



RENEWABLE AND LOW-CARBON FUELS
VALUE CHAIN INDUSTRIAL ALLIANCE

ANNUAL PROGRAMME
FOR 2022 – 2023

ENDORSED AT THE GENERAL ASSEMBLY
OF 12 JULY 2022

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CONTEXT

The [‘Sustainable and Smart Mobility Strategy’ together with its Action Plan](#) presented by the European Commission on 9 December 2020 lays the foundation for the decarbonisation of the EU transport system and, as outlined by the European Green Deal, transport overall needs a 90% cut in emissions by 2050 compared to 1990 levels, delivered by a smart, competitive, safe, accessible and affordable transport system. On 14 July 2021, the European Commission presented a package of proposals to make the EU’s climate, energy, land use, industrial ecosystems, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55 % by 2030, compared with 1990 levels – the Fit for 55 package. Among its objectives, it foresees a faster roll-out of zero - and low-emission vehicles and related infrastructure as well as renewable and low-carbon transport fuels to support the transition to climate neutrality. In particular, the [Refuel EU Aviation proposal](#) will oblige fuel suppliers to blend increasing levels of sustainable aviation fuels in jet fuel taken on-board at EU airports, including synthetic fuels. Similarly, the [FuelEU Maritime proposal](#) will stimulate the uptake of sustainable maritime fuels and zero-emission technologies by setting a maximum limit on the greenhouse gas content of energy used by ships calling at European ports. On 6 April 2022, Commissioner for Transport and Mobility, Adina Vălean, launched the “Renewable and Low-Carbon Fuels Value Industrial Alliance” (RLCF Alliance) as a flanking measure to the Refuel EU aviation and Fuel EU maritime initiatives. The ultimate objective of the Alliance is to ensure that aviation and waterborne transport have sufficient access to renewable and low carbon fuels, while taking into account the future use of these fuels in road transport, and thus contribute to the reduction in the transport sector’s greenhouse gas (GHG) emissions by 90 percent by 2050.

The *Renewable and Low Carbon Fuels Value Industrial Alliance* means to provide a concrete contribution to the decarbonisation of the aviation and maritime sectors by encouraging broad participation along the value chain. The first year of the Alliance will be mainly devoted to the definition of shared visions among the Alliance members and the identification of technological pathways, consistently with the objectives and scope of the ReFuelEU Aviation and FuelEU Maritime. In these tasks, pragmatism will guide the work of the Alliance. The innovation, sustainability and scalability potential, technological, market conditions and timeline specificities of renewable and low carbon fuels in those transport modes have to be duly considered and reflected in the visions and roadmaps referred to hereafter, as well as in the operational structure of the Alliance that will be put into place. At the same time the works of the Alliance need to ensure cross-cutting dynamics and avoid silos modes. Indeed, understanding possible synergies among the maritime and aviation sectors, as well as with land transport, will be particularly important in a value and supply chain perspective to properly identify the main scale up and affordability challenges of renewable and low carbon fuels in the waterborne and aviation sector. Finally, with its members representing the overall renewable and low carbon fuels value chain from feedstock to suppliers and end uses, the Alliance has the ambition to provide concrete benefit for the industrial ecosystems. In this respect the Alliance can play an important awareness raising role on how to facilitate the supply, transport and use of renewable or low-carbon fuels, even more considering the fast-changing regulatory environment. The identification of the main barriers will

be a stepping stone towards a more impactful dialogue with the relevant stakeholders on how to tackle them.

Another key deliverable of the Alliance will be the preparation of a pipeline of investment and R&D projects that will gather, already in the first year, the members contributions with a view to create and give visibility to industry projects. To this end, the Alliance should undertake a reflection on how to ensure a good quality of the project pipeline and which associated tools (including financial) to deploy towards its implementation.

THE ALLIANCE WORK PROGRAMME

The first annual Work Programme of the RLCF Alliance builds on the Alliance Declaration that was presented on the 6 of April and the Memorandum of Understanding with Fuels Europe, Hydrogen Europe, Safran and Fincantieri and the European Commission to kick off and support the works of the Alliance.

The present draft Work Programme of the RLCF Alliance for the years 2022-2023 has been developed by the partners active in the by the Steering Group of the Alliance (European Commission, FuelsEurope, Hydrogen Europe, Safran and Fincantieri) and has been submitted to a public consultation of the Alliance Members between 17 June and 1 July.

The Members of the RLCF Alliance gathered at its first General Assembly are invited to endorse the present draft Work Programme.

The first annual Work Programme addresses a long-term and a short-term objective:

- **Long-term: create a robust Alliance structure to support a sufficient and adequate access of aviation and waterborne transport to renewable and low-carbon fuels while taking into account that, in the transitional phase, they will continue to play an important role in the decarbonisation of road transport.** The Alliance will therefore contribute to the long-term objectives of emission reduction in the transport sector in line with the EU climate ambition.
- **Short-term: establish a clear set of tasks and deliverables for the first-year.** To get the Alliance effectively going, the Work Programme addresses the operational and concrete activities to implement the five specific objectives identified in the Alliance Declaration.

The Alliance Declaration outlines the following five specific objectives:

Objective 1: Building on the sustainable feedstock and production pathways eligible towards the decarbonisation targets put forward in FuelEU Maritime and ReFuelEU Aviation, the Alliance shall:

- i. leverage on work done in other initiatives¹, identify transport fuels which are most economically and environmentally suitable (including consideration for the zero-pollution ambition²) for scaling up, and
- ii. evaluate strong and weak points of the value chain (including systemic, technological, geographical and workforce related ones) and assess investment needs.

Objective 2: For the purpose of accelerating market entry of new innovative fuels and associated technologies, the Alliance will assess the enabling conditions, such as those relating to demand and supply side including local availability of feedstock, adequately trained workforce and industry knowledge base in Member States. It will also identify gaps in standardisation, safety assessments, and make sure all stakeholders in the value chains are aware of any downstream certification requirements³. This assessment will feed into and inform relevant policy debates.

Objective 3: Identifying and assessing existing relevant public and private financing opportunities as well as determining the suitability of additional instruments for de-risking investments for scaling up the production and crowding in private investments (in particular in relation to cross-border projects, including possible Important Projects of Common European Interest) and drawing conclusions on their suitability.

Objective 4: Create a pipeline of investment projects (including high TRL level R&D activities) based on prioritisation established under Objectives 1 and 2 and the self-assessment tools in order to increase their visibility and credibility. In the development of such pipeline, the Alliance will pay particular attention to focus on projects that are compatible with the transition to low- and zero-emission mobility. Ongoing processes to develop and subsequently deploy technologies for zero-emission vessels and aircraft shall not be negatively impacted.

Objective 5: Looking at creating synergies with different transport modes and ensuring availability of resources for renewable and low-carbon fuels for aviation and waterborne transport (notably in cooperating with the European Clean Hydrogen Alliance and ensuring consistency between hydrogen production capacity increases and different utilisation pathways in transport, such as for e-fuels).

Work carried out in the context of the Alliance should enable its members to make substantive progress on the five core objectives by mid-2023, including the project pipeline of investments as foreseen under Objective 4.

¹ Such as European Sustainable Shipping Forum, Aviation Round Table, ETIP Bioenergy and similar.

² The European Commission action plan “Towards a Zero Pollution Ambition for air, water and soil – building a Healthier Planet for Healthier People” adopted on 12 May 2021.

³ A pilot project for the EU “Clearing House” for aviation fuels certification is in preparation by DG MOVE and EASA. The Alliance will provide input into the design of this clearing house as well as contribute to the monitoring of implementation and evaluation of the pilot project results.

