



Coordinating research and innovation in the field of sustainable alternative fuels for aviation

Deliverable 3.8

Report on Stakeholder Workshop

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Deliverable 3.8

Report on Stakeholder Workshop of Working Group 1 on Feedstock and Sustainability

SUBMITTED VERSION 1.0

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Work Package Leader: WIP Renewable Energies

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Aeronáutica SA, Spain



IFPEN – IFP Energies Nouvelles, France



WIP- WIP Renewable Energies, Germany



AGI – Airbus Group Innovations



EXECUTIVE SUMMARY

On October 20th – 22nd 2014, the three European projects CORE-JetFuel, FORUM-AE and ITAKA organized the Sustainable Aviation Fuels Forum in Madrid. In context of this event, CORE-JetFuel conducted its first stakeholder workshop on feedstock and sustainability. The workshop was organized in two complementary sessions. First, presentations on feedstock availability and certification of feedstock destined for biofuel production were held. The second part of the workshop was made up of a panel discussion that addressed with pertinent experts feedstock and sustainability considerations of alternative fuels for aviation.

The workshop participants agreed that feedstock destined for the conversion into alternative jet fuel is not generally sustainable or unsustainable. Instead, the sustainability of feedstock is a management issue that is greatly influenced by cultivation techniques, good agricultural practices and agricultural zoning. In order to make sure good agricultural practices are adhered to in the European Union, they should not be requested solely from the biofuel industry, but rather from European agriculture in general, thereby anchoring good agricultural practices as one of the key tasks in the Common Agricultural Policy (CAP). Furthermore, certification schemes should be tuned to the regional character of feedstock sustainability and its influencing factors.

The appropriateness of the concept of Indirect Land Use Change (ILUC) for the aviation sector as well as implementing ILUC factors in regulatory frameworks such as the European Renewable Energy Directive (RED) was questioned by most workshop participants. Due to a high degree of uncertainty surrounding the ILUC concept, it was recommended not to include it in policies at this stage (October 2014).

Lignocellulosic biomass (waste and residues) is considered as a means to increase the sustainability of biofuel production as well as its economic viability, while decreasing the competition between food and non-food feedstock. Some of the workshop participants voted for a stronger differentiation between the different types of feedstock mentioned above, as agricultural residues constitute a large part of animal feed, which are in turn essential for the livelihoods of farmers in a European context but also worldwide. One of the identified key issues of lignocellulosic biomass is transport costs, as well as other costs emerging from making this type of feedstock ready for conversion, for example collection, which greatly influences the final pricing of the feedstock and therefore its economic viability.

All workshop participants highlighted the importance of social aspects in feedstock and biofuel production as well as in the according regulatory frameworks and standards.

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LIST OF ABBREVIATIONS

ABRETF	(Indonesia) Aviation Biofuel & Renewable Energy Task Force
AFTF	Alternative Fuels Task Force
aireg	Aviation Initiative for Renewable Energy in Germany
ANAC	Brazilian Civil Aviation National Agency
ASTM	American Society for Testing and Materials
ATAG	Air Transport Action Group
CAAFI	Commercial Aviation Alternative Fuels Initiative
CAEP	Committee on Aviation Environmental Protection
CAP	Common Agriculture Policy
CCS	Carbon Capture and Storage
C-JF	Core-JetFuel - Coordinating research and innovation in the field of sustainable alternative fuels for aviation
CO ₂	Carbon Dioxide
COP 21	United Nations Climate Change Conference
DBFZ	Deutsches Biomasseforschungszentrum
DG	Directorate General
DGCA	Directorate General Of Civil Aviation, Indonesia
EC	European Commission
ENAC	Italian Civil Aviation Authority
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
ETS	Emission Trading Scheme
EU	European Union
FAA	Federal Aviation Administrative
FAO	Food and Agriculture Organization
FT	Fischer-Tropsch
fltr	From left to right
GHG	GreenHouse Gas
HEFA	Hydro-processed Esters and Fatty Acids
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IGAC	Indonesia Green Aviation Conference
IINAS	International Institute for Sustainability Analysis and Strategy
ILUC	Indirect Land Use Change
INRA	Institute Nationale de la Recherche Agronomique
IPCC	Intergovernmental Panel on Climate Change
ISAFF	Italian Sustainable Aviation Fuel Forum

