



# Advanced Sustainable BIOfuels for Aviation

## **Deliverable D5.4:** Regulatory Framework Proposal

### Consortium:

Acronym	Legal entity	Role
RE-CORD	CONSORZIO PER LA RICERCA E LA DIMOSTRAZIONE SULLE ENERGIE RINNOVABILI	CO
SKYNRG	SKYENERGY BV	BEN
CENER	FUNDACION CENER-CIEMAT	BEN
ETA	ETA – Energia, Trasporti, Agricoltura Srl	BEN
CCE	CAMELINA COMPANY ESPANA S.L.	BEN
JRC	JOINT RESEARCH CENTRE – EUROPEAN COMMISSION	BEN
ENI	ENI SPA (entered 25/06/2021)	BEN

*CO...Coordinator, BEN...Beneficiary*

'The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. The European Commission is not responsible for any use that may be made of the information contained therein.'



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 789562.

## General Information

Call identifier: H2020-LCE-2017-RES-IA  
 GA Number: 789562  
 Topic: LCE-20-2016-2017  
 Start date of project: 01/05/2018  
 Duration: 62 Months  
 Work Package: WP 5 – Market scaling strategy  
 Type: Deliverable  
 Number: D6.9  
 Title: Regulatory framework proposal  
 Due Date: 30/04/2022 (After Amendment)  
 Submission date: 30/04/2022  
 Reference Period: 31/10/2019 – 30/04/2022

Prepared by: RE-CORD (Lead), all partners  
 Responsible Person: David Chiaramonti. Contributors: Tommaso Barsali, Matteo Prussi (POLITO), Oskar Mejerink, Renco Beunis  
 Dissemination Level: Public

INTERNAL MONITORING & REVISION TABLE					
REV.	DATE	DESCRIPTION	PAGES	CHECKED	APPROVED
1	28/02/2022	Original	n.a.	REC/PoliTO	
2	30/04/2022	Revision after Amendment	15	REC/PoliTO	REC

Document Type		
PRO	Technical/economic progress report (internal work package reports indicating work status)	
DEL	Technical reports identified as deliverables in the Description of Work	x
MoM	Minutes of Meeting	
MAN	Procedures and user manuals	
WOR	Working document, issued as preparatory documents to a Technical report	
INF	Information and Notes	

Dissemination Level		
PU	Public	x
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	
CON	Confidential, only for members of the Consortium	

## TABLE OF CONTENT

<b>1</b>	<b>SUMMARY .....</b>	<b>4</b>
<b>2</b>	<b>The regulatory framework for SAF large scale deployment.....</b>	<b>4</b>
	2.1 The opt-in mechanism: definition	4
	2.2 The EU Framework: REDII, Delegated Act, and REDII amendment	4
	2.3 The Dutch bioticket system	6
	2.4 The International dimension: the CORSIA Programme	7
	2.5 The FitFor55 package and the proposed ReFuelEU Aviation Directive	9
<b>3</b>	<b>Engaging the Italian Ministries and bodies .....</b>	<b>11</b>
<b>4</b>	<b>The regulatory proposal .....</b>	<b>12</b>
<b>5</b>	<b>Conclusions .....</b>	<b>14</b>

## 1 SUMMARY

According to the BIO4A Workplan, this Regulatory Framework report describes the opt-in mechanism, the “biotickets” system in use in The Netherlands, the main EU regulatory framework for SAF, and finally proposes a system to expand the Dutch experience to three main Southern EU Countries.

First, the opt-in mechanism is explained, as a tool to shift from not-yet regulated biofuel markets, as SAF, to regulated ones, e.g. road transports. The effectiveness of this approach has been demonstrated in the Dutch system, here described: this scheme could be well replicated in other EU Member States (MSs), boosting SAF use in Member States.

Following a short recap on the REDII and related Acts, the FitFor55 package and the ReFuelEU Aviation proposed Directive, are then shortly introduced, as the future policy framework that will regulate EU Aviation in the coming years. In addition, the International framework is also described, referring to the UN ICAO CORSIA programme.

A policy opt-in approach for three main Southern EU Member States is then proposed, suggesting the National body that could issue the corresponding certificates and scheme structure to operate the mechanism.

Finally, the possibility to include Carbon offsetting (removal) in Aviation is also suggested, so to interlink FitFor55 through ReFuelEU Aviation, revised REDII, CAP and Carbon Farming.

