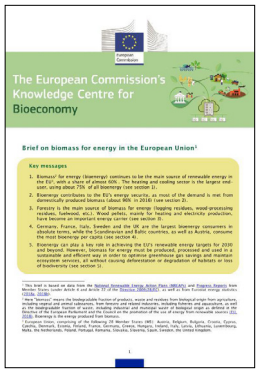
EC's Knowledge Centre for Bioeconomy briefs

European Commission's Knowledge Centre for Bioeconomy (EC KCB)

The EC's Knowledge Centre for Bioeconomy is publishing a series of briefs that intend to provide independent evidence for EU policy in all fields of Bioeconomy.

1. Brief on biomass for energy in the European Union (2019)

This brief on biomass for energy is one out of a series of briefs from the EC's Knowledge Centre for Bioeconomy which intend to provide independent evidence for EU policy in this field.
Link



2. Brief on algae biomass production (2019)

This brief on algae biomass production is one out of a series of briefs from the EC's Knowledge Centre for Bioeconomy which intend to provide independent evidence for EU policy in this field.
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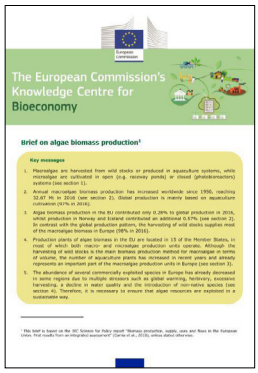

3. Brief on food waste in the European Union (2020)

This brief on food waste one out of a series of Bioeconomy Knowledge Centre briefs that intend to provide independent evidence for EU policy in this field.
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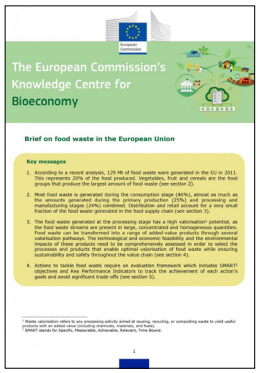
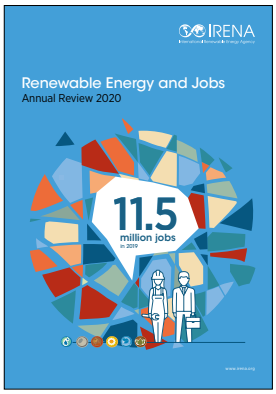


Publications

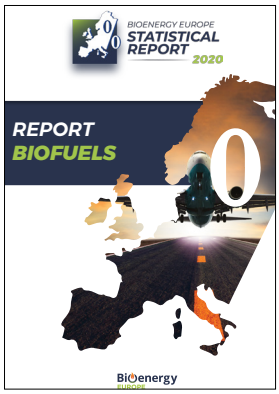


Renewable Energy and Jobs – IRENA annual review 2020

International Renewable Energy Agency (IRENA)

IRENA analyses the annual employment balance sheet and confirms a long-term growth trend; to ensure a continued increase in the COVID-19 era strong policy measures must be taken. Employment in the renewables sector continues to grow, reaching 11.5 million jobs worldwide. The report also highlights some promising initiatives to promote the education and training of workers.

PDF



Bioenergy Europe: Statistical Reports 2020

Bioenergy Europe

The European Biomass Association (Bioenergy Europe) has published the following chapters of its statistical report 2020. Besides, each report is accompanied by a policy brief.

Bioenergy Europe: Statistical Report 2020 – Biofuels for Transport

This report provides readers with accurate and up-to-date information on the current state of play of biofuels for transport, the availability and dynamics of supply, and much more!

PDF

Bioenergy Europe: Statistical Report 2020 – Bioheat

The report provides readers with accurate, up-to-date data on the current state of play of biomass for heating purposes, the demand for renewable heating, and much more!

PDF

Bioenergy Europe: Statistical Report 2020 – Pellets

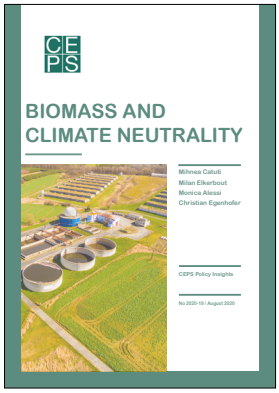
This report provides readers with accurate and up-to-date information on the current state of play of wood pellets, the availability and dynamics of supply, and much more!

PDF

Bioenergy Europe: Statistical Report 2020 – Biomass supply

The report provides readers with accurate, up-to-date data on the current state of play of biomass supply, forest management, agrobiomass potential for next years, and much more!

PDF



Biomass and Climate Neutrality

Centre for European Policy Studies (CEPS)

CEPS has recently published a report assessing the impact that bioenergy will have on achieving the goal of climate neutrality. The report provides a comprehensive summary of current regulatory arrangements for the sector and various future projections related to demand and availability.