ISCC	International Sustainability and Carbon Certification
ISEAL	International Social and Environmental Accreditation and Labelling
ISEAS	Integrated Seawater Energy and Agriculture System
ITAKA	Initiative towards Sustainable Kerosene for Aviation
JRC	Joint Research Center
LCA	Life Cycle Assessment
MIT	Massachusetts Institute of Technology
MSW	Municipal Solid Waste
NGO	Non-Governmental Organization
NISA	Nordic Initiative for Sustainable Aviation
PNPB	Brazilian National Biodiesel Program
R&D	Research and Development
RED	Renewable Energy Directive
RES	Renewable Energy & Sources
RFS	Renewable Fuel Standard
RIN	Renewable Identification Number
RSB	Roundtable on Sustainable Biomaterials
RTD	Research and Technological Development
SUSTAF	Sustainable Alternative Fuels
WEC	World Energy Council
WWF	World Wide Fund for Nature

Background - The CORE-JetFuel Project

For a number of ecologic and economic reasons, the aviation industry is highly interested in alternative fuels. Highly ambitious goals for the reduction of the sector's overall greenhouse gas emissions set from industry and politics imply sustainable alternative fuels as an important contribution. To meet the high expectations research and innovation efforts are required in order to develop pathways for an economically feasible large-scale production of such fuels for aviation.

The transformation of its energy base from fossil fuels to a secure supply of renewable, climate-friendly, sustainable and sufficiently scalable alternative fuels represents a tremendous challenge for aviation. Many different types of renewable feedstock, most prominent biogenic materials (biomass), and various kinds of conversion technologies can be utilised for the production of alternative jet fuel.

Objectives

The CORE-JetFuel project supports the European Commission in its dynamic and informed implementation of research and innovation projects in the field of sustainable alternative fuels for aviation. It links initiatives and projects at the EU and Member State level, serving as a focal point in this area to all public and private stakeholders. CORE-JetFuel addresses competent authorities, research institutions, feedstock and fuel producers, distributors, aircraft and engine manufacturers, airlines and NGOs. The project is aimed to set up a European network of excellence for alternative fuels in aviation that brings together technical expertise from all across this complex thematic field and helps to coordinate R&D as well as implementation efforts.

More information can be found on the CORE-JetFuel official website: www.core-jetfuel.eu

Stakeholder involvement

CORE-JetFuel will ensure cooperation with other European, international and national initiatives and with the key stakeholders in the field. The expected benefits are enhanced knowledge of decision makers, support for maintaining coherent research policies and the promotion of a better understanding of future investments in aviation fuel research and innovation.

In order to ensure efficient involvement of international experts and stakeholders in the coordination of research and innovation throughout the duration of the project, four stakeholder working groups are established on the following topics.

- WG1: Feedstock and sustainability
- WG2: Radical concepts and conversion technologies
- WG3: Technical compatibility, certification and deployment
- WG4: Policies, incentives and regulation

Workshop Organization

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Introduction

The Sustainable Aviation Fuels Forum in Madrid on 20th – 22nd October 2014 was jointly organised by the projects CORE-JetFuel, FORUM-AE and ITAKA. This Sustainable Aviation Fuels Forum focused on recent progress and important steps forward in the field of sustainable fuels for aviation.

The event brought together stakeholders to share experiences and views, to exchange best practices, to evaluate emerging issues and to jointly elaborate recommendations towards the successful future development of sustainable aviation fuels. By emphasizing the cooperation between experts and relevant players in the field of sustainable alternative fuels for aviation, the workshop set out to implement long-lasting, fruitful synergies and a vivid exchange of knowledge between the participants.