## 2 The regulatory framework for SAF large scale deployment

### 2.1 The opt-in mechanism: definition

The opt-in mechanism allows SAF to earn credits without incurring debits under the system<sup>1</sup>, and would incentivize biojet production without setting compliance targets for emission reductions, given that biojet availability is limited. It is also very likely that a “fuel multiplier” for biojet fuels would have to be incorporated into these types of policies. This would allow biojet fuels to earn more credits as compared to a similar volume of renewable diesel and help bridge the greater investment required to make biojet fuels.

For instance, California approved an opt-in mechanism for aviation biofuels on a voluntary basis in 2018. Although this could result in an effective cross-subsidization of aviation by road users, in the short term it is not likely to create a significant distortion due to the low volumes of biojet fuel that are currently available<sup>2</sup>.

Thus, in summary, the opt-in mechanism allows that fuel providers can apply to voluntarily opt into the programme for those fuels that are not regulated under the specific policy in place (e.g. REDII in EU or LCFS in California), such as biojet fuel, differently from road fuels as gasoline, diesel and substitutes. This will generate credits that they can sell and trade in the market.

### 2.2 The EU Framework: REDII, Delegated Act, and REDII amendment

The EU framework on sustainable transports fuels grounds on the Renewable Energy Directive II<sup>3</sup>, which regulates the whole EU transport policy area and the sustainable fuel production: it

---

<sup>1</sup> IRENA. Reaching zero net with renewables – BIOJET FUELS. 2021

<sup>2</sup> Searle, S. et al. (2019), Long-Term Aviation Fuel Decarbonization: Progress, Roadblocks, and Policy Opportunities, ICCT.

<sup>3</sup> [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L\\_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC)

also offers specific provisions for SAF. REDII, issued in 2018, sets an overall 14 % target by 2030, accompanied by multipliers for selected feedstocks listed in Annex IX Part A, and waste feedstocks listed in Annex IX Part B (e.g. used cooking oils, waste animal fats). In addition, a 1.2 multiplier for the use of SAF from no food and feed crop is established.

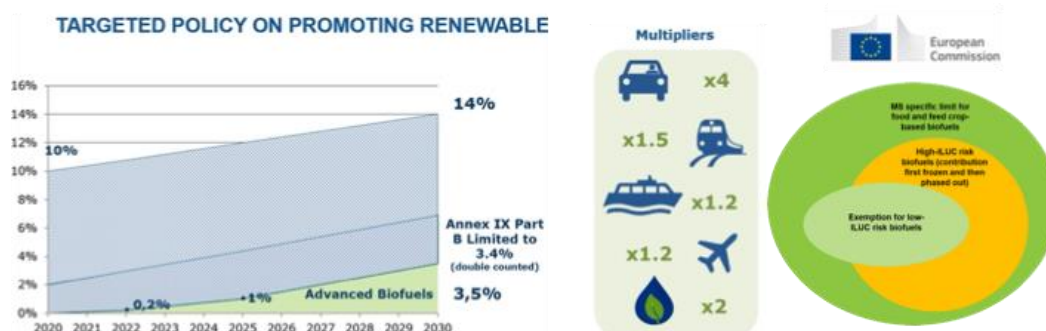


Fig.1 – REDII targets and provisions for Biofuel

In order to become operational, the EU legislation, as the REDII, also needs some additional acts.

The Delegated Act on low ILUC feedstocks, as well as the Implementing Act on sustainable agronomic practices (not yet issued, but already voted by MSs), are particularly relevant for the SAF sector, as they impact on feedstock supply, land use, sustainability of biofuels.

The European Civil Aviation Conference (ECAC) assessed several European State’s policies, in order to identify on-going national policy actions aiming at promoting the supply and use of Sustainable Aviation Fuels (SAF). A summary of those policy initiatives is included below in Table 1.

It should be noted that some of the national initiatives from EU States\* summarised below, were developed before the launch of the EU regional regulatory initiative (ReFuelEU) and may be partly replaced by action at EU level.

Country	SAF mandate	Notes	Deadline
Finland	30%	For all aviation fuel uplifted in the country.	2030
France	5%	Based on the “ <i>French roadmap for the deployment of sustainable aeronautical biofuels</i> ”	2030
Germany	200,000 t	Based on the “The <i>PtL roadmap</i> is intended to boost the annual production of at least 200,000 tonnes of SAF, which corresponds to a third of the current domestic flights fuel use.”	2030
Netherlands	14%	This was established on the basis of a “Study on the potential effectiveness of a renewable energy obligation for aviation in the Netherlands”	2023
Norway	0,5% (30%)	The Norwegian government established a blending obligation to aviation fuel suppliers for a 0.5% minimum content of advanced biofuel from 1 January 2020. The goal is to reach 30% by 2030	2020 (2030)
Sweden	1% (30%)	Obligation for jet fuel suppliers to promote the use of SAF from 2021. SAF blend ratios will be needed to meet the reduction obligation, increasing from 1% by volume in 2021 to 30% in 2030	2021 (2030)

Table 1 - SAF National policies

## 2.3 The Dutch bioticket system

The main goal of the Dutch bioticket system is to bridge the price gap between fossil and renewable jet fuel, in the frame of the EU Directives.

