European Commission

Research and Innovation

Workshop on Advanced Biofuels and RFNBOs

The Way Forward

5 May 2026, Brussels

Workshop on Advanced Biofuels and RFNBOs – The Way Forward

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Report

A workshop on how Europe can speed up the deployment of advanced biofuels and other renewable fuel technologies and turn promising technologies into real market solutions was organized by Unit C2 Clean Energy Transitions in the Clean Planet Directorate of the European Commission's Directorate-General Research and Innovation (EC DG RTD) on 5 May 2026 in Brussels. The event brought together around 150 participants from the European Commission, Member States, industry, finance and research community to discuss the way forward to market for advanced biofuel and other renewable fuel technologies and inform on the results of two recent DG RTD studies and research and innovation activities supporting priorities of the Strategic Energy Technology Plan (SET Plan).

The discussions focused on one common challenge: Europe has a strong innovation capacity, but technologies still need support to reach the market faster and at scale and mobilization of all actors and resources across the value chain is necessary.

Advanced biofuels and renewable fuels of non-biological origin (RFNBOs) are highly sustainable, renewable fuels manufactured from sustainable feedstocks like biomass wastes or renewable hydrogen which do not compete with food and feed. They significantly reduce greenhouse gas emissions, and they are indispensable to decarbonize hard-to-electrify sectors like aviation and maritime transport even in the longer term.

Advanced biofuels and RFNBOs are supported with specific targets in EU policies and legislations because they are key contributors to achieving the Member States commitment to becoming climate-neutral by 2050[1]. The Renewable Energy Directive (RED)[2], the REFuelEU Aviation[3], the FuelEU Maritime[4], the Net-Zero Industry Act[5], the Emissions Trading Scheme[6] are examples of implemented EU Policy support in the area, while the Clean Industrial Deal[7], the Strategic Transport Investment Plan[8], the Industrial Accelerator Act[9] and Accelerate EU[10] are examples of continued policy support.

The main objective of the workshop was to promote a concerted action of the European Commission, Member States, and market and finance sectors towards commercialisation of advanced biofuels and RFNBO technologies. The event focused on presenting the DG RTD's strategy based on studies on the potential and mobilization of industrial capacity building, discussing the perspectives of European and Member State policy, national commitments and readiness, showing the industry market outlook, business opportunities, and financing available, exploring prospective ways forward between all decision makers to enlarge the market in Europe, illustrating the business cases for selected value chain examples in a panel roundtable.

The workshop supported the implementation of the SET Plan priority action on Renewable Fuels and Bioenergy, helping advance the development and deployment of such technologies and value chains. It also contributed to wider EU priorities linked to the Clean Industrial Deal, Strategic Transport Investment Plan, Affordable Energy Action Plan[11] and Energy Union's

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1119

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

[3] Regulation (EU) 2023/2405 of the European Parliament and of the Council of 18 October 2023 on ensuring a level playing field for sustainable air transport (ReFuelEU Aviation)

[4] Regulation (EU) 2023/… of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023PC0161

[6] EU Emissions Trading System (EU ETS) - Climate Action - European Commission

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52025DC0085

[8] https://transport.ec.europa.eu/document/download/73447373-de2a-4ba4-9371-36d1186035d4_en?filename=COM_2025_664_STIP.pdf

[9] Industrial Accelerator Act - Internal Market, Industry, Entrepreneurship and SMEs

[10] https://energy.ec.europa.eu/document/download/7fac9eea-5717-4182-a368-bd68c427ff4c_en?filename=Communication.pdf

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52025DC0079

Accelerate EU. In addition, it supported on-going Research and Innovation (R&I) activities and EU policies related to Fit for 55, climate neutrality and net-zero clean tech manufacturing in the EU. It is linked to a European Parliament event for transport decarbonization[12].

Technology and Market Status – European Commission R&I strategy

The outlook and mobilization of deployment of Advanced Biofuels and Renewable Fuels of Non-Biological Origin (RFNBOs) technologies from essential industrial value chains (i.e. combination of feedstock types and conversion technologies into one or more products) was presented based on the data identified into two EU studies[13,14]by DG RTD. Value chains considered in this report include the production of liquid and gaseous biofuels from feedstock listed in Part A and part B of Annex IX of Directive 2023/2413, as well as RFNBOs in combination with biogenic CO2. The session was moderated by Beatrice Coda, Head of Unit at DG RTD of the European Commission.

Dr. Maria Georgiadou, Senior Expert in Renewable energy R&I policy at the Directorate-General of Research and Innovation of the European Commission, presented the EU R&I Priorities and Support for Advanced Biofuels and RFNBOs in the frame of EU policies comprising the European Green Deal and Fit for 55, The Hydrogen and decarbonised gas markets, the Grean Deal Industrial Plan and the Net Zero Industrial Act, and the latest Competitiveness Compass and Clean Industrial Deal including the recent Accelerate EU stating **increasing the domestic production** of sustainable biofuels, biogas and biomethane, hydrogen-based sustainable aviation and maritime electro-fuels (e-SAF and e-SMF). In a highly regulated EU framework with specific targets for transport and mandates, opportunities exist for scaling-up Advanced Biofuels and RFNBOs and this potential is identified in the first EC RTD Study[13] which determined the factors for industrial growth of advanced and sustainable biofuels production in the EU under the **pertinent EU policy and respective regulatory framework.** Only domestic (EU) production of sustainable biofuels is considered in the figures of key findings, thus supporting substantially the EU security of energy supply.

Box 1 – Key findings "Development of outlook for the necessary means to build industrial capacity for drop-in advanced biofuels"

- **Demand for biofuels in transport** in the EU could increase by a factor of up to 2.5 towards 2030, compared to 2021, to meet climate targets.
- **Industry declares ready to invest;** capacity expansion in EU for advanced biofuels and biomethane could reach 23.6 Mtoe per year in 2030.
- **Substantial exploitation of sustainable biomass is sufficient** to cover demand even in low mobilization – in 2030, 310 - 836 million dry tons are available for energy markets (~20% - 55% of technical potential). In 2050, dedicated lignocellulosic and oil crops from unused degraded lands and as cover and intercrops needed in combination with normal food production.
- **Under certain conditions,** demand for advanced biofuels may be even higher making the biofuel industry strategically important for EU, to ensure a timely and cost-effective delivery of emissions savings reduction.

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[12] https://www.youtube.com/watch?v=rwAJCUWEwfI

[13] European Commission: Directorate-General for Research and Innovation, Exergia, E3Modelling, Wageningen University & Research, BEST, BTG, POLITO, Georgiadou, M., Goumas, T.Chiaramonti, D. (eds), Development of outlook for the necessary means to build industrial capacity for drop-in advanced biofuels – Final report, Publications Office of the European Union, 2024, https://data.europa.eu/doi/10.2777/679307

[14] European Commission: Directorate-General for Research and Innovation, EXERGIA, POLITO, BEST, Georgiadou, M. et al. (eds), Mobilization of industrial capacity building for advanced biofuels – Final report, Publications Office of the European Union, 2026, https://data.europa.eu/doi/10.2777/2375274

Identifying and proposing ways to realize essential industrial value chains contributing to EU targets, considering technical, financial, business and feedstock-related aspects via collecting data directly from industries and funding providers was the objective of the second EC RTD Study[14]

Box 2 – Key findings "Mobilization of industrial capacity building for advanced biofuels"

- **A significant increase in biofuel production capacities** based on RED Annex IX feedstocks is required now to 2030-2040 to meet EU targets, also compensating for possible delays in e-mobility and e-fuels.
- **No single value chain can deliver more than 50%** of the required sustainable fuels – we need a portfolio of complementary solutions with a diverse mix of technologies to utilize the full range of eligible feedstocks and produce the complete spectrum of necessary fuels.
- **The scale-up of value chains** towards these targets requires further financial and administrative support to enable both feedstock mobilization and industrial capacity build-up.
- **By 2030, annual financial support** to build industrial plants and mobilize necessary feedstock from €4.5 to €8.75 billion for 60% of the foreseen demand; higher level of support is needed for deployment towards 2040.
- **EU funding** schemes and instruments at EU level exist, **1/3 of Member States** have effective support measures in their national strategies, **European technology providers** have know-how and personnel to build the industry.