To this end, the Steering Group will prepare a call for projects beginning 2023 reflecting the vision and technological pathways discussed in the relevant operational structures of the Alliance concerning the maritime and the aviation sectors, as well as the cross-cutting supply chain issues. The project pipeline will take into consideration the works of the European Clean Hydrogen Alliance concerning the availability of renewable hydrogen and its use for the production of synthetic fuels.

The call for the project pipeline will be based on objective criteria. All projects meeting the latter will be included in the pipeline, following verification by the European Commission.

The Steering Group will seek the advice of the relevant operational structures of the Alliance in the preparation of the call for projects. The project pipeline will provide visibility to the ongoing and foreseen industry efforts. It will also be instrumental to the identification of the gaps in the value chain and the bottlenecks to be addressed through the Alliance operational structures.

THEMATIC ROUNDTABLES

Work carried out in the context of the Alliance should enable all members to make substantive and harmonious progress on the five core objectives by mid-2023 and open a first call for proposal for investments to be included in the project pipeline under objective 4. To this end, the Work Programme recognises the need of a flexible approach to fully consider the specificities of aviation and waterborne transports and the different level of awareness, technology maturity and preparation of the stakeholders. In this regard, the work Programme proposes to put into place several operational structures that will adequately tackle the specific challenges the maritime and aviation sector are confronted with, as well as the most relevant cross-cutting issues that need to be addressed to facilitate the availability and use of renewable and low carbon fuels. The General Assembly is thus invited by the Steering Group to endorse the following four roundtables:

1. Roundtable 1 - The availability of feedstocks, synergies among sectors and the so-called “Just transition”
 2. Roundtable 2 - Production pathways and value chain – Aviation
 3. Roundtable 3- Production pathways and value chain – Waterborne Transport
 4. Roundtable 4 - Access to public and private finance
- Each roundtable will be composed of a limited number of participants (i.e. 30 to 35, as an indicative number), grouping selected stakeholders from relevant value chains along key fuel technologies and modes (aviation and waterborne), and key common challenges and horizontal issues, e.g. access to feedstock, access to finance, synergies with road transport, etc. based on an open call for participants. The call for participants to the four roundtables will be launched after the General Assembly, with a view to organise the constitutive meetings in autumn. Roundtables will be created on the basis of this Work Programme, proposed by the Steering Group and endorsement by the General Assembly. The selection of the members of the thematic roundtables will be conducted by the European Commission assisted by the Steering Group and paying particular attention to ensure (at all times): a high level of expertise;

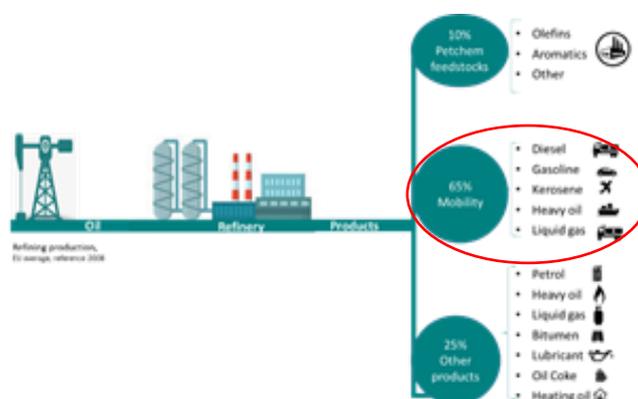
- geographic balance, favouring underrepresented regions of the EU;
- representation of large, medium and small enterprises;
- contribution from other stakeholders, including financial market actors, non-governmental organisations and other social partners.

Thematic roundtables shall operate on the basis of specific Terms of Reference, developed on the basis of a model submitted by the Steering Group, consistently with the objectives of the Alliance and the Work Programme. External expertise on a case-by-case basis may be considered in implementing the Work Programme. Each roundtable shall nominate a Chair. Its members will approve the organisation of the works streams. These will be implemented under the authority of the Chairman of the Roundtable who will update the Steering Group on a regular basis.

ROUNDTABLE 1: THE AVAILABILITY OF FEEDSTOCKS, SYNERGIES AMONG SECTORS AND THE JUST TRANSITION”

- *Take stock of the current energy demand and the availability of resources to support the EU climate ambition.*

Roundtable 1 on feedstock and synergies is invited to take stock of the current energy demand and the availability of resources to support the energy transition of the fuel industry and the decarbonisation of transport. Currently, a wide array of products from the refining of crude oil fulfils the vast majority of the energy needs for transport of citizens and businesses alike. To satisfy the market demand, about 65% of the crude oil processed in EU refineries is transformed into (mostly liquid) fuels for transport, about 10% provide petrochemical feedstocks, and about 25% is employed for other products. To comply with the European Green Deal many technologies are needed and it will be essential to develop an effective industrial cooperation in Europe, supported by the relevant R&D frameworks. Many technologies and diversified feedstocks are needed to develop and scale-up in a sustainable way to support the European Green Deal objective and it will be essential to develop an effective industrial cooperation in Europe across the whole value chain, supported by the right R&D frameworks.



Eurostat – WoodMackenzie 2015 – EEA 2020

To enable the decarbonisation by 2050 of the aviation and maritime sector - without excluding the fact that in the medium term different renewable and low-carbon fuels will continue to play an important role in the decarbonisation of road transport - a critical technologies must be deployed at scale.

To this end, Participants in Roundtable 1 are invited to reflect on the deployment of renewable and low carbon fuels technologies and synergies considering the following elements as a starting point consistently with the provisions of the Renewable Energy Directive (2018/2001 EU), the proposal for a regulation of the European Parliament and of the Council on ensuring a level playing field for sustainable air transport (ReFuel EU Aviation, (COM)2021) 561) and the proposal for a regulation of the European Parliament and of the Council on the use of renewable and low-carbon fuels in maritime transport and amending directive 2009/16/EC (Fuel EU Maritime, COM 2021/0210).

The table below refers to various fuel technologies that may contribute to compliance with the ongoing EU legislative proposals under the Fitfor55 (REDIII, ReFuelEU Aviation and FuelEU Maritime). Given that these are proposals still under negotiation, the table may still be subject to modification pending to approval of the final text by the European Parliament and Council.

Type of fuels	Feedstock / sources	RED II(i)	ReFuelEU Aviation (EC proposal)	FuelEU Maritime (EC proposal)
<i>1. Biofuels</i>	Food and feed crop ⁴	X		X ⁽¹⁾
	Annex IX A (Advanced biofuels)	X	X	X
	Annex IX B (Used cooking oil, Animal fats Cat 1 & 2)	X	X	X
	Other residues or feedstocks not in Annex IX for biofuel production	X		X

⁴ Excluding residues, waste or ligno-cellulosic material and intermediate crops, such as catch crops and covercrops, provided that the use of such intermediate crops does not trigger demand for additional land)