REDII is the EU Renewable Energy Directive, the EU legislation for the promotion of renewable energy sources. RED was first issued in 2009 (Directive 2009/28/EC) and then amended in 2018 (Directive 2018/2001/EU)<sup>4</sup>.

Under this directive each EU Member State is mandated to generate 14% of the total energy demand in the transport sector from renewable energy sources in 2030.

All 27 individual EU member states have their own strategy to reach 14% goal. The aviation industry is not included in this 'transport sector' and therefore not obligated under the RED mandate.

The amendment (2015) on the RED does enable bio jet fuel to contribute to the 14% target at 2030 on a voluntary basis: "In the case of suppliers of biofuels in aviation, Member States may permit such suppliers to choose to become contributors to the reduction obligation provided that those biofuels comply with the sustainability criteria".

The way the Dutch bioticket systems works is depicted in the following scheme:

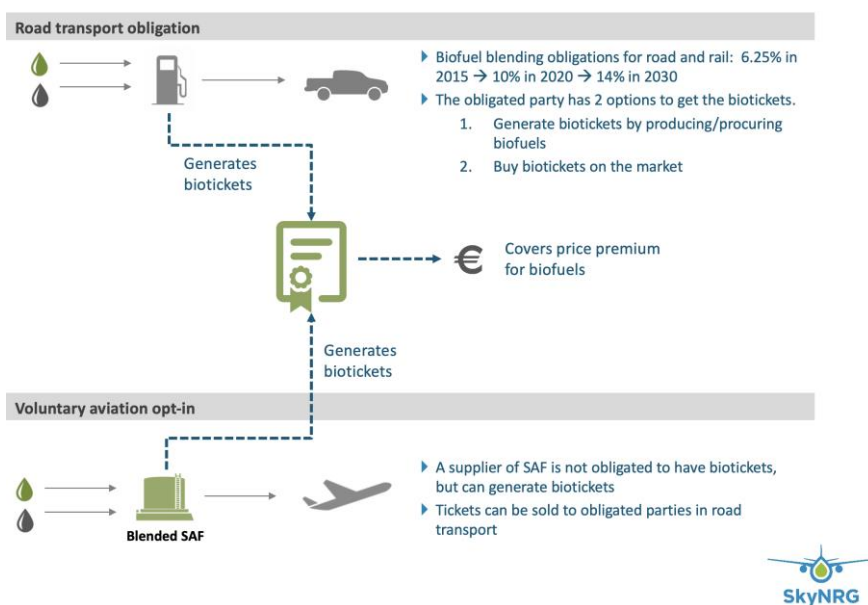
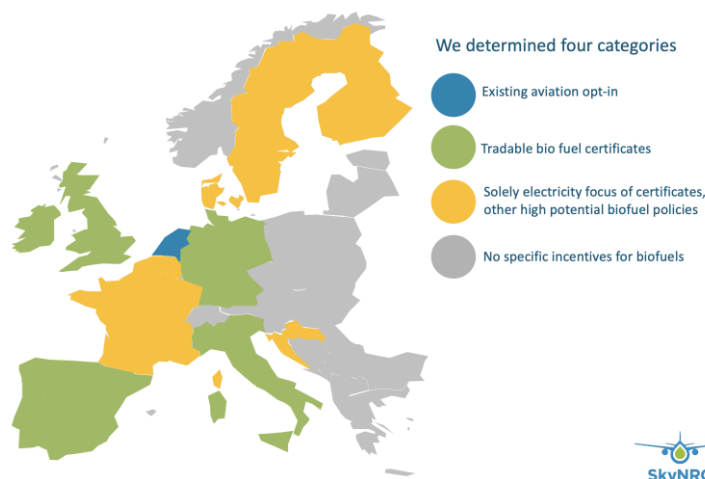


Fig.2 – How the Dutch “bioticket” system works

The Country Analysis at EU27+UK level identified the following situation:

<sup>4</sup> [https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive\\_en](https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en)