The Stakeholder Workshop of CORE-JetFuel Working Group 1 on Feedstock and Sustainability took place in context of the Sustainable Aviation Fuels Forum on October 20th 2014. The workshop addressed the sustainability of feedstock and biofuel production, surrounding regulatory frameworks as well as the according certification schemes and was organized in two complementary sessions. In the first session, presentations on feedstock availability and on one of the most prominent certification schemes, the Roundtable for Sustainable Biomaterials, were held. The CORE-JetFuel Consortium chose to conduct a panel discussion in the second session in order to make it more interactive for the audience on the one hand, and on the other hand to gain more knowledge from the experts participating in the workshop by motivating them to state in an open discussion their views on the topics at hand.

In order to facilitate a targeted discussion with maximum thematic output for the CORE-JetFuel project, the participants of the panel discussion on feedstock and sustainability have been provided with guiding questions in advance to the Sustainable Aviation Fuels Forum. The panel questions as well as additional supporting material can be found in the appendix.

Environmental considerations of Alternative Fuels for Aviation – CORE-JetFuel Stakeholder Workshop

1 Participants

Speakers:

Name	Organization
Donald Smith	BioFuelNet / McGill University, Canada
Rolf Hogan	Roundtable on Sustainable Biomaterials (RSB)

Panellists:

Name	Organization
Olivier Dubois	Food and Agriculture Organization of the United Nations (FAO)
Yuri Herreras Yambanis	Camelina Company España
Alexandre Gohin	Institute Nationale de la Recherche Agronomique (INRA), France
Jenny Walther-Thoss	World Wide Fund for Nature (WWF) Germany
Sergio Ugarte	SQ Consult, Netherlands

The presentations are available online on the following website:

<http://www.core-jetfuel.eu/Shared%20Documents/presentations.html>

2 Presentations

2.1 Donald Smith: Feedstock Availability and Sustainability in Canada

Donald Smith, BioFuelNet Canada / McGill University opened the CORE-JetFuel stakeholder workshop of Working Group 1 with a presentation on feedstock availability and sustainability in Canada. In the first part of his talk, Mr. Smith introduced to the auditorium a variety of definitions. Starting with defining biomass in general and energy crops in particular, he moved on to elaborate on conventional and advanced biofuel feedstock, their according subcategories as well as desired feedstock properties for biofuel production, such as high photosynthetic rate for maximum CO₂ uptake or high water use efficiency. After addressing different types of feedstock, their sustainability advantages and disadvantages along the production chain in more detail, Mr. Smith presented the Canadian biofuel potential and put it in an international context. In the last part of his talk Mr. Smith presented the Canadian Center of Excellence “BioFuelNet”, which brings together the Canadian biofuel research community missioned to support the growth of Canada’s advanced biofuels industry through coordinated research, innovation, effective education, smart policy and strategic partnerships.

2.2 Rolf Hogan: Certification of Sustainable Aviation Fuel

Rolf Hogan, Roundtable on Sustainable Biomaterials first presented the structure of the RSB, which is made up of over 120 organizations from 30 countries and is organized in seven chambers, covering all stakeholder groups crucial for sustainable biomaterials and their certification, respectively. After elaborating on RSB’s vision of global sustainable production,

conversion and use of biomass, Mr. Hogan moved on to explain the organization's certification system as well as the most prominent tools being applied in the certification process. In context of presenting the ISEAL (International Social and Environmental Accreditation and Labelling) Alliance, a non-governmental organization with the mission of strengthening sustainability standards for the benefit of people and the environment, Mr. Hogan outlined important social principles with respect to certification, for example food security, rural development or water rights. Subsequently, Mr. Hogan presented to the auditorium a selection of projects and initiatives partnering with the RSB that identify feedstock, infrastructure and technology needs at a local level to develop a sustainable aviation biofuels industry. The last part of Mr. Hogan's presentation addressed certified aviation biofuel supply chains as well as examples of commercial flights deploying RSB certified alternative fuel blends, for example the ITAKA project and the recently certified renewable jet fuel farnesane (Amyris / Total), respectively.