PDF

Supporting local bioenergy development

A Policy Brief from the Policy Learning Platform on Low-carbon economy (Interreg Europe)

Bioenergy is one of the most flexible renewables, with the possibility to convert biomass into many different end-products for different applications. Whilst national and international frameworks support bioenergy generation, there is significant scope for regional authorities to act, with bioenergy development being dependent on local conditions, stakeholders, resources and action plans. Interreg Europe projects have found several relevant good practices that could be replicated in other regions to provide sustainable bioenergy for communities, whilst also creating new employment and supporting regional development. Regions interested in supporting bioenergy should consider existing good practices and available resources and can make use of a significant number of support funds and platforms for implementing their projects.

PDF

Future transitions for the Bioeconomy towards Sustainable Development and a Climate-Neutral Economy

European Commission's Knowledge Centre for Bioeconomy (EC KCB)

The Expert Network on the Bioeconomy, established to contribute to the EC KCB, has produced a report in which the Experts have reviewed and synthesized information and data on the current landscape and progress in research and innovation in the field of bioeconomics to identify the main opportunities and key challenges for achieving a bioeconomy capable of contributing to the achievement of the United Nations' Sustainable Development Goals and the EU's climate objectives.

PDF

Save the date! International bioenergy events

JANUARY 2021

18-22 January 2021
Fuels of the Future: 18th International Conference on Renewable Mobility
Virtual conference
link

21 January 2021

IEA Bioenergy – Workshop 5: Social Impacts of Woody Biomass
Virtual conference
link

FEBRUARY 2021

10-11 February 2021
Bringing Value to Agrobiomass – AgroBioHeat project
Virtual matchmacking event
link

15-16 February 2021
14th International Conference on Biofuels and Bioenergy
Virtual conference
link

24-26 February 2021
World Sustainable Energy Days
Wels, Austria
link

MARCH 2021

22-23 March 2021
12th Edition of International conference on Biofuels and Bioenergy
Virtual Conference
link

23-24 March 2021
International Biomass Congress & Expo
Brussels, Belgium
link

APRIL 2021

26-29 April 2021
29th European Biomass Conference & Exhibition (EUBCE)
Virtual conference + Marseille, France
link

26-30 April 2021
Pyro 2021 Conference
Ghent, Belgium
link

MAY 2021

18-21 May 2021
IEA Bioenergy - 2nd International Conference on Negative CO_2 Emissions
Virtual conference
link

JUNE 2021

2-4 June 2021
Plant Based Summit 2021
Reims, France
link

9-10 June 2021
Oleofuels 2021
Marseille, France
link

10-11 June 2021
15th International Conference on Economics of Forest Biomass and Bioenergy
Copenhagen, Denmark
link

15-16 June 2021
International Biogas Congress and Expo
Brussels, Belgium
link

EERA Bioenergy in Europe

Table 1: Full and Associate members of the EERA Bioenergy Joint Programme..

Aalborg University
Department of Energy Technology (Denmark)
web

AICIA
Asociación de Investigación y Cooperación Industrial de Andalucía (Spain)
web

BERA
Belgian Energy Research Aliance (Belgium)
web

BESTMER
Ege Üniversitesi Biyokütle Enerji Sistemleri ve Teknolojileri Merkezi Ege (Turkey)
web

BOUN
Boğaziçi University (Turkey)
web

CAMPUS IBERUS
Campus de Excelencia Internacional del Valle del Ebro (Spain)
web Campus / web Universidad

CEA
French Alternative Energies and Atomic Energy Commission (France)
web

CENER
National Renewable Energy Centre – Biomass Deparment (Spain)
web

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

CIRCE
Centro de Investigación de Recursos y Consumos Energéticos (Spain)
web

CNR
Istituto Motori del Consiglio Nazionale delle Ricerche (Italy)
web

CNRS
Centre National de la Recherche Scientifique (France)
web

CRES
Center for Renewable Energy Sources and Saving (Greece)
web

CSIC
Agencia Estatal Consejo Superior de Investigaciones Científicas (Spain)
web

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

ECN
Energy Research Centre of the Netherlands (The Netherlands)
web

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

FCiências.ID
Associação para a Investigação Desenvolvimento de Ciências (Portugal)
web

IEN
The Institute of Power Engineering (Poland)
web

IFK Stuttgart
Institute of Combustion and Power Plant Technology (Germany)
web

IMDEA
Instituto Madrileño de Estudios Avanzados (Spain)
web

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

LNEG
Laboratório Nacional de Energia e Geologia (Portugal)
web

NIC
National Institute of Chemistry (Slovenia)
web

NTNU
Norwegian University of Science and Technology (Norway)
web

NTUA
The National Technical University of Athens (Greece)
web / web

PSI
Paul Scherrer Institut (Switzerland)
web

RE-CORD
Renewable Energy Consortium for Research and Demonstration (Italy)
web

SINTEF
(Norway)
web

TÜBITAK
Scientific and Technological Research Council of Turkey (Turkey)
web

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

UNIBO
Universitá di Bologna (Italy)
web

UNICT
Università degli studi di Catania (Italy)
web

UNIMORE
University of Modena and Reggio Emilia (Italy)
web

UNIPD
Università degli Studi di Padova (Italy)
web

UNITO
Università di Torino (Italy)
web

UNL
Universidade NOVA de Lisboa, Faculdade de Ciências e Tecnologia (Portugal)
web