*The Dutch Bioticket market in 2021* - The Dutch Emission Authority has reported that (update as of 6<sup>th</sup> of July 2021<sup>5</sup>), with reference to 2021, 2.3mn renewable energy units (HBEs), or tickets, have been generated by Dutch oil companies for compliance year in April-June period, compared to approximately 1.4mn in the same period for the previous year. 1.9 mn are so called HBE-Gs, i.e. produced from Annex IX Part A feedstocks, which generates Advanced Biofuels according to REDII. Thus, during that period the volume of biotickets almost doubled

The number of HBE-Os — "other" renewable units that are generated through waste-based biofuels or by selling electricity to charge electric vehicles and are double-counted — was around 400,000, lower by about 100,000 compared with the same period last year. No conventional HBE-Cs, which are generated through blending crop-based biofuels, have been booked into the emissions authority's registry so far this compliance year. Obligated parties have carried over around 12mn HBEs from the 2020 compliance year, of which 7.6mn were HBE-Gs and 4.2mn were HBE-Os.

The overall blending target in the Netherlands has increased to 17.5pc in 2021, from 16.4pc in 2020. HBE prices have been rising consistently in the past few months on the back of growing demand for road fuels, with HBE-Gs going up from €13.30/GJ in April to €15.60/GJ in June.

## 2.4 The International dimension: the CORSIA Programme

At international level in 2016, the ICAO Assembly agreed on the adoption of a global market-based scheme to limit international aviation CO<sub>2</sub>e greenhouse gas emissions (GHG): the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)<sup>6</sup> has been developing to implement the 2016 agreement by the ICAO Assembly to cap the aviation emissions from 2020 onwards: also known as Carbon Neutral Goal. The attempt to limit sector' emission aims at reaching the objectives of the UNFCCC and Paris Agreement: limiting the global temperature increase to well below 2°C, and pursuing efforts to limit the increase to 1.5°C.

CORSIA requires airlines to offset CO<sub>2</sub>e emissions that exceed 2019 levels. On the basis of impact assessments and scientific available knowledge, CORSIA has been framed to allow offsetting either through credits or through the use of CORSIA Eligible Fuels (CEFs), such that international aviation achieves carbon neutral growth from 2020.

<sup>5</sup> <https://www.argusmedia.com/en/news/2231490-dutch-2021-biofuel-ticket-volumes-up-on-higher-mandate>

<sup>6</sup> ICAO. Introduction to the ICAO Basket of Measures to Mitigate Climate Change. 2019.





Aviation sector is pursuing emissions reduction by airplane technological improvements, however stabilizing international aviation CO2 emissions at 2019 levels will likely require the use of drop-in sustainable aviation fuels (SAFs), for short-medium terms: the drop-in SAFs do not require engine or system modifications in the aircraft, nor do they require dedicated refueling infrastructure. CORSIA allows the use of SAFs in order to reduce airlines’ carbon offsetting requirements.

The main specifications for civil aviation Jet A-1 fuel are the UK specification DEF STAN 91-91 and the American Society for Testing and Materials (ASTM) specification D1655. In June 2009, ASTM International issued the ASTM D75667 Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons. The UK DEF STAN standard incorporates the requirements approved by ASTM International. To be eligible under CORSIA an alternative jet fuel must meet a set of sustainability criteria and are derived from biomass or waste resources.

One definition used in ICAO (ICAO Annex 16 Volume IV (CORSIA Standards and Recommended Practices) for determining eligibility under CORSIA requires net greenhouse gas emissions reductions of at least 10% compared to the baseline life cycle emissions values, that it is not made from biomass obtained from land with high carbon stock and that it meets sustainability criteria in the areas of water, soil, air, conservation, waste and chemicals, human and labour rights, land use rights and land use, water use rights, local and social development and food security<sup>8</sup>. After the pilot phase (from 01/2024 onward) the sustainability criteria will be extended.