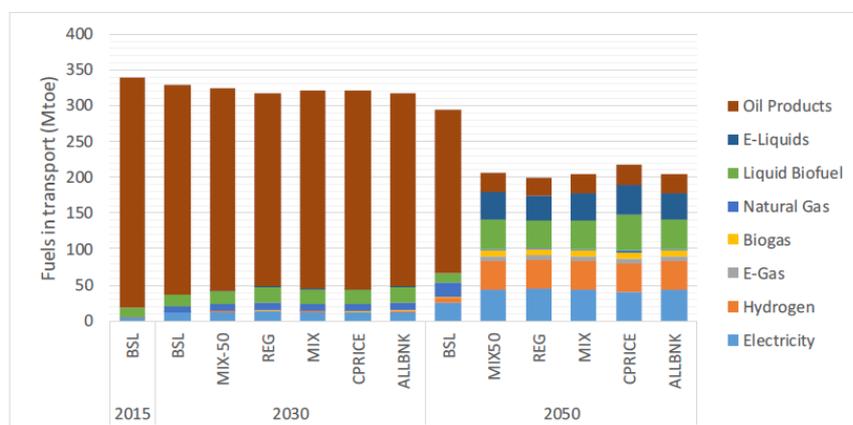
2. Recycled Carbon Fuels (RCF)	Liquid or solid waste streams of non-renewable origin which are not suitable for material recovery or from waste processing gas and exhaust gas of non-renewable origin which are produced as an unavoidable and unintentional consequence of the production process in industrial installations	X		X
3. Renewable Fuels of Non-Biological origin (RFNBO)	Energy content derived from renewable sources other than biomass	X	X	X
4. Other low carbon fuels ⁵	Low carbon hydrogen (encompassing fossil-based hydrogen with carbon capture source either as final fuel or as basis for production of synthetic fuels)			X
<p>Notes:</p> <p>(1) <i>Food and feed crop biofuels are proposed under FuelEU maritime to be considered as fossil fuel as far as the relevant Well-to-Tank CO₂ emission factors are concerned. This is in line with the general policy line of the Commission with respect to biofuels of 1st generation and reflects the need to safeguard against a surge in demand for these less sustainable biofuel products. From FuelEU maritime legislative proposal : Article 9 (c) biofuels and biogas that do not comply with point (a) or that are produced from food and feed crops shall be considered to have the same emission factors as the least favourable fossil fuel pathway for this type of fuel;</i></p>				

Roundtable 1 on the “Availability of feedstocks, synergies among sectors and the so-called Just transition” will be invited to work on the following objectives :

- i. **Supply and demand** the current supply of liquid fuels, mostly of fossil origin, in EU road, aviation and maritime transport is currently about 370 Mtoe/y.

⁵ Low-carbon fuels’ means recycled carbon fuels as defined in Article 2 of [Directive \(EU\) 2018/2001](#), low-carbon hydrogen and synthetic gaseous and liquid fuels the energy content of which is derived from low-carbon hydrogen, which meet the greenhouse gas emission reduction threshold of 70%. Low-carbon hydrogen’ encompasses fossil-based hydrogen with carbon capture and electricity-based hydrogen, with significantly reduced full life-cycle greenhouse gas emissions compared to existing hydrogen production.

Figure 63: Fuels in transport (including aviation and maritime navigation)



Source: PRIMES model

The demand for liquid fuels is expected to decline (ref. CCW/FuelsEurope and IEA energy outlook, 2021). This is the result of various drivers such as the implementation of energy efficiency measures as well as the penetration of alternative technologies, such as electrification or gaseous fuels while the renewable fuels and the e-fuels are progressively replacing fossil fuels in liquid fuel usage, contributing to the 2050 climate neutrality objective.



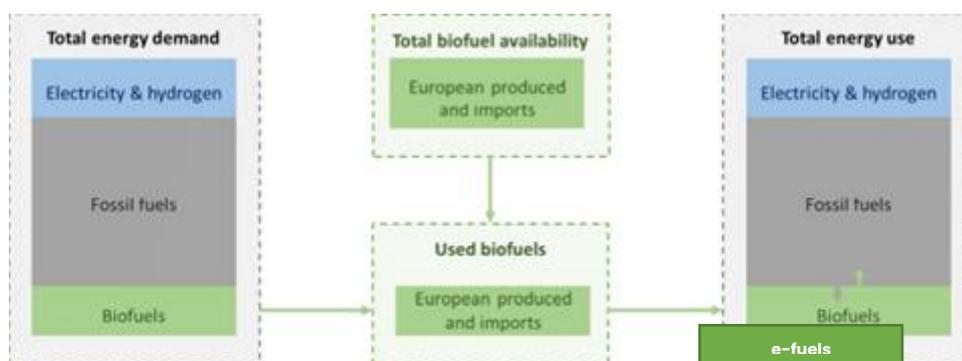
IEA Energy Outlook 2021

The Roundtable is invited to consider the demand in different plausible scenarios by 2030 and by 2050 (e.g. high demand for all transport modes, medium demand - aviation, maritime and partially road - and low demand where the Renewable and Low carbon liquid fuels are exclusively for aviation and maritime) and to identify the key challenges associated to each.

- ii. The Roundtable is encouraged to discuss the **sustainable availability of feedstocks** that will be needed for the production of renewable fuels and the raw materials to sustain the energy transition and how to collect and mobilise these feedstocks to the production sites, as well as the potential impact on biodiversity. Based on a stocktaking exercise, involving projected demand in all transport modes, with the support of relevant authoritative available studies, including those specific to the aviation and waterborne sectors, the Roundtable will identify and map all available feedstock in European regions and globally with a particular focus on EU Member States in full compliance with the EU sustainability criteria as defined in the current Renewable Energy Directive (2018/2001 EU) also addressing the potential need for imports. This assessment will facilitate the identification of strengths and weaknesses as well as new business and job opportunities for EU national and local authorities and industries. Such an assessment will also benefit industrial stakeholders from the sustainable fuels value chain as it

will help them to streamline the allocation of their resources, optimise logistics and supply costs, and potentially their investment choices based on the location of feedstock.

- iii. As some studies argue that the energy transition is a “transition of commodities”, members of Roundtable 1 are also invited to reflect on raw materials requirements for renewable liquid fuel production to support the ambitious climate policy in EU. *Which are the progressive steps to move? What are the opportunities for domestic supply or for breaking strategic dependencies on imports? How to build integrated value fuel production chains?* Is the EU regulatory framework suitable to enable the development and deployment at scale of renewable fuels? These and other questions might stimulate the debate.
- iv. The Roundtable will assess the enabling conditions and identify bottlenecks along the whole value chain, with particular attention to standardisation, safety assessment and certification requirements, constraints and strengths in the value chain and the role of the agricultural and forestry sector, including feedstock logistics (including infrastructure) and supply chains. The Roundtable will seek integration and industrial symbiosis among sectors e.g. agriculture, chemicals, forestry, waste and recycling. Moreover, the Roundtable will assess the availability of renewable electricity, and therefore of hydrogen and CO₂ and other relevant technologies, processes and inputs, for the production of sustainable fuels for the aviation and waterborne sectors. This will be notably crucial for the production of synthetic fuels (e-fuels or power-to-liquid), building on the existing knowledge of the Clean Hydrogen Alliance, and of advanced biofuels.



- v. Participants in Roundtable 1 are invited to identify **key actions to speed up the replacement of the (fossil) liquid demand with the non-fossil and sustainable one** and recognise how would be possible to reach the maximum efficiency of the decarbonisation with lower costs (in terms of Euro/ton CO₂) through the competition of alternative solutions
- vi. Roundtable 1 will also consider the **risks and the potential unexpected challenges of technical feasibility, costs and unintended consequences for the society** and discuss mitigating actions and strategies for the industry. In the short to medium term, renewable fuels alternative to petroleum based liquid fuels such as advanced biofuels and e-fuels will be more expensive to produce than the petroleum based equivalent. Therefore, the affordability of these alternative

fuels needs to be achieved and, in the short term, improved. *How ensure that nobody is really left behind to have a “just transition”?*

Assess and exploit the synergies of all transport sectors

Decarbonisation is expected to be a simultaneous process where transport modes (road, aviation and maritime transport) will progress in parallel, including the segment of construction vehicles and agriculture machineries. Decarbonisation is also becoming a topic of interest for the military and defence sectors and their transition, although characterized by different requirements and needs, should also be considered.

Assessing the technological path and the associated costs

To enable by 2050 aviation and maritime to reach the climate neutrality, a combination of critical technologies must be deployed at industrial scale. The combination of options practically available will be different from site to site, dictated by different factors such as existing configuration, location and proximity to other industries.