The role of the Member States is important in realizing the industrial value chains and is activated currently with the Working Group of **Renewable Fuels and Bioenergy** under the Strategic Energy Technology (SET) Plan which is part of the Net Zero Industrial Act as of 2024. It brings together 16 national governments, industry and academia to align public and private R&I priorities and funding in Europe. This group develops a Common Implementation and Investment Plan linked to National Ministries and European Commission, covering renewable gaseous and liquid fuels for transport and industry, including advanced biofuels, biomethane, synthetic electro-fuels, RFNBOs, biohydrogen and direct solar fuels.

Horizon Europe Work Programme 2026-2027 of Cluster 5 includes two SET Plan flagship calls of EUR 70 million to bridge technology with scaling up. They aim to create market readiness of essential renewable fuel technologies that can cost-effectively contribute to domestic commercial production beyond 2030, bringing their industrial value chains at technological maturity for a competitive cost.

They also contribute to connecting regional renewable fuel value chain activities across Europe, especially with partners from Eastern European countries, involving regions with lower innovation performances, to overcome fragmentation where different regions have different capacities in terms of feedstock, technology and skills.

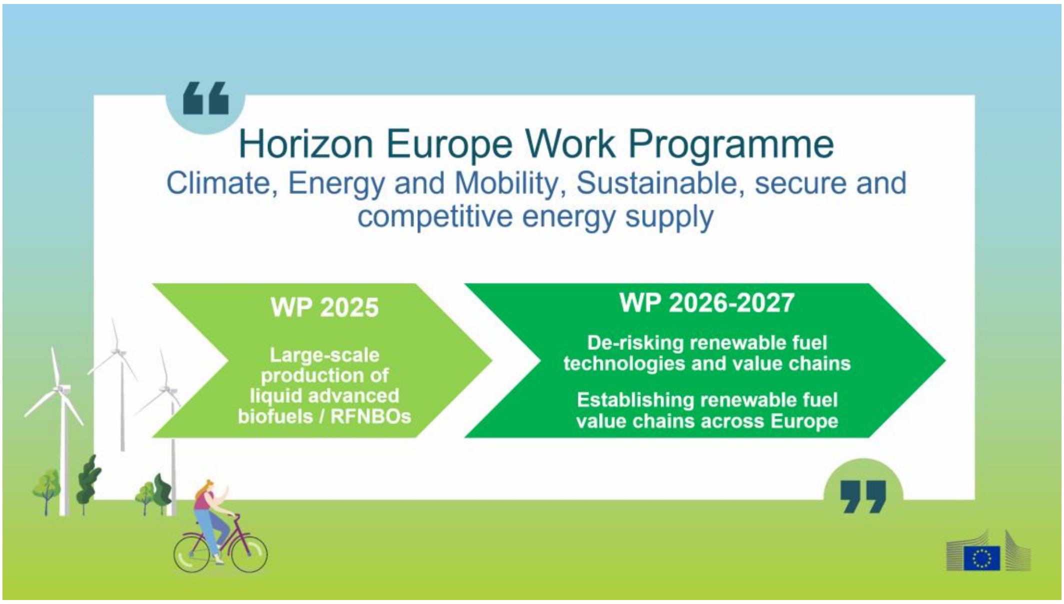

Figure 1. Overview of the Horizon Europe calls in 2025-2027

David Chiaramonti, Professor of POLITO and Chairman of Clean Energy Ministerial (CEM) BIOFUTURE Platform presented in detail the first EC RTD study[13] "Development of outlook for the necessary means to build industrial capacity for drop-in advanced biofuels" concluding:

Box 3 – Concluding remarks

- Biofuel demand increases from about 16.5 Mtoe/y in 2021 to above **40 Mtoe/y in 2030** to meet policy climate targets.
- Stakeholders' consultation for 2030 advanced biofuels and biomethane projected capacity reaches about **27-28 Mtoe/y** when only 10% of biomethane is used in transport
- Volumes are **not capped by domestic (EU) feedstocks**: sustainable biomass is sufficient to reach above **57 Mtoe/y** in 2030 under 2023 market and regulatory conditions of which advanced biofuels comprise more than 50%.
- **Biomass potentials** are thus **sufficient** to cover such demand and beyond, if respective supply chains are developed proactively.
- EU Carbon market including the European Carbon Removals and Carbon Farming (CRCF) and coproduct valorisation support price gap reduction, generating volumes of sustainable alternative fuels. This positively impacts EU security and competitiveness (**Made in EU**), **new income** and **job opportunities** for EU farmer and EU industry.
- Feedstock availability could be further increased via **intermediate crops and marginal land cultivations** which is important input to the ongoing revision of the 996 Implementing Regulation of and the new Renewable Energy Directive.

Theodor Goumas, Chairman at EXERGIA, presented in detail the second EC RTD study[14] "Mobilization of industrial capacity building for advanced biofuels" illustrating the collective effort needed to create bankable industrial value chains that integrate the feedstock mobilization and the industrial production by offering feedstock and biofuel production premiums, removing administrative barriers upstream, introducing certification and book and claim systems while integrating support under a single program.

Box 4 – Closing the gaps for lenders and investors

Finance instruments that can unlock senior debt

Farmers and aggregators

- Contract for Difference (CfD) or double-sided auction to establish revenue floor and limit policy risk
- Feedstock premium to mobilize sustainable biomass without overloading feedstock procurement cost

Producers and marketers

- Production Feed-in Premium (FiP) to support Debt Service Coverage Ratio (DSCR)
- Guarantees / first-loss tranches to reduce loss-given-default and extend tenor
- EIB / InvestEU blended finance to anchor financing and crowd in private capital
- CAPEX grants to reduce Engineering, Procurement and Construction (EPC) risk and need for leverage

Administrative interventions that can reduce operational risk and increase bankability

Farmers and aggregators

- Alignment of Common Agricultural Policy (CAP) crop lists with RED Annex IX
- Alignment of RED Life Cycle Assessment with CAP LULUCF data
- Joint Monitoring, Reporting and Verification (MRV) systems
- Development of contract templates
- Group certification of contract farmers for feedstock producers

Industrial units and marketers

- Consistent implementation of RED III Targets across Member States
- Gradual mandated demand ramp-up
- Public incentives that support demand
- Harmonized Book-and-Claim systems and carbon accounting

Financing support initiatives

Farmers and aggregators

- Proportional to supplied quantities and mobilizes feedstock supply,
- ~ EUR 3,849 - 7,499 billion in 2030
- ~ EUR 11,586 – 17,852 billion in 2040

Industrial units and marketers

- Proportional to produced quantities of biofuels in the form of Feed-in Premium (FiP), Feed-in Tariff (FiT), Contract for Difference (CfD), etc.
- Influences significantly the final price to consumers,
- ~ EUR 700 -1,245 billion in 2030
- ~ EUR 1,704 – 2,805 billion in 2040

Paolo Frankl, Head Renewable Energy Division at International Energy Agency (IEA) illustrated the global perspective of sustainable fuels mentioning that sustainable fuels will **quadruple globally** if announced policies are implemented, depending on the country and regional circumstances, the sustainable fuels mix and shares can be very different from global averages. He added that sustainable fuels continue to be **important for transport** even with electrification, direct electrification and energy efficiency are essential to transitioning away from fossil fuels, but sectors such as aviation, shipping, heavy industry and parts of road transport, continue to rely on fuel-based solutions. Sustainable fuel **growth** is **not rapid** enough, several challenges and barriers are hampering deployment, calling for stronger and more predictable policy design and implementation, both for biogenic and hydrogen-derived fuels. Innovation and scale can **narrow the cost gap** with conventional fuels, despite higher costs, impact on end-use consumer prices is expected to be limited by 2035. A 15% SAF blend would increase the flight ticket price by 5-7%. The price of a car made with low-emission steel would increase by <1%. **Sustainability** remains a challenge, aligning **carbon reporting frameworks** and scheme boundaries (e.g. Indirect Land Use Change, reference energy) and expanded mutual recognition of certification schemes would reduce barriers to international trade. With well-designed policies, **very low life cycle GHG** emissions is possible. **Integrated policies** are needed to expand sustainable fuels, a core policy framework underpins sustainable fuel deployment, but targeted measures are needed depending on technology readiness and market maturity. Nearly a century of global experience offers a solid foundation to build on. He concluded that multiple yet pragmatic approaches are needed to reach scale across a portfolio of technologies at different level of technology maturity; value chains and economies of scale of biogenic and non-biogenic sustainable fuels are **interconnected** and **cross-sectoral**, requiring a more integrated approach. Priorities include Increasing in parallel demand and supply of sustainable fuels, delivering global common sustainability criteria and supporting research and innovation to narrow cost gaps and accelerate the scale-up of pathways with high GHG emissions-reduction potential.