3 Panel Discussion on Feedstock and Sustainability

Moderation: Dominik Rutz, WIP Renewable Energies, Germany

In order to facilitate a targeted discussion with maximum thematic output for the CORE-JetFuel project, the participants of the panel discussion on feedstock and sustainability have been provided with guiding questions in advance to the Sustainable Aviation Fuels Forum. In general, the topics that were addressed in this panel aimed at building and following up on the work that has been conducted in the first year of CORE-JetFuel Working Group 1 on Feedstock and Sustainability.



Figure 1: Panelists (f.l.t.r.): D. Rutz (Moderator), O. Dubois, Y. Herreras Yambanis, D. Smith, R. Hogan, J. Walther-Thoss, S. Ugarte, A. Gohin

Dominik Rutz, WIP Renewable Energies opened the discussion by inviting **Jenny Walther-Thoss, WWF Germany** to state her view concerning the sustainability of European feedstock production coupled with the question if the measures to safeguard sustainability currently in place in the EU such as the Renewable Energy Directive (RED) are sufficient. Mrs. Walther-Thoss positively highlighted that the RED was the first proposal to implement legislation over a voluntary scheme and clearly stated her disappointment that the directive will not continue after 2020. In addition, she criticized the lack of the social dimension in the RED, which in her opinion also fails to address questions concerning soil fertility / degradation and water availability / usage sufficiently. Mrs. Walther-Thoss views sceptically that the availability of feedstock is equated with sustainability, when it is actually about the final use of feedstock in her view.

Concerning the concept of Indirect Land Use Change (ILUC) and its appropriateness for the aviation sector, Mrs. Walther-Thoss stated that the concept itself as well as the scientific discussion surrounding it is important. However, ILUC factors should not be implemented in policies at this stage.

Yuri Herreras Yambanis, Camelina Company España first outlined the hurdles the Camelina Company had to overcome regarding the certification of its feedstock for the value chain of the ITAKA project, which mainly concerned different requirements the three major certification schemes vital for the above-mentioned value chain (RSB/EPA/SkyNRG Sustainability Board) are imposing. Despite the considerable efforts accompanying the process of certifying 200 camelina-growing farmers, the Camelina Company is according to Mr. Herreras the first one that is certified by the Roundtable for Sustainable Biomaterials (RSB) and complies with the requirements of the Environmental Protection Agency (EPA) of the United States (US). One of these requirements is that feedstock produced outside the US (and Canada) has to come from land that was agricultural land already in 2007. Mr. Herreras further stated that the Greenhouse Gas (GHG) emission reduction potential of camelina-derived alternative jet fuel is 60%, with room for improvement.

According to Mr. Herreras, feedstock is not sustainable or unsustainable per se but depends on the land and process employed for cultivation. Since sustainable land use is not easily defined, Mr. Herreras recommended that current measures should focus on determining land sustainability on a project to project basis, rather than through general ILUC factors.

In order to make sure good agricultural practices are adhered to in the EU, they should not be requested solely from the biofuel industry, but rather from European agriculture in general. This suggestion should be incorporated as one of the key tasks of the Common Agricultural Policy (CAP). In this sense, the CAP has recently incorporated the "Greening Policy", which promotes good agricultural practices among European farmers, linked to their CAP subsidy, which is according to Mr. Herreras a first step in the direction outlined above.

Being asked about the production potential of lignocellulosic biomass for aviation (waste and residues) and its economic viability, Mr. Herreras stated that one should keep in mind that although an agronomic residue might not initially have any application, it will probably end up entailing some kind of revenue for farmers. In this case, although the agronomic residues have initially low or no value, they will finally have some market price (such has been the case in Spain for cereal straw). Under these competitive circumstances, the biofuel industry is usually not the one that can pay the most (although, on the other side, can guarantee very high volumes). Additionally, one of the key issues for lignocellulosic biomass is transport cost, which greatly

impacts on its final pricing. This will certainly be a challenge for producing economically viable biofuel.