The development at industrial scale of renewable and low-carbon fuels needs a number of “enablers”, including (but not limited to):

- Support R&D frameworks to develop an effective industrial cooperation and industrial ecosystems in Europe to boost a combination of multiple technologies;
- Enabling international regulatory frameworks for the promotion of the renewable and low-carbon technologies;

To identify and address the entry barriers on a concrete basis, the Roundtable 1 will take stock of the existing renewable and low-carbon fuels projects in Europe and their different levels of maturity/readiness. Available information (e.g. www.cleansfuelsforall.eu/towards-climate-neutrality/#transformation and the [Project pipeline of the European Clean Hydrogen Alliance](#)) will serve to map the market needs to deploy the production at scale and discuss how to encourage the creation of hubs and industrial ecosystems for production and distribution of sustainable hydrocarbons for use as liquid fuels. *How many industrial installations will be needed and by when they will be required to progressively replace fossil fuels in transport?* The Roundtable 1 will be invited to reflect on these aspects.

Finally, the Roundtable will discuss about the costs that the transition of the industry along the whole value chain towards these technologies will imply and liaise with Roundtable 4 on these topics. EU research and development programmes (e.g. the Innovation Fund) are expected to trigger further development and investments in the renewable and low-carbon technologies, potentially reducing the production costs in the coming years (e.g. CAPEX reduced due to the development and scaling up of the technologies).

Building on the elements above, Participants in the Roundtable 1 will develop a shared vision on the availability of feedstock, technologies and processes, the production capacity and renewable and low-carbon fuel quantities, also identifying the different renewable and low-carbon fuel pathways.

ROUNDTABLE 2: PRODUCTION PATHWAYS AND VALUE CHAIN – AVIATION

Sustainable aviation fuels (SAF) are an immediate and available solution that has been identified as one of the most promising ways to reduce meaningfully the environmental footprint of aviation in the short to medium term. By 2050 the aviation sector may need around 400-500Mt/year of SAF worldwide to achieve its net-zero emission objective. However, today, global production is estimated to provide only around 0,05 % of the aviation needs. This very low level of production results in particular from too limited investments and no efficient incentives to use SAF as they remain too expensive and therefore uncompetitive for final users - air operators mainly, but also aircraft and engine manufacturers - without policy support.

As it stands, in 2023, the ReFuelEU Aviation regulation proposal currently under negotiation will provide a favourable regulatory framework for the massive deployment and uptake of SAF. Thanks particularly to the new EU SAF blending mandate, together with an e-fuels sub-target, this regulation will provide the legal certainty and visibility needed by investors and help the whole European SAF value chain to emerge. Accordingly, with the help of the Members interested in the aviation sector, the Alliance will work on the relevant enabling conditions and supporting measures to ensure that the SAF production capacities in Europe will grow quickly and consistently with the blending mandate trajectory set in the ReFuelEU Aviation. The Roundtable will in particular focus on identifying and addressing all the existing obstacles to SAF mass deployment and production. Finally, as SAF deployment is a global challenge, participants in the roundtable are invited to promote and support international cooperation with relevant similar Alliances around the world (e.g, but not only, in the United States of America, United Kingdom, Australia, Asia). The 2022-2023 work programme will therefore focus on five key actions taking advantage of all potential synergies between the thematic roundtables .

The Alliance members are invited to endorse a thematic roundtable dedicated to the Aviation sector. The roundtable shall be open to the participation of interested members of the aviation sector and of the renewable and low-carbon fuels value chain.

Its activities and initiatives should be geared toward achieving the following tasks:

- ***Establish a common knowledge base (stocktaking exercise)***

The aviation sector is divided into several markets segments, from urban air mobility to long-haul carriers, including also helicopters and military aircrafts. In the coming decades, each segment will rely on several energy carriers: electricity, conventional and sustainable aviation fuels, hybridisation, hydrogen. In this energetic mix, SAF will play a crucial and lasting role while

disruptive technology solutions are progressively developed and until they reach a sufficient level of maturity for commercial operations, especially for long-haul flights. However, other modes of transport are facing the same technological challenges and share the same need to secure sufficient access to sustainable fuels in order to achieve their own decarbonisation objective.

In this context, it is therefore of the utmost importance that the aviation sector has a clear picture of 1) the availability of feedstock in Europe and worldwide (global availability, but also practical availability, taking into account the difficult mobilization of this resource) for SAF production (based on the input from Roundtable 1) and 2) the quantity of SAF that is expected to be produced out of them covering both advanced biofuels and synthetic fuels (e-fuels, or Power-to-liquid - PtL). During the last ten years, many studies and assessment of available feedstock and future outlook, of SAF pathways and supply chains have been carried out at EU and international level. These studies have been useful to better understand what the availability of feedstock is and quantify the volume of SAF needed to meet the aviation sector carbon-neutrality target by 2050.

The Roundtable 2 is invited to take stock of the existing work to develop an EU common knowledge base on SAF. As a first task, an inventory of relevant knowledge based on feedstock, technology and processes for SAF production can be identified to feed into the work of the Roundtable 1 on feedstock and technology assessment. From that assessment made in the Roundtable 1, the Roundtable 2 will draw the consequences and scenarios for the production of SAF leading to the identification of the production potential of SAF according to the production pathway, in function of various factors, such as the combination of available feedstock, technology and other inputs used, environmental efficiency (expected yield), scalability potential and sustainability (GHG reduction potential).

- ***Elaborate a roadmap for scaling up SAF : taking into consideration the diverse maturity of SAF pathways (certified and new ones)***

The success in SAF deployment in Europe and globally will depend on the access to a multiplicity of diversified SAF produced from sustainable biomass and renewable electricity. Given the need for the aviation, maritime and land-based transports sectors to gain access to sustainable fuels and the gradual deployment of SAF in the early years, the aviation sector will require various scalable and sustainable sources of SAF supply. Indeed, all SAF pathways will be needed in order to comply with the future EU blending mandate and even go beyond, and achieve carbon neutrality.

However, existing SAF pathways do not have the same level of technological development, and commercial maturity, certification status in terms of aviation safety, environmental benefits (different level of emission gains) or industrialisation timeframe, scalability and different economic viability (cost competitiveness).

In order to build an optimised and rational investment strategy that reconciles both the objective of rapidly increasing their availability on the market with their technological and commercial maturation, it is first necessary to build a clear and common roadmap for the rapid development and commercialisation of the different SAF production pathways.

The Roundtable will produce such SAF deployment roadmap clarifying the sequencing of the technological and commercial maturation of each pathway as of today until 2030, which is the expected timing for the commercial full-scale deployment of synthetic fuels on the SAF market. The roadmap should identify, for each of SAF pathway (certified and new ones), the technological and economic barriers to be removed and the R&D activities necessary to make rapid progress towards their introduction on the market. In addition, other barriers should be considered, including the analysis of the existing and required logistics and infrastructures along the entire value chain, standardisation and certification, skills, etc for the production and supply of SAF across Europe (including in smaller airports) and its regions. It should also identify the strengths and weaknesses, opportunities and risks of the SAF Value Chain in Europe, with due consideration of Europe's regional differences, for each of the SAF pathway.

The Roundtable will assess the potential of environmental benefits of various SAF production pathways, and take stock of gaps and differences in terms of SAF sustainability assessments (e.g. difference in Life Cycle Assessment approaches) to allow investors and value chain stakeholders make the right decisions.