Sustainable fuels quadruple globally if announced policies are implemented

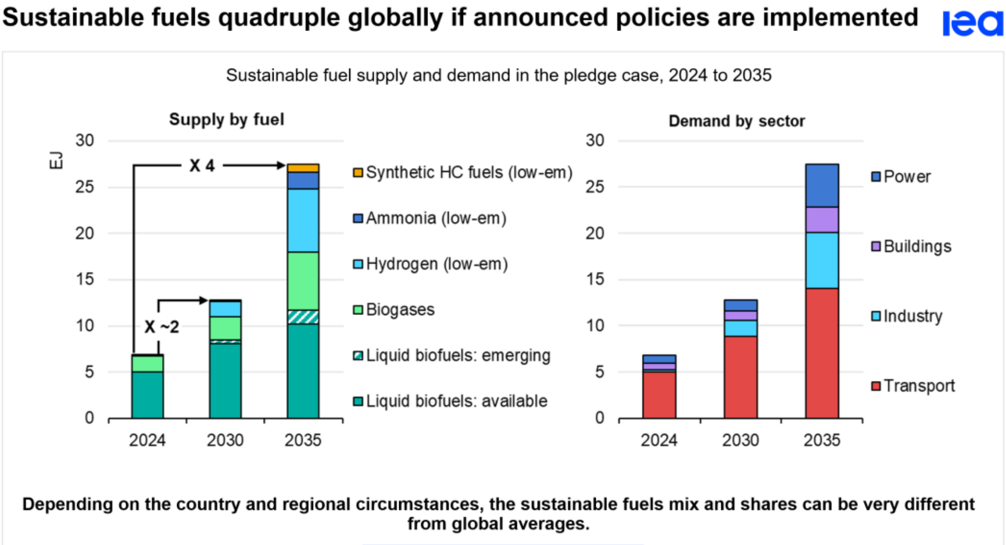

Figure 2. IEA - Renewable Transport – A global perspective

EU Policy updates

The relevant policy at the European Parliament and the European Commission was presented. The session was moderated by Beatrice Coda, Head of Unit at DG RTD of the European Commission.

Dario Nardella, Member of the European Parliament and S&D Coordinator of the Committee on Agriculture and Rural Development, emphasized that the sector is ready to scale up but requires predictability and investment security. Building strong European value chains of advanced biofuels, biomethane and RFNBOs contributes to a structural rather than temporal decrease of EU's exposure to external geopolitical shocks like the current wars. The two EC RTD studies are very timely and essential in the context of supporting EU's strategic autonomy and resilience besides just the green transition, illustrating how to translate potential to industrial reality of genuine producers of European energy security reducing our dependence on critical non-European supply chains. They provide input to set up the policy and finance framework to allow upscaling of domestic production from existing and sufficient EU feedstocks and available technologies. Sustainable biofuels and electro-fuels are essential for aviation, maritime and heavy-duty transport complementing electrification as the backbone of road transport, the fossil fuels should be progressively phased out, agricultural policy should be updated to integrate the production of food, feed, material, and energy not competing with food, and policy certainty is required to unlock investments. He thanked particularly DG Research and Innovation for the continued attention devoted to the sector, for the two studies and the workshop, perceiving them as working tools for the European Parliament to translate evidence into political choices, and hoped for keeping exchanges between experts of the European Commission and members of the European Parliament on the way forward.

Commission services presented next the EU policy updates in energy, transport and climate. Bernd Kuepker, Policy Officer at DG ENER described the implementation of the Renewable Energy Directive, the framework for the promotion of the RFNBOs based on the comprehensive hydrogen policy and the relevant GHG methodologies and the proposal in Accelerate EU for targeted revision of the production criteria for hydrogen, the public consultation on a draft methodology outlining criteria for the production of hydrogen from nuclear power and the clarification of the methodology for co-processing of hydrogen and biomass. For biofuels, a review of certification rules in Regulation (EU) 2022/996 will address distinguishing food and feed crops from intermediate crops in Part A and B of RED Annex IX, verifying compliance with the qualifiers included in the feedstock descriptions, setting safeguards ensuring credible claims for the production of selected feedstocks and adding more feedstocks to Annex IV that can be considered to fall under the feedstock categories included in Annex IX. Preparation of the post 2030 framework is ongoing while transposition of the current one is progressing slowly.

Moumen Hamdouch, Head of Unit at DG MOVE, presented the Strategic Transport Investment Plan focused on aviation and waterborne transport, which almost fully rely on conventional fuels as their options to decarbonize are limited. Renewable and low carbon fuel are the viable solution to decarbonize these sectors in the short and medium term The plan emphasizes rapid scaling up of electro-fuels for aviation and maritime with immediate investments of EUR 2,9 billion from the EU, EU-wide double auctions, Early Movers Alliance, reporting simplification, investigating extending ETS allowances to the aviation and waterborne and evaluating book and claim' options. Engaging Member States would imply use of flexibility of the new State aid rules, a possible Integrated Project of Common Interest (IPCEI), promote investments under the Resilience and Recovery Fund. In the global frame, work continues in adoption of the International Maritime Organization (IMO) Net-Zero Framework, work in International Civil Aviation Organization (ICAO), mutual recognition agreements and clean trade and investment partnerships.

Polona Gregorin Head of Unit at DG CLIMA presented the Emissions Trading Scheme (ETS) for aviation and maritime that puts a carbon price to fuels but with zero rating for sustainable biofuels and RFNBOs. An additional incentive of more than 20 million EU ETS allowances provides support up to 100% of the cost difference for eligible fuels in aviation to bridge the price gap. In the ETS review, of this July, a similar system to support sustainable maritime fuels is being assessed. Innovation Fund supports already the production side. Part of EU ETS revenue is also directed to Member States to use it for climate and energy support.

National strategies, policy and measures for deployment of advanced biofuels and RFNBOs

The strategy and measures for the deployment of advanced biofuels and RFNBOs production was presented for Italy, Finland and Poland, members of the SET Plan Working Group of Renewable Fuels and Bioenergy which is co-chaired by Italy and Finland. The session was moderated by Franco Cotana, professor at University of Perugia and Co-Chair of the SET Plan Working Group who emphasized the challenge of translating the policy into a concrete instrument of industrial choice, investment decision and production value chains building under different national energy mix and approaches.

Giovanni Perrella, Senior Adviser at Energy Department of the Italian Ministry of Environment and Energy Security, described the Italian targets for decarbonizing transport underlining the holistic promotion of all vectors which can contribute to decarbonization based on technology neutrality, including renewable electricity, biofuels, RFNBOs, recycled Carbon Fuels (RCF) and Low-Carbon Fuels. The challenge is to reduce production costs while sustainably using all renewable energy sources and raw materials. The Italian law of January 2026 requires 1 Mt of pure biofuels (hydrotreated vegetable oil, biodiesel, other) on top to the target for renewable energy consumption in transport, 8% advanced biofuels (including biomethane) and RFNBOs of which 1% RFNBOs (half of it for direct use) counting in the target event if used as intermediates (H2) for biofuels. Due to raised needs, the RED Annex IX Part B cap of 1.7 % would be increased to 5 %, for feedstocks enabling waste-based biofuel production.

Timo Ritonummi, Deputy Director-General at Energy Department of the Finnish Ministry of Economic Affairs and Employment, also Co-Chair of the SET Plan Working Group, described the country's targets of renewable energy in transport reaching 34% in 2030 of which 4% RFNBOs. Finland has been leading to promote advanced biofuels with Neste Oy world leader producing advanced Hydrogenated Vegetable Oil and world largest producer of bio-kerosene, JET A-1. Finland has one electrolyzer of 20 MW running, won many hydrogen auctions but no final investment decisions in Finland so far, so RFNBOs/ hydrogen evolve slowly.