Given the current aviation fuel targets, it will be extremely difficult to meet them, unless there are sustainable feedstock imports in Europe. Additionally, it is very important to define which feedstock/projects are acceptable for the aviation industry (especially residues such as tallow). Current measures are usually sufficient. However, the main problem is that the organizations from the aviation value chain are requesting a series of certificates that differ from certificates requested for other bio-products. The lack of harmonization is a clear barrier to sustainable feedstock deployment.

Bio-products other than biofuel tend to have a higher unit price than fuel, which means such industries usually have the capacity to pay more for sustainable feedstock. In such case, if policy makers want to guarantee that a given sustainable raw material is employed in biofuel applications, the prioritization will need to include important subsidies. Additionally, bio-products in Europe are currently not requested to have such demanding and costly sustainability schemes and certifications. New sustainable feedstock producers may then not only be driven by price.

Alexandre Gohin, INRA stated that the intention of deploying biofuels is to fight climate change and its negative impacts, respectively, which in turn caused the emergence of a series of economic models calculating the potential of biofuels to reduce the emission of climate-active gases. Yet, when developing economic models, he experienced great difficulties in incorporating land use change as well as trade impacts. According to Mr. Gohin, all models conclude that it is possible to cover the increasing demand for food solely by increasing yields – in the past and in the future. Opposed to this, he stated that the scenario previously outlined is not valid for biofuel production, where an increase in demand means increasing the cultivation area. Finally, he asked where the limit of agricultural production and efficiency will be – also considering that most models conclude that it is not feasible to substitute (artificial) fertilizers, which also have a negative impact on the climate.

Sergio Ugarte, SQ Consult shared Yuri Herreras' view on avoiding a generalization of feedstock in terms of good (sustainable) or bad (unsustainable), and also emphasized the importance of good agricultural practices. In addition, he regards the avoidance of "excesses" (for example large plantations of a single species, displacing others) an important measure to safeguard sustainability, which is generally feedstock agnostic in his view. In regard to the excess of feedstock mentioned above, Mr. Ugarte criticized that policy continues to assess how to mitigate impacts from those "excesses" instead of trying to avoid it.

Being asked about the concept of indirect land use change Mr. Ugarte stated that ILUC models should analyse the sustainable availability of feedstock and not its production in terms of sustainability. According to Mr. Ugarte, sustainability and policies safeguarding it, respectively, are regional issues. Therefore, measures of combining and harmonizing international policies currently investigated by the International Air Transport Association (IATA) to achieve global sustainability schemes are difficult. The mistake being made here is that sustainability schemes cannot be applied globally because different regions require different levels of assurance (sustainability impacts are not the same for camelina production in Europe compared to a different region with poor governance).

Robert Malina, MIT added in this regard that indirect land use change is occurring every day due to the production of other goods, which is why the ILUC regulation should not be stronger or more stringent on biofuels than for other (bio-) products in his view.

Olivier Dubois, FAO generally opted for revisiting the segregation of food and non-food feedstock as well as the competition between them. Exemplary of this competition are developing countries, where 40% of animal feed comes from agricultural residues – clearly showing the dependency of local farmers on residues for their livelihoods. In line with the other panellists, Mr. Dubois highlighted with this statement the importance of social aspects in feedstock and biofuel production as well as in the respective regulatory frameworks. Mr. Dubois especially highlighted that the potential impact of feedstock production has to be assessed – for which certification schemes are not sufficient in his view. In addition, he considers the existence of different certification schemes problematic since most feedstock producers will likely adhere to the cheapest one with the lowest sustainability requirements. Instead, he suggested adopting a system that is being applied when rating hotels. According to this proposed rating system, feedstock producers would be incentivized by moderate targets to improve their sustainability performance, which will in turn be recognized by the certification bodies.

After all panellists have been heard the floor was opened to the auditorium which was invited to pose questions and comments on the panellists' statements.

Models assessing the sustainability of feedstock destined for the production of alternative aviation fuels are according to **Jim Hileman, Federal Aviation Administration** hard to apply because information is lacking on how to explicitly use these models. Opposed to their intention, their complexity is preventing the estimation of sustainability in many cases. Mr. Hileman additionally criticized that due to the lengthy certification process a backlog of bio-jet fuels ready for use is “waiting” for their certification.