The roadmap will propose a short and efficient action plan to unlock the potential of the identified SAF pathways (R&D, business model and sustainability understanding, identification of gaps in the value chain and industrial projects). For each SAF pathway, the roadmap should answer to this question: *what are the steps to be taken and the obstacles to overcome in order to move towards full scale production and reach economies of scale? how to unlock SAF production with viable business models across various regions of Europe? what bottlenecks needs to be overcome to ensure availability and supply of SAF in all European airports in medium and long term?*

At the end, the main objectives of the roadmap should be to complete and accelerate the transition to the market of industrial processes in their late R&D stage (with a strong focus on the development of demonstrators, first of kind production plants...) and to build a viable business models for their full-scale deployment across Europe. The roadmap would also identify opportunities and barriers for Members States for creating a SAF value chain production.

- ***Supporting the creation of a dynamic European SAF market***

As it stands, the new ReFuelEU Aviation regulation is expected to enter into force at the beginning of 2023. The new regulation will provide for a transitional period during which the SAF value chain will prepare and build the European SAF market to ensure that the right

quantities of SAF will be available at the right time to comply with the new blending mandates and to supply SAF even beyond these mandates.

With this perspective, Roundtable 2 will progressively identify the market levers needed to future boost the supply and demand for SAF in the European Union.

Specifically, the Roundtable will identify SAF quantitative target (in term of volumes) by 2025 and 2030 to serve a success yardstick to meet the blending mandate trajectory set in the future ReFuelEU Aviation regulation. The future technical annual report on SAF market development provided for in the regulation will help to monitor the progress made towards this target;

The Roundtable is invited to assess the demand stemming from the regulatory requirements, but also additional demand potential from industry voluntary commitments. It should further examine additional supply/demand required to meet national and sectorial aspirational targets, including comparison of scenarios in various sectoral decarbonisation roadmaps;

Based on the previous identification of gaps in the value chain and actions needed to overcome those, the Roundtables will quantify investment needed to reach the various demand scenarios. It should also qualitatively and quantitatively assess the investments needed at the level of each SAF production pathway (certified and new ones) taking account of specific feedstock technologies and process as well as geographical and regional factors.

The Roundtables will identify and assess market-based mechanisms to further support the deployment of SAF in Europe. This can include the opportunities and challenges raised by a so called SAF Book and Claim mechanism with the support of relevant sustainability certification entities, and exploring the feasibility, necessity, credibility, coherence with EU laws, criteria and conditions of such a possible mechanism. The Roundtable may also consider the needs to develop guidelines and contract templates for medium and long-term supply of SAF.

The Roundtable is also invited to contribute to the work of Roundtable 4 by exploring financial and market-based incentives to close the price gap between SAF and fossil fuels, increase affordability of SAF and further accelerate the deployment and uptake of SAF (e.g. contract for difference mechanism of SAF, feed in tariffs).

Similarly to the Roundtable 3, action plan on the “economical” levers outlined below, the Roundtable will provide the Roundtable 4 indications on the relevant economic aspects of SAF production (this may include cost structure breakdown, total ownership costs according to the SAF technological pathway,).

- ***Facilitating the certification of new SAF pathways (EU Clearing House)***

The Roundtable is also expected to contribute to the facilitation of new SAF pathways certification through the **EU Clearing House**. The certification of new sustainable aviation fuels performed by standardization bodies such as ASTM International and DEF STAN, is on the

critical path before any market deployment. However, this certification process, that takes place today mainly in the US under the ASTM International leadership, can be complex, expensive and often very long, potentially discouraging small European producers from innovating. Cost and duration of the certification process must be reduced in order to foster innovation and support a diverse mix of additional pathways that lower the cost of SAF with a high potential for emissions reductions. As such, support for these companies in their certification process is necessary.

With this view and in order to help European producers to innovate, the Roundtable will support initiatives from the regulation authorities, in particular EASA, to simplify, streamline and to coordinate better from a European stakeholders point of view, the SAF certification process and seek opportunities to simply and streamline that process. This might include actively updating and engaging European stakeholders on fuel specification activities to ensure European stakeholders are engaged, well informed and that their views are passed on to the standardization bodies like ASTM.

During the first year, in coordination with EASA, the Roundtable will discuss the opportunity and challenge pertaining to a stronger European coordination and communication on SAF certification which can be fed into the work of an EU Clearing House for SAF, being implemented by EASA. Relevant stakeholders in the SAF certification process (fuels producers, test laboratories, engine manufacturers...) should be associated. In particular, the Roundtable will provide input into the EU Clearing House design and to the monitoring of implementation and evaluation of the results of the upcoming European Parliament's preparatory action – EU Clearing House for Sustainable Aviation Fuels (SAF).

- ***Feeding the investment pipeline with SAF projects***

The Roundtable is invited to take stock of the results of its work, in particular with respect to the identification of the production potentials, with the SAF roadmap and production targets and potential demand, the gaps and investment priorities along the SAF value chain in order to help the Steering Group in identifying the selection criteria (i.e. elaborating standard scheme to build the pipeline) for the first call for proposal for investments expected by mid-2023, and identify the type of industrial and R&D SAF projects to feed the initial investment pipeline.

Finally, along with this first task on the common knowledge base, the Roundtable will map the announced and launched SAF projects in Europe⁶. Such map should outline key technological and commercial characteristics of the project, including information on the technology and commercial readiness levels, feedstock and production pathway, GHG reduction potential.

⁶ Such as: [Initiatives and Projects \(icao.int\)](#) – more information [here](#) and map [here](#).

Overview of the 2022-2023 Work programme for the Aviation



ROUNDTABLE 3: PRODUCTION PATHWAYS AND VALUE CHAIN – WATERBORNE TRANSPORT

Unlike aviation, maritime transport can use a wider variety of RLCF, possible to use as energy carriers in different combinations of energy conversion systems. Distinct factors may interact in the technical/operational decision to use different RLCF, including operating profile of the ships, fuel availability along the route/ports of call of the ship, safety/risk analysis aspects, amongst others. Assessing the feasibility of utilization of different RLCF in the maritime segment, of defining Sustainable Maritime Fuels (SMF) and developing their value chain in a context where the end users/maritime operators have multiple options is not an easy task to address. It is therefore important to establish three different layers for the promotion of RLCF in the maritime sector:

I. Technical

- a. **Pathway Characterisation** – different pathways possible for RLCF for maritime transport. Feedstock, production processes, distribution infrastructure and networks, including intermediate storage, bunkering, ship design and integration need to be assessed.
- b. **Mapping Technology and Commercial readiness level** – Identification of TRL/CRL for the different elements of the pathways characterized with sufficient granularity to allow identification of innovation needs, taking primarily into account all published studies and data available in this regard.
- c. **Standardization and Safety** – In respect to interoperability, interconnectivity and safety, international standards should be in place to facilitate deployment (bunkering and use) of RLCF.

Certification of different onboard systems will only be possible and facilitated in a wider scale if the relevant safety framework is in place at IMO.

II. Operational

- a. **Fuel certification** – RLCF shall be supplied to maritime transport with a certification of quality with respect to their composition and sustainability. To attest information requirements proposed in FuelEU Maritime, an adequate fuel certification scheme must be in place to demonstrate quality and origin of RLCF.
- b. **Optimization of RLCF availability** – Given the aspects and characteristics of maritime transport activity, but also the expected targets for operators to comply with increasingly stringent GHG reduction targets for the energy used onboard, it is relevant to assess how should the optimization of RLCF availability be assessed in relation to the demand profile from different maritime transport segments.
- c. **Decision-making support for supply chain development** – Which parts of the supply chain should be further developed, and which measures should be considered in the establishment of the relevant logistic steps in the value chain for different RLCF products.
- d. **Contract templates** – It is expected that contract for medium to long term supply of RLCF may be established between operators and fuel suppliers with a view to ensure availability of fuel under a designated/required specification. It would be relevant to identify the main structural elements that should be considered as a minimum in such contracts.