Bartosz Arabik, Deputy Director at Innovation and Energy Efficiency Department of Ministry of Climate and Environment described advanced biofuels and RFNBOs as complementary pillars in Poland's decarbonization pathway, particularly in the context of economic competitiveness and, especially right now, security. Poland remains below the EU average of renewable energy used in transport. With hydrogen production almost entirely fossil based, Poland is the second largest producer of hydrogen in the EU, being in the process of implementing the RED. As a country with significant agriculture and forests residues, Poland supports changing the RED Annex IX to allow a broader use of catch crops, which would enable the broader use of catch crops at an affordable cost for all users. Greater regulatory flexibility, predictable rules for the investors, an efficient and reliable certification system, effective mitigation of frauds in supply chains, an adequate volume of sustainable fuels, as well as distribution infrastructure and off-takers, are all considered essential. Development of advanced biofuels, biomethane, green hydrogen and electrolyzers is being supported, although the latter develop slower than anticipated, with projects of 350 MW confirmed out of the 2 GW capacity target in 2030. Advanced biofuels, RFNBOs and electrification are all needed to decarbonize transport, bearing in mind that the transport sector has a major impact on the wider economy and its competitiveness, while also meeting societal expectations. As Dr. Arabik stated: "There is great potential in advanced biofuels, but solutions are needed that will increase the availability of feedstocks and enable the development of market projects."

The Financing side - Public and private instruments and funds for scaling up production

The financial needs and the supporting instruments were illustrated next in a session moderated by Theodor Goumas, Chairman at EXERGIA.

Dr. Konstantinos Kalligeros, Financial Expert at EXERGIA, described the analysis made in the second EC study[2] shaping the proposal of a collective financing plan for upstream feedstock mobilization, downstream revenue stabilization, de-risking, and harmonized certification rules. This financial plan overcomes the barriers of i) bankability because contracted cash flows, sponsor strength, tenor, and downside protections are insufficient for lenders and investors; ii) economics since all-in biofuel levelized cost of production (LCoP) does not support investment when compared to market value of competing fossil fuels; iii) and risk allocation in the absence of counterparties able and willing to bear key value chain risks.

Material administrative and financial risks in the value chain comprise of unclear operational rules for new RED Annex IX feedstocks, administrative overhead for RED certification in fragmented biomass supply regions, misalignment between the CAP and REDII/III reporting requirements, lack of indexation, regulatory complexity and lack of EU-wide book-and-claim systems. The financial risks include marginal economics of oil & lignocellulosic crops: versus alternatives, especially in North Europe, risk for agricultural oily and forest residues of economic cost due to sustainability restrictions and risk of breaching the CAP's "Good Agricultural and Environmental Conditions", operating profitability in fragmented supply areas, high production costs compared to fossil, low technology readiness, weak offtake commitments & downstream infrastructure, low supply security, first-mover disadvantage, competing decarbonization strategies, regulatory uncertainty & steep regulatory demand increments. Closing the gaps for lenders and investors requires finance instruments that can unlock senior debt and administrative interventions that can reduce operational risk and increase bankability as also illustrated in Box 4 above.

Box 5 – Finance instruments that can unlock senior debt

- **Production Feed-in Premium:** close the variable cost gap and support Debt Service Coverage Ratio (DSCR)
- **Contract for Difference or double-sided auction:** convert policy value into a revenue floor and limit risk
- **Feedstock premium:** mobilize sustainable biomass without overloading feedstock procurement cost
- **Guarantees / first-loss tranches:** reduce senior-debt loss-given-default and extend tenor
- **EIB / InvestEU blended finance:** anchor financing terms and crowd in commercial lenders
- **CAPEX grants:** reduce Engineering, Procurement and Construction (EPC) risk and need for leverage

The study proposed a collective plan to be framed around four policy actions: a) EU or Member State feedstock premiums to mobilize sustainable biomass without distorting final fuel prices; n) introduce biofuel production premiums or equivalent contracts for difference to close the price gap between advanced biofuels and fossil comparators; c) harmonize certification, sustainability accounting and carbon-credit rules so that fuels can move across Member States with predictable compliance value; and d) treat the value chain as an integrated industrial system: feedstock, aggregation, conversion, logistics, infrastructure and offtake financed together.

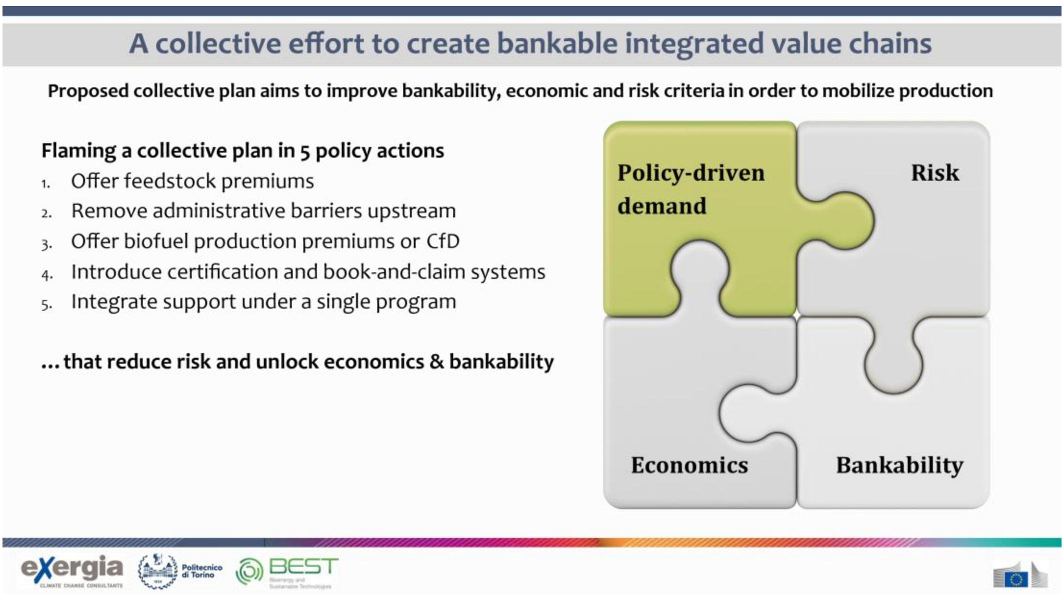

Figure 3. The collective support plan

Filippo Munisteri, deputy Head of Unit at DG ECFIN and alternate member at the board of Directors of the European Bank for Reconstruction and Development (EBRD), presented the landscape of the EU financing instruments, emphasizing on the implementation of the Invest EU Fund gathering 17 implementing partners comprising of the EIB group (European Investment Bank, European investment Fund), International Financial Institutions (Council of Europe Development Bank, European Bank for Reconstruction and Development, Nordic Investment Bank) and several National Promotional Banks. Examples of financed projects include the Andalucia Advance Biofuels by Cepsa / Moeve, the Sines Advance Biofuels by Galp and the ENI Biorefineries by ENI. for a total above EUR 1 billion EU loans to support production of Hydrogenated Vegetable Oil and Hydro processed Esters and Fatty Acids.

Under the EBRD and InvestEU Biofuels Framework, a blended finance structure also exists to support private sector investments in biofuels operated in EBRD EU countries. The example of SIA Next Biogas in Latvia illustrated this framework as closing financing gap in the region. An EBRD loan of 17,4 million with a 45% First-Loss Guarantee from InvestEU and private co-investment was approved to SIA Next Biogas to develop and operate a biomethane production plant.