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

UWM
University of Warmia and Mazury in Olsztyn (Poland)
web

VŠB
Technical University of Ostrava (Czech Republic)
web

VTT
Technical Research Centre of Finland Ltd (Finland)
web

WIP
WIP Renewable Energies (Germany)
web

WUR
Wageningen University & Research (The Netherlands)
web

EERA Bioenergy in Europe

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

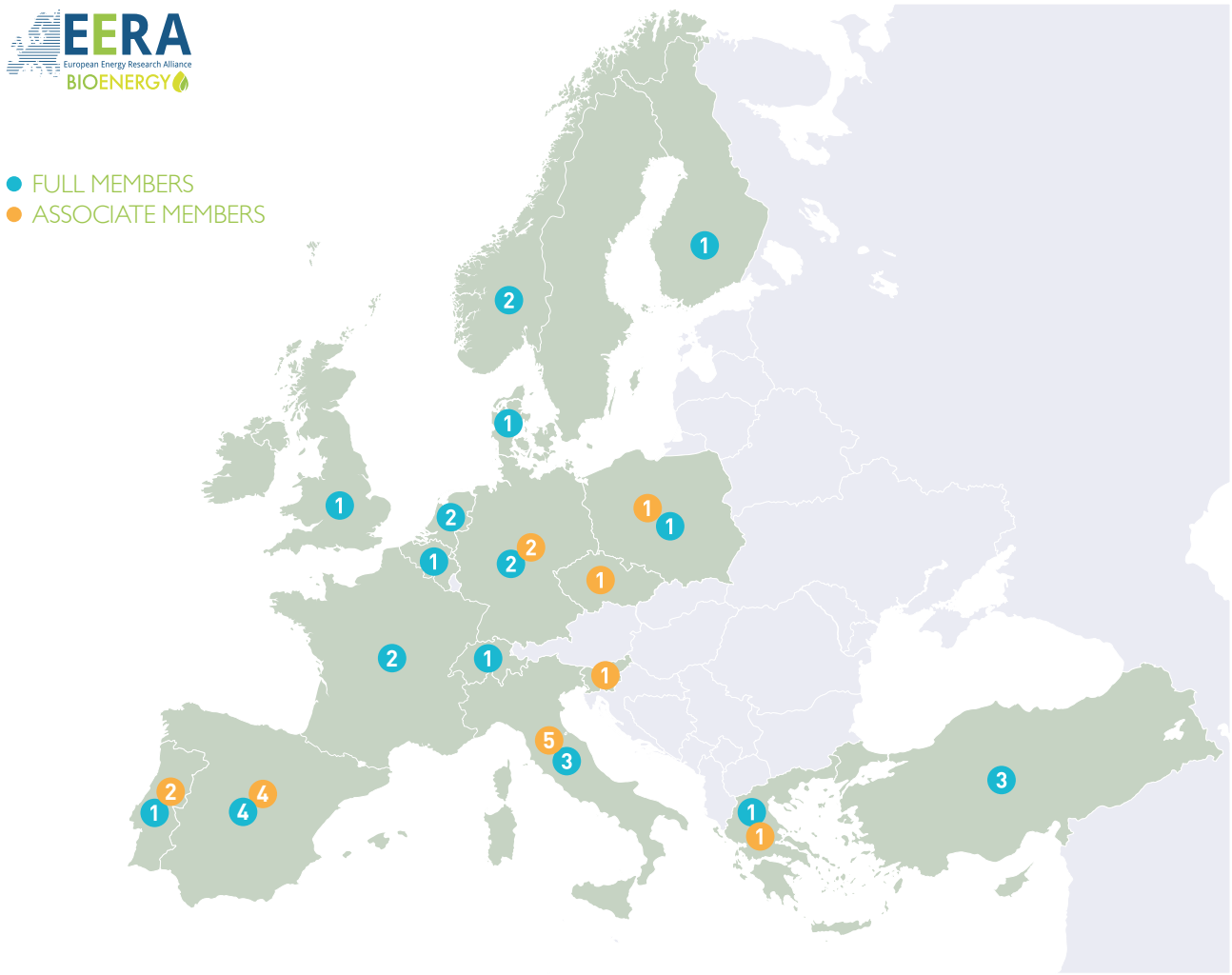


Figure 1: The EERA Bioenergy Joint Programme consists of 43 members (26 Full members and 17 Associate members) from a total of 18 countries. Link

www.eera-bioenergy.eu

Contacts

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