III. Economical

Roundtable 3 will provide indications on relevant economic aspects mentioned below to the Funding & Financing roundtable.

- a. **Cost structure breakdown** for the different production pathways should be developed with a view to identify where cost-efficiency strategies should be invested. Which processes would benefit from targeted action with a view to reduce cost of production. Economic barriers hindering early uptake of RLCF shall also be assessed.
- b. **Fuel-only Contract for Difference** - Contracts for Difference can be an important instrument to support the deployment and use of RLCF but it is important that adequate criteria for emission performance are defined.
- c. **Total Cost of Ownership (TCO)** – Estimation of different TCO for operators opting for different energy/fuel options, considering potential aspects such as fuel cost, carbon price, Contract for Difference, energy conversion investment cost in newbuilds and retrofits and costs of design integration.

Following the identified points, the Alliance members are invited to endorse a thematic roundtable dedicated to the maritime ecosystem. The roundtable shall be open to the participation of interested members of the maritime sector and of the RLCF.

Considering some similar challenges of the RLCF value chain of inland waterborne transport, the establishment of a work flow dedicated to this segment may be assessed to explore possible synergies and complementarities, and to duly take into account this sector perspective.

The workflow of the roundtable shall tackle the following objectives:

1. *To establish a common knowledge basis (stocktaking exercise)*

The maritime sector is characterized by different types of vessels having different requirements in terms of power, operational profiles and autonomy. The maritime segment of the Alliance shall map from its stakeholders the state of the art of the adoption of RLCF the opportunities arising from these fuels in the short, medium and long term, and the technological, regulatory, and permitting barriers hindering their early uptake. Coherence with the work of RT 1 should be ensured.

The development of a common knowledge basis (stocktaking exercise) should be primarily responding to the need identified above.

Regarding availability of RLCF the Alliance shall identify, as far as possible, potential synergies deriving from SAF production aiming at reaching, as far as possible, the definition of a SMF.

The maritime sector shall have a clear picture of the availability of feedstock in Europe and worldwide, in order to consider the potential of external partnerships. As far as the quantities are concerned it is important to assess the amount of “drop-in” products which may be available which, used in blends, will support meeting the relevant GHG intensity requirements.

The RLCF Alliance shall develop an EU common knowledge base on RLCF for maritime, following collection and gathering of all the knowledge available deriving also from studies on waterborne transport and on SAF pathways and supply chains.

- 2. In the short term, the Alliance shall give particular attention to the availability of drop-in RLCF, including advanced biofuels such as HVO or FT diesel and e-diesel, identifying the relevant availability of sustainable biomass available (give also demand from other sectors) and, for e-diesel, availability of renewable electricity/green hydrogen and Carbon source. In parallel, solutions for the adoption of net zero-carbon fuels shall be identified and considered (e.g. ammonia, methanol, hydrogen) taking into account the entire life cycle. *To develop a mapping exercise of Technology and Commercial Readiness Levels for different Fuel Products, considering the different possible pathways for their production, distribution, bunkering, and use of RLCF in ships and shipping.***

Several studies have been published identifying TRL/CRL for different energy and power systems for ships and their integration onboard ship. These have included so far aspects related to fuels and energy conversion systems. The Alliance shall map the existing information published and produce a consolidated mapping of all relevant options for maritime transport, assessing all relevant criticalities and potential ways of overcoming them.

3. *To assess the feasibility of utilisation of different RLCF in the maritime segment as well as assess the feasibility of defining Sustainable Maritime Fuels (SMF) and developing their value chain.*

Based on the results arising from the previous step, members shall identify opportunities in the development of RLCF related to upstream supply. For this purpose, demand at ports shall be qualitatively assessed, aiming at identifying the upstream value chain and at defining the strategies to support demand. Pros and cons of local production versus transport and distribution shall also be considered.

Since the maritime value chain could rely on a large variety of RLCF (i.e. biofuels, synthetic fuels, methanol, ammonia, hydrogen) with different feedstock, infrastructure (depending also on ports size) and transportation needs, a discussion on fuels maturity, the maturity of fuel uptake in ports and onboard ships, and prioritisation of fuel pathways shall be initiated, based on criticalities assessment above, also considering the role of LNG as a transitional maritime fuel.

To identify gaps in the framework for the use of maritime RLCF, including aspects related to production and infrastructure, energy conversion and fuel systems for vessels, standardization, regulatory and certification frameworks, safety (including of bunkering), competencies and qualifications of workforce and maritime end users.

After having assessed fuel opportunities, maturity and upstream value chain potential, members shall target those technological constraints that are hindering the development of a RLCF value chain. In particular, technologies and strategies to ensure sufficient availability of fuels at ports.

Consideration shall also be reserved for a roadmap on standardisation and certification of these technologies, the assurance of the highest safety standards, and the need for new skills and jobs to support the transformation.

The lack or a regulatory framework, the need to define standards, the harmonised framework for certifications, a streamlined permitting flow are of particular importance especially in the port areas where different administrations set requirements onshore and at shore. Alliance members shall identify such fragmentation for the maritime segment to be tackled in order to secure the widest upscale of the potential of the RLCF value chain. Synergies among different transport modes and end users and across different Member States and third countries shall be identified.

Identification of several studies contributing to this task to be done in cooperation and contact with the European Maritime Safety Agency (EMSA).

4. *Contribute to the development of a RLCF certification framework which is compatible to the requirements of the FuelEU Maritime, including both fuel quality and sustainability certification.*

Fuel Certification is a key building block of the FuelEU Maritime, being the key element of evidence for operators to demonstrate compliance with the provisions of the regulation. A sound, verifiable, enforceable certification framework that is able to operate at international level is of primary relevance for FuelEU. In addition, quality standards for fuels need to be ensured considering existing ISO standards.

Experience in Fuel Certification schemes operating currently in the aviation sector should be taken as reference and, to the extent possible, work in cooperation with existing certification companies accredited today under RED should be undertaken to address the specific aspects of the maritime sector.

The following challenges associated to certification of marine RLCF are of particular relevance: 1) Sustainability Certification of fuel products in different production pathways; 2) Blending (at different points of the value chain), 3) Bunkering (how to include bunkering suppliers in the certifications scheme?) and 4) Traceability of fuel products.

A workshop on this topic in cooperation with ESSF shall be organized.

5. *Develop Guidance for drafting of Fuel Supply Contract templates for Maritime Operators*

The Alliance shall identify the relevant best-practices with respect to the establishment of contractual relations between maritime operators and fuel suppliers with a view to prepare the sector for a contract-based fuel supply to shipping as a mitigating measure to reduce the risk of non-availability.

To the extent possible the Alliance shall collate suggestions from both fuel suppliers and operators with a view to develop a balanced guidance to the drafting of fuel supply contracts of fixed term.

The best-practices will be identified and published as a guidance document. Existing supply contracts of LNG to shipping operators to be considered as a reference.

6. *To help identify a common pipeline of both existing and new investment projects suitable for development and bankable for financing. Contextually, ensuring alignment of industrial projects to enable new value chains.*

The identification of opportunities and constraints is key to signal to policymakers the most important areas to tackle in order to facilitate the deployment of industrial projects. In particular, the Roundtable will support the Steering Group in identifying the selection criteria for the first call for proposal for investments expected by mid-2023, with a focus on projects with the highest maturity aiming at upscaling RLCF production, logistics and technology development and bankable by design. Matching sessions shall be facilitated between the alliance stakeholders proposing those projects and public and private financing Institutions (i.e. within the framework of the Financial Roundtable), in order to support

their early start. Project pipelines, based on priorities identified and on financial schemes to build up a project portfolio, shall be further developed in 2023 and onwards. *Note: Contact and cooperation with the European Sustainable Shipping Forum (ESSF) should be established especially on tasks 1, 2, 3, and 5 given work that has been developed on this Forum's subgroup on Sustainable Alternative Power for Shipping (ESSF-SAPS).*

ROUNDTABLE 4: ACCESS TO PUBLIC AND PRIVATE FINANCE

The Alliance members are invited to endorse a thematic roundtable dedicated to the identification and, if necessary, the improvement and possible creation of funding and financing frameworks and instruments. The roundtable shall be open to the participation of **public and private financing organisations, funding authorities, corporates, associations and other members of the Alliance involved or interested in funding and financing of renewable and low carbon fuels projects for the aviation and waterborne sectors**.