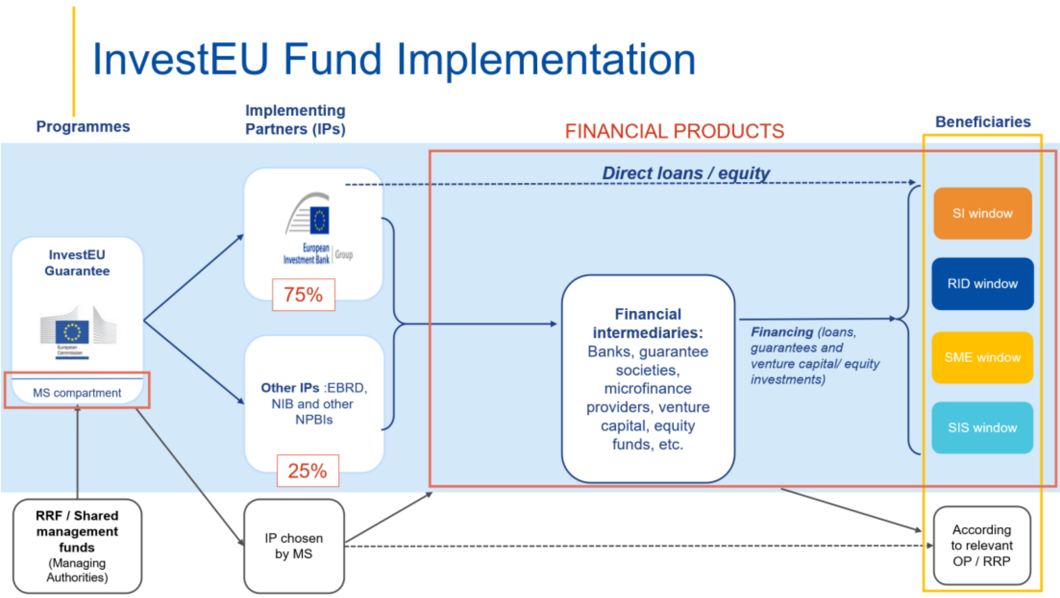

Figure 4. InvestEU Implementation

Roundtable: Bridging the gap and the way forward

The Roundtable addressed how to get Europe ready for large scale deployment of Advanced Biofuels and RFNBOs collecting the views of the Industrial Value Chain (IVC) key players. It comprised four sessions, each dedicated to a specific Industrial Value Chain of Advanced Biofuels and RFNBOs which is considered essential for meeting the RED targets for transport decarbonisation. It was moderated by David Chiaramonti, Professor at POLITO and Chairman of the CEM BIOFUTURE Platform. The expert contributions to each session have been compiled and reported by the four session Rapporteurs and summarized here.

Session IVC 2 – Hydrotreated Vegetable Oil / Hydro processed Esters and Fatty Acids (HVO/HEFA)

The panel comprised of Alexander Bachler Chairman of Working Party on Bioenergy at CopaCogeca, Luigi Scordamaglia President, Eat Europe, Sebastian Hirsz, Policy Executive at FuelsEurope Preeti Jain, Head R&I International Air Transport Association (IATA) and had as rapporteur: Dr. Giacomo Talluri, Senior Researcher, POLITO. The findings of the study around this value chain were illustrated as in the Figure 1 and debated by the panellists.

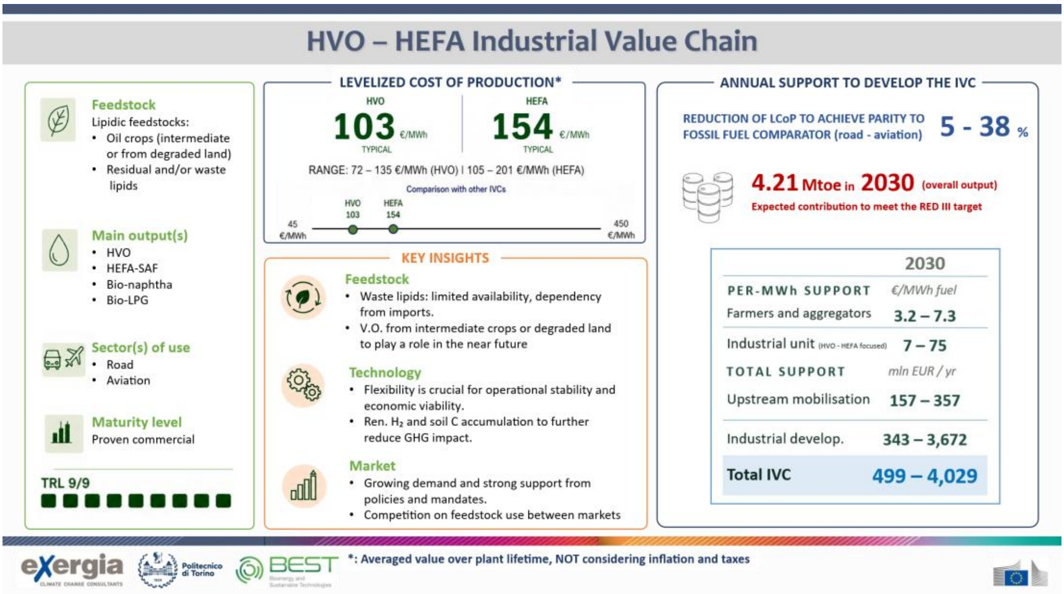

Figure 5. Overview of the HVO-HEFA Industrial Value Chain

Box 6 – Panel key messages

- **The HVO/HEFA** value chain is already scaling up, supported by technological maturity and the EU regulatory framework; however, further deployment depends on stable demand signals and investment across the value chain.
- **Lipidic feedstock availability** in the EU represents a strategic bottleneck, requiring stronger mobilisation of domestic resources, including intermediate oil crops and crops cultivated on marginal and degraded lands.
- **The contribution from sustainable agriculture** is key to scaling-up, offering the necessary additional feedstock support without compromising food/feed production - indeed supporting it through sustainable farming methods; adequate income streams for farmers must be ensured.
- **Regulatory design** can act as a key enabler or a barrier: it should ensure broad flexibility in feedstock selection while ensuring sustainability and robustness and taking due account of agronomic requirements.
- **Market and global dynamics matter**, particularly for aviation, where affordability, liquidity, and international alignment (e.g. with International Civil Aviation Organization frameworks) are essential for large-scale uptake.

Alexander Bachler, Chairman of Working Party on Bioenergy at Copa-Cogeca, strongly reinforced the message that there is no competition between food/feed and sustainable biofuel production and the requirement of increased availability of domestic feedstock, as it currently relies heavily on imported waste lipids. Lipidic intermediate crops can support such feedstock needs, but they need to provide additional income for farmers. Targeted economic incentives, including sufficiently high premiums for intermediate crops, are necessary to stimulate farmers participation. Such incentives should also consider the increasingly worsening climate conditions, particularly reduced rainfalls, raising the risk that crops planted in early summer may fail without adequate support.

Luigi Scordamaglia, President at Eat Europe underlined that the energy transition should be recognized not only as an environmental objective but as a strategic priority for the EU. Farmers are essential to enable the energy transition at scale and thus the decarbonization of the economy must be closely linked with agricultural development and the farming agri-food perspective. Sustainable biofuel feedstock production can generate additional income for farmers without compromising – but rather supporting - existing food and feed production, for example through intermediate crops or cultivation on severely degraded land. Evidence indicates that sustainable feedstock availability is not a limiting factor for biofuels capacity deployment, unless it is constrained by the regulatory framework itself. Annex IX definitions risk becoming a barrier to EU-based biofuel capacity, if they will remain too rigid and disconnected from agronomic realities. While the Commission recognizes the importance of biofuels, certain regulatory provisions may inadvertently limit feedstock availability. Strong efforts should be put on preventing fraud, such as cases where virgin palm oil is misclassified as Used Cooking Oil.

Sebastian Hirsz, Policy Executive at FuelsEurope mentioned that scaling of the HVO/HEFA value chain is already underway, driven by the combination of technological maturity and regulation/ mandate-driven demand (i.e. from RED and ReFuelEU Aviation frameworks). Competitiveness of the Value Chain depends also on maximising the use of existing industrial assets, including fostering the co-processing in existing refineries and the development of industrial clusters to capture synergies between existing processes. It should be stressed that output of a biorefinery is not simply HVO or HEFA, but rather a pool of biobased products. This in turn leads to the suggestion of avoiding excessive prescriptiveness in regulatory frameworks requirements, since that would hinder market optimisation as the sector scales. As an example, revisions to Annex IX should aim to maximise the use of all sustainable feedstocks. Confidence in robust sustainability certification systems is essential to address fraud risks. Overall, scaling is already in progress, the priority is to further leverage the industrial value chain and mobilize investment, particularly in feedstock supply and sustainable agriculture.

Preeti Jain, Head Net Zero Research & Programs at IATA shared that from the airline perspective, the priority is the availability of SAF that are both sustainable and affordable, as costs are ultimately passed downstream. In recent years, airlines have spent approximately USD 2.9 billion on SAF globally, a significant share of which is related to regulatory compliance efforts. Offtake agreements require improved transparency in cost structures to ensure clearer price signals. SAF availability remains insufficient and unevenly distributed geographically. On the one hand, revisions to RED Annex IX (Parts A and B) are needed to expand the feedstock base; on the other, mechanisms such as book-and-claim can help reducing operational costs and facilitating uptake. Increased SAF market liquidity has to be supported from the supply side by both consolidating the position of already mature production pathways and fostering the entrance of technologies currently still in their development phase. Aviation is a global sector, and EU framework must align with Global frameworks like *Carbon Offsetting and Reduction Scheme for International Aviation* adopted by sovereign nations and guiding airlines. EU policies should not work in isolation. While the EU is a leader in technology and policy, achieving decarbonisation targets requires global cooperation and alignment of measures.