Ruta Baltause, European Commission DG ENER stressed the fact that sustainable agriculture is a fundamental prerequisite for sustainable biofuels. In addition, a sustainable form of agriculture is also considered as a crucial tool to counteract issues such as food insecurity, deforestation and the like. Having said this, Mrs. Baltause moved on to ask how sustainable biofuel production could be measured and certified, after which she elaborated on the two important approaches taken on EU level. According to Mrs. Baltause, the European Commission does not look at single types of feedstock but instead distinguishes between pathways in categories such as starches or oils, vegetable oils, land-using or not land-using – subsequently to which regulation takes place. Opposing statements made by almost all panellists concerning the lack of social aspects for example in the RED, Mrs. Baltause stated that current EU schemes do indeed consider the social dimension by addressing issues such as water availability and water quality. Therefore, the issue arises from unmeasurable criteria as well as criteria that cannot be attributed.

Concerning the efficiency of agricultural land, **Xavier Dommange, Airbus Group Innovations** asked the panellists if the continuation of increased yields is feasible in the coming years.

Alexandre Gohin answered that in his experience farming is quite difficult to measure seeing as it depends on land and location, thereby underlining the regional scope of biofuel production and its sustainability. In addition, he mentioned the uncertainty with respect to yield increases and price changes, which can only be overcome by reliable physical data sources.

Jenny Walther-Thoss added that certification can indeed have big advantages on certain sustainability aspects, although it cannot solve others. She positively highlighted the focus on land use plans that has taken place over the last five years.

In **Olivier Dubois'** point of view, monitoring agricultural practices and the progress they are making, respectively, is not an easy task. Therefore, measuring progress should in his opinion be part of policies from which incentives can be derived. The monitoring process is currently undertaken in two to three year intervals, which should be revised to a continuous process.

Similar to Mr. Dubois' earlier comment on creating incentives for sustainable biofuel production through policies, **Sergio Ugarte** added that the RED should recognize the different assurance levels of certification schemes, which should in turn follow practices of a "standard of standard". Consequentially, the private sector will strive for a higher level of assurance, instead of the current situation in which most certificates are issued by schemes with low level of assurance. Additionally, Mr. Ugarte criticized that the European Commission mandates sustainability certification but does not provide a clear framework for the assessment of level of assurance.

Rolf Hogan, Roundtable for Sustainable Biomaterials prompted in this regard that business should take leadership and show its part regarding different levels of assurance as well as adapt standards, which should be regionally interpreted.

David Chiamonti, RE-CORD Consortium lastly commented that most of the discussion circling around the certification of feedstock primarily addresses oily crops. In this context, he emphasized that certification schemes need to consider an adaption towards lignocellulosic biomass, since sustainability issues connected to their utilization are very different.

4 Identified Issues and Results

In summary, the following contributions from panellists and the forum audience are emphasized with respect to ***environmental considerations of alternative fuels for aviation***:

- Bio-jet feedstock is not sustainable or unsustainable per se. The sustainability of feedstock is a ***management issue*** that is greatly influenced by cultivation techniques, ***good agricultural practices*** or agricultural zoning
- In order to make sure ***good agricultural practices*** are adhered to in the EU, they should not be requested solely from the biofuel industry, but rather from ***European agriculture in general***.
- The sustainability of feedstock is a ***regional issue***, to which certification schemes and standards should be adopted accordingly
- The ***social dimension*** is lacking in sustainability standards
- The concept of ***indirect land use change*** is an important scientific discussion but due to a ***high degree of uncertainty***, it should not be included in policies at this stage
- Due to a lack of information, ***sustainability models*** are not easily applied by the aviation sector
- ***Lengthy certification process*** hinders deployment of alternative aviation fuels from an airline's perspective

5 CORE-JetFuel Consortium

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6 Appendix

6.1 Panel Discussion on Feedstock and Sustainability: Topics and Questions

General Information:

Timing: Monday, 20 October 2014, 15:00-16:00

Moderation:

Dominik Rutz, WIP Renewable Energies, Germany

Panelists:

Olivier Dubois, Food and Agriculture Organization of the United Nations (FAO)

Yuri Herreras Yambanis, Camelina Company España

Alexandre Gohin, Institute Nationale de la Recherche Agronomique (INRA), France

Jenny Walther-Thoss, World Wide Fund for Nature (WWF) Germany

Sergio Ugarte, SQ Consult, Netherlands

Aims and Objectives

This panel discussion aims at building and following up on the first telephone conference of CORE-JetFuel Stakeholder Working Group 1 on Feedstock and Sustainability on March 25 2014. Please find attached the minutes of this CORE-JetFuel telephone conference.

Topic and Questions

Sustainability of feedstock production in the EU

In order to safeguard the sustainability of biofuels, good agricultural practices or a sustainable land use in general are often cited measures to counteract negative impacts of feedstock production in the European Union.

- **Are agricultural measures to guarantee sustainably produced feedstock for aviation fuels in the EU sufficient?**
- **Are current measures (voluntary sustainability certificates according to the provisions of the Renewable Energy Directive (RED)) appropriate / enough?**

Multi-feedstock strategies that emphasize lignocellulosic biomass coupled with good agricultural practices are regarded as a means to safeguard GHG emission reductions while decreasing the utilization of edible feedstock. Considering that biofuel producers are path-dependent in the sense that they are currently only able to produce cost-competitively by utilizing said types of feedstock in specific conversion pathways,

- **Do you think that in light of the limitations outlined above, biofuels for the aviation sector can be sustainably produced from lignocellulosic biomass (waste and residues) at a level that is economically viable in the near future?**

Sustainability of feedstock production in non-EU countries

In case biomass in the EU is not sufficient to meet demand and contribute to the EU targets, imports of raw or converted biomass from non-EU countries may be necessary.

- **Are imports needed to meet the demand for aviation fuels?**
- **Which measures are necessary to guarantee that this imported biomass for aviation fuels is sustainable?**
- **Are current measures (certificates) appropriate / enough?**

Direct and indirect land use change

Feedstock production for energy purposes will lead to increased direct and indirect land use competition. The application of the Indirect Land Use Change (ILUC) concept and the introduction of ILUC factors may, on the one hand, contribute to increased sustainability, and, on the other hand, negatively impact potential investments.

- **Is the application of an ILUC concept appropriate and useful for aviation fuels?**
- **How could a practical approach to address ILUC in the aviation sector look like?**
- **In light of the 6% quota on biofuels from edible biomass sources, is an implementation of ILUC factors in the RED really necessary?**

Prioritization of the use of biomass

Biomass is a renewable, but limited source. In the future, it is most likely that the demand for (lignocellulosic) biomass surpasses its production capacity in Europe, as it may be needed road transport, ship transport, flexible electricity production, bio-products (pulp & paper, bio-plastics, etc.) or as aviation fuel.

- **Is there a need for policy makers to prioritize the use of biomass for certain uses, e.g. for aviation, or should this be left to the market?**

6.2 Participants Sustainable Aviation Fuels Forum

NAME	ENTITY
Alejandro Ríos	MASDAR
Alessio Frasoldati	POLITECNICO di MILANO
Alexander Zschocke	LUFTHANSA
Alexandre Gohin	RENNES
Alexandre Rodrigues Filizola	ANAC
Alfredo Iglesias	AESA
Andreas Sizmann	BHL
Anne Bogdanski	FAO
Anne Bouter	IFPEN
Anne Laure Gaumerais	FRANCE DGAC
Annika Lindell	TRANSPORT STYRELSSEN
Armando Salmerón	REPSOL
Arvind G. Rao	DELFT UNIVERSITY
Beatriz Guirao	CLH
Bhupendra Khandelwal	SHEFFIELD UNIVERSITY
Borja Alonso	CCE
Bruno Miller	METRON AVIATION
Carlos Alberto Fernández	IDAE
Carlos Menéndez de Solas	AESA
Carmen Rivera	SENASA
César Velarde	ICAO INDONESIA
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