Access to funding and financing opportunities is one of the workstreams of the Alliance that raises particular interest among its members considering the important investments that industry will have to face to scale up the production, transport and use of renewable and low carbon fuels and to reduce the price gap between conventional fuels and alternative and sustainable ones.

Key elements of the workflow include, but are not limited to, the following:

- Structuring the participation of the financial institutions and fora in the works of the Alliance on a permanent basis so that they can provide their expertise concerning: a) the types of projects they may be interested in financing, and the criteria they should respond to; b) the initiatives that could be promoted within the Alliance to match the industry and investors interests and needs (ex: investors fora/platforms, partnerships with investors etc) namely in support of the pipeline of projects.
- Engaging with EU, national and regional authorities providing public funding to understand the availability and suitability of the different funding instruments and schemes for renewable and low carbon fuels projects, with a particular focus on the maritime and aviation sector, and the conditions that apply. This might relate to the main EU programmes like ETS Innovation Fund, InvestEU, Horizon Europe, CEF-Transport, etc, but also to the use of the Recovery and Resilience Facility via national state aids in the light of the new Climate, Energy and Environmental State Aid Framework with a focus on alternative fuels pricing (such as, but not only, contract for difference for both sustainable aviation fuels and maritime fuels) and the Communication on Important Projects of Common European Interest, among others.

- To make sure the Alliance can address the funding and financing needs efficiently, it will be of utmost importance to stimulate the interest of the financial community in the works of the Alliance. To this end the Alliance will map in the first year the relevant public and private financial institutions and undertake reach out activities to invite them to become members of the Alliance. Reach out activities will also address relevant EU and national (or regional) funding authorities. The members of the Steering Group will be directly involved in these actions, but all members of the Alliance are invited to equally support this action with their financial partners.
- Roundtable 4 will organise dedicated exchanges on the different funding and financing instruments, sequencing tasks for structuring industrial projects, business models and bankability of projects, for the members of the Alliance. To better illustrate the needs and foster the dialogue, industry members will be invited to share their experience, expectations and concerns, including on sustainable finance. The Roundtable will also assess the opportunity to build an integrated financial model from upstream production to end users of RLCF.
- Building on the analysis of the existing funding opportunities and investments needed in coherency with the three Roundtables, the Alliance will also assess potential funding gaps and the need for additional new financing and de-risking instruments or products outlining the main characteristics of such possible instruments/products.
- In this respect the Roundtable is invited to assess in particular the use of (carbon) contracts for difference or similar supporting mechanisms (such as feed in tariffs) and their relevance to minimize price uncertainty and identify the main characteristics, structure and mechanism for such possible instruments. The analysis should cover the assessment of the financial and budgetary implications according to the techno-economic project characteristics, identification of pricing data sources notably for fuels with illiquid markets, and considerations of cost-efficiency and complementarity with de-risking tools and incentives.
- The knowledge gathered in such way will be used to put into place a Funding and Financing Investment De-risking Guide (or Compass) with relevant information on the existing opportunities and contacts.

The Alliance will also seek advice of the financial community in the preparation of the call of investment projects in view of the first project pipeline, in particular the criteria to be met by the projects, the financial sustainability requirements and the contractual framework with a view to facilitate the future financing of the project embedded in the pipeline.

CONCLUSIONS

The Steering Group invites the General Assembly to:

- Endorse the present work programme for 2022 –2023,
- Open a call for membership to the four roundtables as of 13 of July 2022
- To endorse the Terms of Reference of the four roundtables that will be operational.

ANNEX A. OVERVIEW OF ACTIONS

OBJECTIVE	ACTION	DELIVERABLE	WHO	TIMEFRAME
Objective 1: identify transport fuels which are most economically and environmentally suitable & evaluate strong and weak points of the value chain	1. Establish a Common knowledge basis (stocktaking exercise)	Database of existing studies and reports (accessible via CircaBC)	RT 1 Feedstocks RT 2 Aviation RT 3 Waterborne	Q4 2022
	2. Elaborate a roadmap to scale up RLCF fuels taking into consideration the diverse maturity of fuel pathways, and different techno-economic and geographic factors	RLCF roadmap	RT 1 Feedstocks RT 2 Aviation RT 3 Waterborne	Q1 2023
	3. Assess the demand potential and identification of quantitative targets	Develop a set of numerical demand and supply indicators by fuel technology	RT 1 Feedstocks RT 2 Aviation RT 3 Waterborne	Q1 2023
	4. Identify gaps in the value chain and quantify investment needs taking account of specific technologies and geographies	Analysis of the EU supply chain and action plan Map and quantify the investment needs across the value chain	RT 1 Feedstocks RT 2 Aviation RT 3 Waterborne	Q2 2023
Objective 2: assess the enabling conditions & identify gaps in standardisation, safety assessments, and raise awareness on certification requirements	5. Facilitate the certification of new RLCF pathways and contribute to the development of the EU Clearing House	Clearing House design and assessment	RT 1 Feedstock RT 2 Aviation RT4 Access to Finance	Q2 2023
	6. Identify and assess market-based mechanisms for SAF deployment	Analysis of market-based mechanisms		

	7. Assess the coherency and synergies among regulatory frameworks and existing certifications	Regulatory & certification readiness framework assessment	RT 1 Feedstocks RT 2 Aviation RT 3 Waterborne	Q1 2023
	8. Contribute to the development of a RLCF certification framework which is compatible to the requirements of the FuelEU, including both fuel quality and sustainability certification.	Organisation of a workshop with ESSF	RT 3 Waterborne	Q2 2023
	9. Identify gaps in the framework for the use of RLCF/SAF by maritime transport and by aviation, including aspects related to production and infrastructure, energy conversion and fuel systems for vessels and aircraft, standardization and safety, competencies and qualifications of workforce and end users	Report on bottlenecks and possible recommendations	RT 2 Aviation RT 3 Waterborne	Q1 2023
	10. Develop a mapping exercise of Technology and Commercial Readiness Levels for different Fuel Products, considering the different possible pathways for their production, distribution, bunkering/storage, and use of RLCF in shipping and aviation.	Technology mapping	RT 1 Feedstock RT 2 Aviation RT 3 Waterborne	Q1 2023
Objective 3: Identifying and assessing existing relevant public and private financing opportunities	11. Identification of existing funding opportunities and de-risking gaps, including at Member State level, and if necessary, identify needs and characteristics for new instruments, that can meet the identified investment needs. 12. Identify existing and explore new financing initiatives to accelerate transactions between investee and investor and use feedback gathering arguments for additional support mechanisms, where necessary, for key elements in the value chain.	Financing and de-risking and Funding guide	RT 4 Access to Finance	Q2 2023

Objective 4: Create of a pipeline of investment projects	13. Launch a call for industrial and R&D RLCF projects to feed the initial investment pipeline	Project self-assessment tool Project collection platform	Steering Group	Q2 2023
	14. Translate the project collection into a working document, and adapt if needed project mappings and findings of RTs 1, 2 and 3	Map of RLCF projects with key characteristics	Steering Group RT 1 Feedstock RT Aviation RT Waterborne	Q3 2023
Objective 5: creating synergies with different transport modes	15. Develop a complete supply chain and end use vision, including other transport modes	Assess the synergies and find ways to value them in tasks relating to objectives 1, 2 and 3	RT 1 Feedstock	Q1 2023