Session IVC 7 – Anaerobic Digestion to biomethane

The panel comprised of Harmen Dekker CEO at European Biogas Association, Andrea Gerini

Head of Open Innovation at IVECO GROUP and had as rapporteur Dina Bacovsky, Scientific Adviser, BEST. The findings of the study around this value chain were illustrated as in the Figure 2 and debated by the panellists.

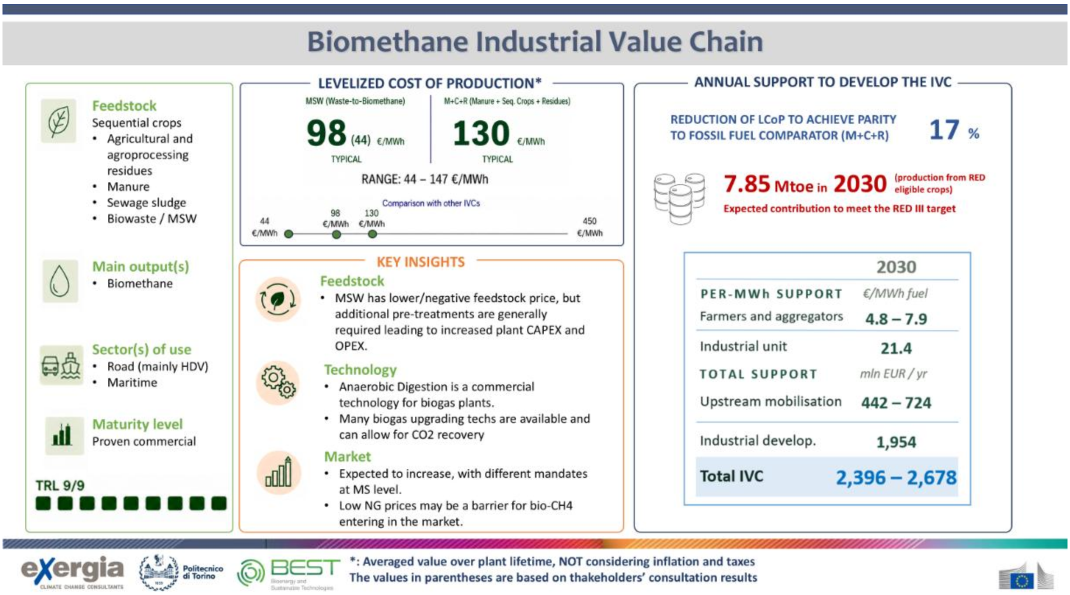

Figure 6. Overview of the Biomethane Industrial Value Chain

Box 7 – Panel key messages

- **The technology is mature, and the value chain is already widely used in heavy-duty transport** (25% of total EU biomethane production is consumed in transport, well beyond the conservative 10% assumption of some studies); it can be scaled up to 140 Mtoe from European feedstocks.
- **Production costs** can be further reduced over time; no technological barriers are identified, although an economic barrier exists related to the higher fuel price of biomethane, since fuel cost represents 1/3 of total cost of ownership in the heavy-duty vehicles sector.
- **Scaling up the value chain requires several actions:**
  a) a revision of the RED regarding which fuels are considered advanced, how Annex IX restricts the use of certain feedstocks, and the harmonization of how biogas and biomethane are treated across different parts of the regulation
  b) close alignment between the CO2 standard regulation, the RED, and the Alternative Fuels Infrastructure Directive is necessary.

Harmen Dekker, CEO at the European Biogas Association (EBA) mentioned that Accelerate EU confirms that Europe wants to further deploy sustainable fuels for the transport sector. It is necessary to accelerate the deployment of biofuels of European origin for reasons of energy crisis (continued volatility), becoming independent with own technology and own resources and sustainability. Support needed for biofuels is less than the support Europe has given to consumers and businesses during the energy crisis of 2022, when Europe spent 800 billion

Euro to support the fossil industry. The current share of biomethane production that is used in the transport sector is 25%. Engineering, Procurement and Construction (EPC) contractors stand ready for scaling biomethane production; towards 2030 28 billion Euro are set aside by biomethane developers to grow if conditions are right as the real barrier is regulatory hurdles. Biomethane can accelerate at scale and moreover is expected to reduce costs in time. A recent EBA report finds the sustainable biomethane production potential for the EU 27 at 166 billion cubic meters (corresponding to 140 Mtoe). There are four main barriers, all within the RED, for scaling up biomethane production: i) RED Annex IX does not take into account all sustainable feedstocks, severely hampering the ramp-up and positive contribution biofuels can make as also mentioned by other speakers; ii) biogas and biomethane production are sometimes seen as advanced technology and sometimes not, but is per definition advanced being a sophisticated system within a multivariable process producing multiple products which requires strict control;. maturing the technology remains advanced, i.e. feedstocks for biogas should all be placed in Annex IX Part A; iii) moving certain feedstocks from Annex IX Part A to Part B disrupts national markets while some Member States already classify these materials as “advanced” resulting in regulatory inconsistencies, legal uncertainty and investment risk; iv) inconsistent classification by end-use: listing the same feedstock under Part A and Part B, depending on their end-use, contradicts the principle of classification based on technology maturity, creating a system that is impractical to implement as the biomethane producer typically does not control the final end-use of the renewable energy they produce.

Andrea Gerini, Head of Open Innovation at IVECO GROUP said that the heavy-duty (HDV) road sector is a hard-to-abate sector, 7 million heavy-duty vehicles running in EU, it consumes 1/3 of EU energy in transport (80-90 Mtoe), 95% of which is diesel. The sector moves away from fossil diesel, electrification is coming very slowly since recharging capabilities for huge batteries need to be put in place, hydrogen will come. Biofuels are needed to speed up decarbonization of the sector. The heavy-duty sector is extremely sensitive to total cost of ownership, and the costs of fuels make up around 1/3 of cost of ownership, especially in the long-haul sector that is the main contributor to GHG emissions of this sector. Biomethane is already a consolidated reality, IVECO GROUP has a complete line up of vehicle since late ’90, and in EU 25% of methane used in transport is already biomethane, distributed as bio-CNG and bio-LNG. Last year IVECO took part at the Tour d’ Europe initiative, with an LNG truck that covered 6000 km all with bio-LNG, with a certified GHG saving of about -150%, leading even to a negative CO2 balance. What is needed is a close alignment between the CO2 standard regulation, that is the main driver for OEMs, the RED and the Alternative Fuels Infrastructure Directive, thus recognizing the contribution of biofuels to CO2 reduction over the sole tailpipe measurement.

Session IVC 8a - Gasification to methanol

The panel comprised of Felicia Mester Managing Director EU & IMO, Methanol Institute, Berta Cabello Calvo, Renewable Fuels Director, Repsol, Roberta Cenni, Head of Biofuels, Zero Carbon Shipping Mc-Kinney Moller Center Maersk. It had as rapporteur Dr. George Vourliotakis, Head of Energy & Policy and Planning Dpt., EXERGIA The findings of the study around this value chain were illustrated as in the Figure 3 and debated by the panellists.

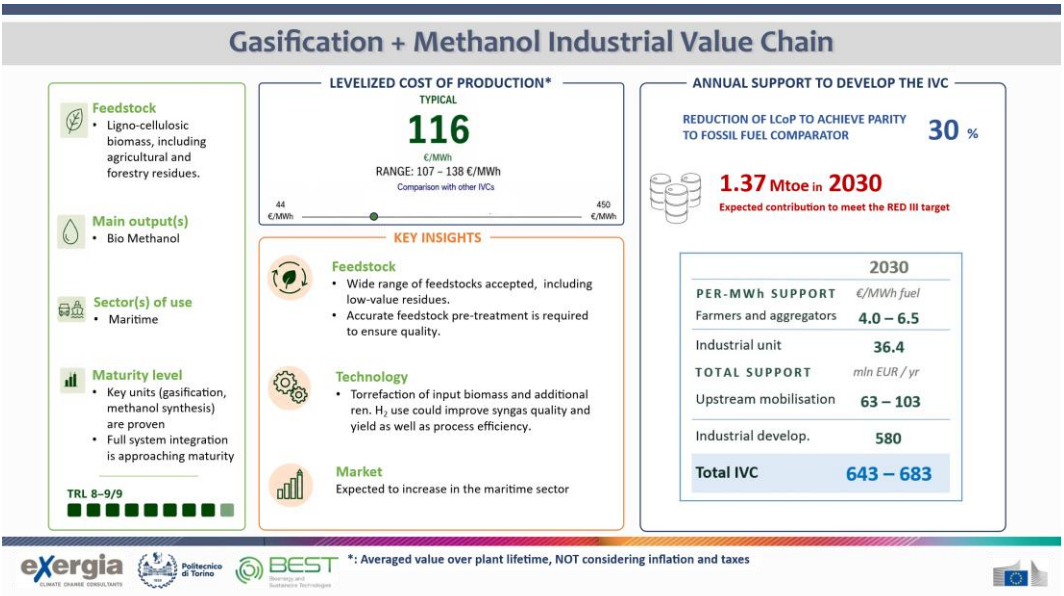

Figure 7. Overview of the Gasification + Methanol Industrial Value Chain

Box 8 – Panel key messages

- **Methanol deployment in maritime** faces a "timing and bankability gap": despite a supportive EU framework, limited near-term demand (before 2040), high production costs, and regulatory uncertainty hinder investment and large-scale project development.
- **Significant untapped potential exists from waste-based** pathways, particularly MSW-to-methanol, which could simultaneously reduce landfill volumes, enhance energy security, and meet a substantial share of EU methanol demand -provided adequate policy support is in place.
- **Scaling requires** clear long-term signals and investment support beyond first-of-a-kind projects, including lead markets (e.g. road transport), incentives for EU-based production, and a framework that enables hybrid technologies**.**
- **Global competitiveness and cooperation** are critical, as production is currently more viable in regions such as China, while Europe faces structural disadvantages and declining production.
- **Regulatory improvements** are needed, including more flexible feedstock rules, robust yet practical certification systems, and more science-based GHG accounting methodologies that better reflect real emissions and unlock additional feedstock potential**.**

Felicia Mester, Managing Director EU & IMO at Methanol Institute, noted that Methanol Institute members are exploring gasification as a potential pathway alongside other renewable and low-carbon production technologies. As the representative of the full methanol value chain, Methanol Institute underlines the importance of creating long-term market certainty for the use of methanol in the maritime sector. The EU policy framework has played a central role in promoting renewable and low-carbon fuels and establishing the market fundamentals for sustainable fuel projects. However, it is not sufficient on its own. Current market realities suggest that robust demand signals capable of unlocking large-scale production are still missing. For example, the level of ambition under FuelEU Maritime remains limited, with a clear incentive to use renewable fuels emerging only after 2030–2035. Such policy gaps must be addressed if Europe is to deploy clean fuels at scale. At the same time, a global perspective and stronger international collaboration are essential, as technologies cannot be scaled in isolation. For instance, methanol-to-jet technology in China could reach cost parity with fossil fuels around 2040, while in Europe methanol production has been declining and renewable fuel projects continue to struggle to reach final investment decision. Certification is another critical issue. The implementation of the Union Database is expected and will introduce an additional layer of complexity, with renewable fuels that have been certified for years by voluntary schemes and used for compliance under renewable energy targets now potentially at risk of becoming ineligible. Finally, a reality check is needed to assess whether the current regulatory framework is effective enough to deliver on the level of ambition that has been set.

Berta Cabello Calvo, Renewable Fuels Director at Repsol emphasized that there is a significant potential for reducing landfill waste and increasing energy security through biofuel production and presented Repsol's first-of-its-kind gasification to methanol project from municipal solid waste. Around 50% of municipal solid waste is going to landfill right now in Europe; there is opportunity of producing biofuels through MSW and reduce the amount of carbon that goes to landfills and at the same time increase energy security. Exploiting the above potential would result into the production of quantities of methanol equal to the current demand for all uses (while now half of that demand is covered through imports). The technology is commercial and only needs the appropriate policies and incentives to support the scaling up. Repsol plant is expected to start operations in 2029, when the technology will be fully commercial. With the appropriate policy framework, significant capacity could be deployed by 2035. For example, we need clear long-term targets for road transport as a lead market (driving the demand for biofuels). Repsol took the Final Investment Decision (FID) for its plant without any long-term offtake from maritime sector, but because it believed that methanol can be sold in different applications. It is important to promote production and investments in Europe. Support is needed for the real scaling up of those technologies. Sometimes Europe is not so competitive compared to others, thus promoting feedstocks and technologies made in Europe is needed. It is better to have policies to promote instead of policies to forbid, as promotion of new technologies like the ones defined in the two EC RTD study reports is necessary to deploy capacity (that will be needed by 2035) as fast as possible, and this is only doable by reducing the costs, and this in turn requires actual investments. Currently, there are tools for R&I and first-of-a-kind funding, but after that there is nothing. Hybrid technologies (bio, non-bio waste and RFNBO) should also be considered, and the regulatory framework should take into account hybridization of the different routes.

Roberta Cenni, Head of Biofuels at the Maersk Mc-Kinney Moller Center for Zero Carbon Shipping, noted that enabling methanol in shipping, may also require enabling ethanol. While methanol is widely regarded as a promising fuel within the shipping industry, its uptake is currently constrained by limited availability and relatively high costs. Some operators have secured offtake agreements in China, where methanol is offered at lower prices; however, competitively priced supply remains challenging to access in Europe. In this context, ethanol presents a complementary pathway, as it can be utilised in methanol-capable engines. Expanding the scope to include ethanol could help sustain momentum in the deployment of alcohol-based fuels while methanol supply chains scale up. At present, ethanol is not strongly supported as a fuel for shipping within the EU, largely due to concerns related to its origin from food and feed crops. At the same time, there is an ongoing discussion about the potential to broaden the sustainable biomass base through additionality. Furthermore, there is a need for a more science-based methodology for calculating greenhouse gas emissions from biofuels. Some of the factors currently applied in lifecycle assessments appear to be driven by administrative choices and may not fully reflect real-world conditions. A more accurate and transparent LCA framework would better support policymakers in designing no-regret strategies, enabling both methanol and ethanol to contribute effectively to the decarbonization of shipping.

Session IVC 5 – Lignocellulosic Ethanol and Alcohol to Jet (AtJ) and IVC11a – Gasification and Fischer-Tropsch

The panel comprised of Patrick Pitkänen Venture Development Lead at ST1 Nordic Oy, Tom Berg Director Policy and Sustainability at SkyNRG; Ruben Alblas Program Manager at Public Affairs of KLM Royal Dutch Airlines and had as rapporteur Paolo Corvo, Partner and COO, BF Partners. The findings of the study around this value chain were illustrated as in the Figure 4 and debated by the panellists.

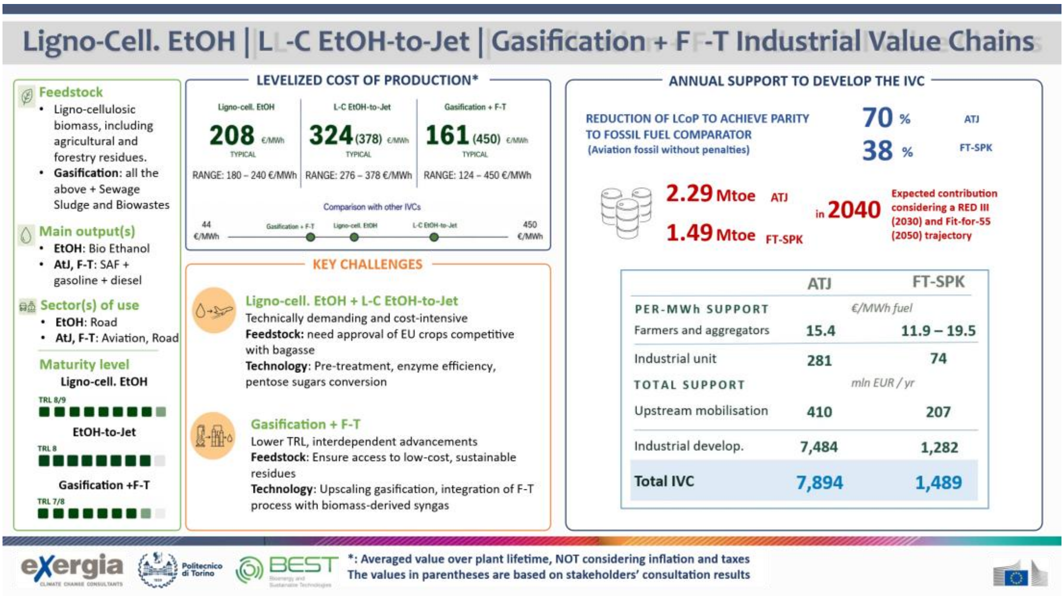

Figure 8. Overview of the Lignocellulosic Ethanol and AtJ and IVC11a – Gasification and Fischer-Tropsch Industrial Value Chains