ANNEX B. MEMBERSHIP

STEERING GROUP OF THE ALLIANCE:



MEMBERS OF THE ALLIANCE (AS OF 11 JULY 2022)

- | | | |
|--|--|--|
| ✓ ACI EUROPE
(Airports
Council
International) | Energy in
Germany e.V. | ✓ Boeing
International
Corporation |
| ✓ Aena SME S.A. | ✓ Airlines
International
Representation
in Europe | ✓ BP plc |
| ✓ Aeroporti di
Roma Spa | ✓ Airport Regions
Council | ✓ BTG Biomass
Technology
Group BV |
| ✓ Aerospace and
Defence
Industries
Association of
Europe (ASD) | ✓ Argent Energy
NL | ✓ Bureau Veritas
Marine &
Offshore |
| ✓ Air France-KLM | ✓ Associação de
Bioenergia
Avançada
(ABA) | ✓ Carbon
Engineering |
| ✓ Air Liquide | ✓ ATR | ✓ Cargolux
Airlines
International S.
A. |
| ✓ AIRBUS | ✓ Ballard Power
Systems Europe | ✓ CEPSA |
| ✓ aireg - Aviation
Initiative for
Renewable | ✓ Bioledger Ltd. | ✓ CETENA SPA |

- ✓ Chantiers de l'Atlantique
- ✓ CIMAC e.V.
- ✓ Clariant
- ✓ Clean Air Task Force (CATF)
- ✓ CLIA Europe
- ✓ CO2 Value Europe
- ✓ Coalition for the energies of Tomorrow in Transport and Supply Chain
- ✓ Concawe
- ✓ Corcern Achema Group
- ✓ Costa Group
- ✓ Crédit Agricole Corporate and Investment Bank
- ✓ Cyprus Shipping Chamber
- ✓ Danish Shipping
- ✓ Danske Maritime
- ✓ DASSAULT AVIATION
- ✓ Deutsche Post DHL Group
- ✓ Deutsches Zentrum für Luft - und Raumfahrt (German Aerospace Center)
- ✓ Dirección General de la Marina Mercante
- ✓ easyJet Europe Airline GmbH
- ✓ EBB - European Biodiesel Board
- ✓ Ecospray Technologies s.r.l.
- ✓ ECSA - European Community Shipowners' Association
- ✓ eFuel Alliance
- ✓ Electricité de France (EDF)
- ✓ Elyse Energy
- ✓ en2x - Wirtschaftsverb and Fuels und Energie e. V.
- ✓ Enagás S.A.
- ✓ ENERGIA
- ✓ Enkern inc.
- ✓ Eni S.p.A.
- ✓ Environmental Defense Fund Europe
- ✓ ePURE - European renewable ethanol
- ✓ EU IWT Platform
- ✓ EUROCONTROL
- ✓ Eurofuel
- ✓ Eurogas
- ✓ European Association of Internal Combustion Engine and Alternative Powertrain

Manufacturers (EUROMOT)	✓ European Union Aviation Safety Agency	✓ General Aviation Manufacturers Association (GAMA)
✓ European Barge Union	✓ EWABA	
✓ European Biogas Association	✓ Exolum Corporation S.A. (Exolum)	✓ Goldman Sachs
✓ European Boating Industry	✓ ExxonMobil Petroleum & Chemical BV	✓ GoodFuels B.V.
✓ European Business Aviation Association – EBAA	✓ Fertilizers Europe	✓ Green Enesys Deutschland GmbH
✓ European Confederation of Fuel Distributors (ECFD)	✓ FETSA Federation of European Tank Storage Associations	✓ Greenergy Fuels Ltd
✓ European Dredging Association (EuDA)	✓ Fincantieri S.p.A	✓ Greenergy Fuels Ltd
✓ European Energy A/S	✓ FinCo Fuel Group	✓ Groupe ADP
✓ European Onshore Power Supply Association	✓ Fraunhofer- Gesellschaft zur Förderung der angewandten Forschung e.V.	✓ Hydrogen Europe
	✓ French ministry of defense	✓ Hydrogenious LOHC Technologies GmbH
	✓ FuelsEurope	✓ IBERIA LAE SA Operadora Unipersona
	✓ GE Aviation	✓ IMT School for Advanced Studies Lucca

- ✓ IndustriAll
European Trade
Union
- ✓ INERATEC GmbH
- ✓ Inter IKEA Group
- ✓ International Air
Transport
Association
(IATA)
- ✓ Intesa Sanpaolo
- ✓ Kuwait
Petroleum
International
Aviation
Company
Limited
- ✓ Kuwait
Petroleum
Research and
Technology
(Q8Research)
- ✓ LanzaTech UK
Ltd
- ✓ Leonardo S.p.A.
- ✓ Liquid Wind
- ✓ Lloyd's Register
Group Limited
- ✓ LUXAIR
- ✓ Mabanft
GmbH & Co.KG
- ✓ Mærsk Mc-
Kinney Møller
Center for Zero
Carbon
Shipping
- ✓ MAN Energy
Solutions
- ✓ Meridiam
- ✓ MEROCO, a.s.
- ✓ Meyer Werft
GmbH & Co. KG
- ✓ Mittelstandsver-
band
abfallbasierter
Kraftstoffe e.V.
(MVaK)
- ✓ MSC
Mediterranean
Shipping
Company S.A.
- ✓ NAVANTIA, S.A,
S.M.E
- ✓ Neste
- ✓ Nextchem Spa
- ✓ Nexxoil GmbH
- ✓ Nordic
Electrofuel AS
- ✓ OCIMF
- ✓ P2X-Europe
GmbH & Co. KG
- ✓ PKN Orlen SA
- ✓ Politecnico di
Torino
- ✓ Polskie Linie
Lotnicze LOT S.A.
- ✓ port of
amsterdam NV
- ✓ Power to X Hub
- ✓ Preem AB
- ✓ QUATRA
- ✓ REPSOL
- ✓ Rolls-Royce
- ✓ Royal Belgian
Shipowners
Association
- ✓ Royal
Caribbean
Group
- ✓ SAFRAN
- ✓ Sasol
- ✓ SEA Europe

- | | | |
|---|---|---|
| ✓ SEA \ LNG Limited | Innovation | ✓ Verband |
| ✓ SERVICIOS Y ESTUDIOS PARA LA NAVEGACION AEREA Y LA SEGURIDAD AERONAUTICA SME MP SA (SENASA) | Centre inland Barging (EICB) | Deutscher Reeder e.V. / German Shipowners' Association |
| ✓ Shell | ✓ The Methanol Institute | ✓ Verband für Schiffbau und Meerestechnik e.V. (VSM) |
| ✓ SkyNRG | ✓ Topsoe A/S | ✓ Viridi RE |
| ✓ Sotacarbo - Società Tecnologie Avanzate Low Carbon S.p.A. | ✓ TotalEnergies S.E. | ✓ voestalpine |
| ✓ SOWAER | ✓ U.S. Grains Council | ✓ World Economic Forum's Clean Skies for Tomorrow Coalition |
| ✓ Stichting Projecten Binnenvaart - Expertise & | ✓ Ufip Energies et Mobilités | ✓ World Shipping Council |
| | ✓ Unione Energie per la Mobilità - unem | |
| | ✓ UPM Biofuels | |
| | ✓ VDMA Power-to-X for Applications | |
| | ✓ Velocys PLC | |