Patrick Pitkänen, Venture Development Lead at ST1 Nordic Oy said that it is of strategic importance building domestic European advanced biofuels production capacity, drawing from ST1's own long-term industrial experience. He explained that ST1 represents a real industrial case study in how Europe can progressively develop integrated production assets, moving from concept to operational scale over many years, and this is not only about building plants, but about strengthening Europe's resilience, competitiveness, and long-term energy independence. Large-scale biofuel projects require extremely long development cycles. Building production facilities, securing technological maturity, and scaling innovation can take many years, often over a decade, which means Europe must act quickly if it wants to remain competitive. He stressed that innovation is required across the full value chain: feedstock sourcing, production technologies, process efficiency, and industrial scaling. The investment challenge is enormous. Europe will need billions in capital to create sufficient domestic production capacity, yet it faces global competition from the United States and China, both of which can often deploy capital more aggressively. Without substantial European support and industrial commitment, there is a real risk that Europe will become increasingly dependent on imported technologies, fuels, and feedstocks. Feedstock availability is a major issue. While Europe has significant potential through secondary and residual biomass streams, collection systems and supply chains remain underdeveloped. Better infrastructure, logistics, and policy support are needed to unlock this potential. In his view, Europe must urgently strengthen both domestic feedstock collection and industrial deployment if it wants to avoid falling behind global competitors. Overall, advanced biofuels are not simply an environmental necessity, but a strategic industrial priority for Europe requiring long-term vision, coordinated investment, and policy support.

Box 9 – Panel key messages

- **The EU must urgently accelerate domestic advanced biofuels and SAF production capacity:** EU's leadership will depend on rapidly transforming policy ambition into industrial reality by scaling domestic production assets now, as project development cycles are long and global competitors are already moving aggressively.
- **Securing and diversifying sustainable feedstock supply is fundamental to long-term competitiveness:** The EU must expand beyond traditional waste oils by developing robust collection systems for residual and secondary biomass, strengthening logistics, and unlocking underutilized domestic feedstock potential to avoid future supply bottlenecks.
- **Billions in strategic industrial investment are required to build a resilient European ecosystem:** Competing with the USA and China will require large-scale capital deployment, coordinated public-private financing, and strong industrial commitment to avoid technological dependence and preserve European energy sovereignty.
- **Reducing financing, technology, and execution risks is essential for project deployment:** Developers need predictable revenues, stable long-term offtake agreements, de-risking mechanisms, and stronger institutional financial support to make advanced biofuel and SAF projects bankable at commercial scale.
- **Innovation and technology scaling across the full value chain must strengthen:** EU's competitiveness depends on continuous innovation in feedstock sourcing, conversion technologies, process efficiency, and industrial deployment to accelerate commercialization and lower production costs over time.
- **Policy frameworks must support industrial competitiveness, not only demand creation:** Mandates are insufficient without globally competitive regulation, cost structures, and industrial strategy. Europe's success will depend on building a resilient, investable ecosystem capable scaling production fast to secure market leadership.

Tom Berg, Director of Policy and Sustainability at SkyNRG, stressed the needed focus on market, investment, and project finance perspective, particularly for SAF. Demand for SAF is already significantly outpacing current supply, with Europe consuming increasing volumes and market signals suggesting this trend will accelerate sharply in coming years. He emphasized that although future announced capacity may appear large on paper, actual supply remains constrained because many existing feedstocks are already heavily utilized by other sectors, creating an urgent need for diversification into new advanced feedstocks and technologies beyond traditional waste oils and fats. There are three primary barriers to scaling advanced biofuels: i) revenue certainty as Investors require confidence that projects will generate stable returns over long periods. Current airline purchasing behaviour often relies on relatively short-term agreements, which creates uncertainty for developers seeking financing for billion-dollar projects: ii) price stability as long-term offtake agreements are essential for financing, but SAF markets remain volatile. Airlines often hesitate to commit to long-term pricing structures, making project bankability more difficult; iii) technology and execution risk as lenders remain cautious regarding first-of-a-kind or early-stage projects. Project financing often depends heavily on proven EPC structures, government support mechanisms, grants, and innovation funds. He underlined that greater public support from European institutions, including mechanisms that reduce project risk, improve financing structures, and provide more predictable regulatory frameworks are needed. Europe's current innovation funding can help, but larger and more coordinated financial support systems are necessary, if Europe wants to compete globally. Europe's challenge is not demand but rather creating a sufficiently investable environment to accelerate domestic project deployment at speed and scale.

Ruben Alblas, Program Director at Public Affairs of KLM Royal Dutch Airlines, presented the fuel supplier and airline as end-user perspective. He emphasized the current operational and commercial realities of the European SAF markets. He said that regional vertical integration from feedstock to supply and direct market participation can provide airlines with more cost certainty and supply security. Airlines need stable, predictable SAF availability at reasonable cost, especially as regulatory obligations increase. The current market structure does not function well. There is sufficient global production, all using a single conversion technology using wasted oils which are limited and capped by European regulations, however the prices for airlines are extremely high. A major concern is caused by Europe's regulatory and cost burden relative to our global competition. European regulations create excessively high SAF costs and significant administrative burden without ensuring adequate domestic production and competitive support structures, creating severe disadvantages for European airlines versus non-European competitors which mostly operate under less stringent frameworks. Europe must prioritize domestic production building, rethink feedstock diversification in combination with boosting new and innovative SAF technologies, support their industrial scale-up and develop policy frameworks that strengthen rather than weaken European competitiveness. Infrastructure development must include not only mega-projects but also mid-scale and regional production facilities to ensure broader resilience and flexibility. SAF and advanced biofuels policy cannot rely solely on mandates. Market structures, industrial strategy, domestic valorisation of resources, know-how and skills and global competitiveness must be aligned and go hand in hand with affordability for the airlines. Europe's future success depends on combining sustainability objectives with realistic economic frameworks that support producers, airlines, and broader industrial ecosystems alike.

Concluding Remarks

One clear message emerged from the discussions: Europe already has the knowledge, technologies and industrial actors needed to move forward but must **mobilize all actors** in an aligned way to scale up deployment and create the right conditions for investment in industrial value chains.

Advanced Biofuels and RFNBO technologies are Important for decarbonization of overall EU economy, particularly transport but also energy intensive industries.

They are **integral part** for implementing the EU Policy for clean transition and industrial decarbonisation and a priority action area in the Strategic Energy Technology (SET) Plan.

EU holds the **technological advantage** in production and innovation development, but **production capacity** remains **limited** and needs to be scaled up at a reduced cost.

Two recent EC RTD studies reveal the **potential** and the ways of **mobilizing** industrial capacity building and production needing administrative and financial support over the entire industrial value chain. Supporting **deployment** through EU and national de-risking instruments, such as programs for grants, funds, loans, loan guarantees and blending finance is possible and crucial.

It is essential to **continue supporting** technological development and scale up through EU research and innovation and competitiveness framework programs. Horizon Europe supports technologies with more than EUR 500 million in the period 2021 - 2027 under Cluster 5 with two SET Plan flagship calls of EUR 70 million to bridge technology with scaling up.

Maintaining a **wide portfolio of complementary solutions** with a diverse mix of technologies to utilize the full range of eligible feedstocks and produce the complete spectrum of necessary fuels is indispensable.

Raising awareness and support at **national level**, spurring creating **critical mass** of activities and stakeholders to incentivize domestic production and stimulating a **concerted action** of European Commission, Member States, industry, and finance sectors are required on the way towards commercialization.

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Advanced biofuels and RFNBOs can be sustainably produced domestically, without dependencies for technologies or feedstock. A wide portfolio of complementary solutions is required with a diverse mix of technologies to utilize the full range of eligible feedstocks and produce the complete spectrum of necessary fuels. Under certain conditions, demand for advanced biofuels may be even higher making the biofuel industry strategically important for EU, to ensure a timely and cost-effective delivery of emissions savings reduction. EU must mobilize all actors in alignment and create the right conditions for investment in industrial value chains.

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