Theme	Principle	Criteria
<b>1. Greenhouse Gases (GHG)</b>	Principle: CORSIA SAF should generate lower carbon emissions on a life cycle basis.	Criterion 1.1: CORSIA SAF will achieve net greenhouse gas emissions reductions of at least 10% compared to the baseline life cycle emissions values for aviation fuel on a life cycle basis.
<b>2. Carbon stock</b>	Principle: CORSIA SAF should not be made from biomass obtained from land with high carbon stock.	Criterion 2.1: CORSIA SAF will not be made from biomass obtained from land converted after 1 January 2008 that was primary forests, wetlands, or peat lands and/or contributes to degradation of the carbon stock in primary forests, wetlands, or peat lands as these lands all have high carbon stocks. Criterion 2.2: In the event of land use conversion after 1 January 2008, as defined based on the Intergovernmental Panel on Climate Change (IPCC) land categories, direct land use change (DLUC) emissions will be calculated. If DLUC greenhouse gas emissions exceed the default induced land use change (ILUC) value, the DLUC value will replace the default ILUC value.
<b>3. Water</b>	Principle: Production of CORSIA SAF should maintain or enhance water quality and availability.	Criterion 3.1: Operational practices will be implemented to maintain or enhance water quality. Criterion 3.2: Operational practices will be implemented to use water efficiently and to avoid the depletion of surface or groundwater resources beyond replenishment capacities.
<b>4. Soil</b>	Principle: Production of CORSIA SAFs should maintain or enhance soil health.	Criterion 4.1: Agricultural and forestry best management practices for feedstock production or residue collection will be implemented to maintain or enhance soil health, such as physical, chemical and biological conditions.
<b>5. Air</b>	Principle: Production of CORSIA SAF should minimize negative effects on air quality.	Criterion 5.1: Air pollution emissions will be limited.
<b>6. Conservation</b>	Principle: Production of CORSIA SAF should maintain biodiversity, conservation value and ecosystem services.	having jurisdiction over that area, unless evidence is provided that shows the activity does not interfere with the protection purposes. Criterion 6.2: Low invasive-risk feedstock will be selected for cultivation and appropriate controls will be adopted with the intention of preventing the uncontrolled spread of cultivated alien species and modified microorganisms. Criterion 6.3: Operational practices will be implemented to avoid adverse effects on areas that, due to their biodiversity, conservation value, or ecosystem services, are protected by the State having jurisdiction over that area.
<b>7. Waste and Chemicals</b>	Principle: Production of CORSIA SAF should promote responsible management of waste and use of chemicals.	Criterion 7.1: Operational practices will be implemented to ensure that waste arising from production processes as well as chemicals used are stored, handled and disposed of responsibly. Criterion 7.2: Responsible and science-based operational practices will be implemented to limit or reduce pesticide use.
<b>8. Human and labour rights</b>	Principle: Production of CORSIA SAF should respect human and labour rights.	Criterion 8.1: CORSIA SAF production will respect human and labour rights.
<b>9. Land use rights and land use</b>	Principle: Production of CORSIA SAF should respect land rights and land use rights including indigenous and/or customary rights.	Criterion 9.1: CORSIA SAF production will respect existing land rights and land use rights including indigenous peoples’ rights, both formal and informal.
<b>10. Water use rights</b>	Principle: Production of CORSIA SAF should respect prior formal or customary water use rights.	Criterion 10.1: CORSIA SAF production will respect the existing water use rights of local and indigenous communities.
<b>11. Local and social development</b>	Principle: Production of CORSIA SAF should contribute to social and economic development in regions of poverty.	Criterion 11.1: CORSIA SAF production will strive to, in regions of poverty, improve the socioeconomic conditions of the communities affected by the operation.
<b>12. Food security</b>	Principle: Production of CORSIA SAF should promote food security in food insecure regions.	Criterion 12.1: CORSIA SAF production will, in food insecure regions, strive to enhance the local food security of directly affected stakeholders.

Table 1 – Themes, principles and criteria for CORSIA

Once recognized as eligible, under CORSIA the emissions reductions achievable by the use of SAFs are calculated using a life-cycle assessment (LCA) approach, agreed upon at ICAO in 2018. With this agreement, the CORSIA LCA method has become the first internationally

<sup>7</sup> <https://www.astm.org/Standards/D7566.htm>

<sup>8</sup> ICAO. CORSIA Sustainability Criteria for CORSIA Eligible Fuels 2021.



adopted approach for the calculation of life-cycle GHG emissions of aviation fuels<sup>9</sup>. The key elements of the CORSIA methodology are: (1) use of life-cycle accounting for GHG emissions, (2) inclusion of induced land use change (ILUC), (3) safeguards to prevent deforestation, and (4) crediting of practices that mitigate the risk of land use change (LUC). These elements enabled a wide range of stakeholders to pursue different measures for SAFs to reduce CO<sub>2</sub>e emissions on a life-cycle basis, while mitigating the risks of unintended consequences. The methodology is under continue revision/extension, as agreed at Council for Aviation Environmental Protection (CAEP) level of the CAEP/13 cycle. Among the relevant argument under development is worth citing the application of the LCA methodology to the Power-to-Liquid fuels, and the implementation of the BioCCS option for lowering the GHG emissions of alternative fuels productions.



Fig.4 – Overview of implementation for CORSIA programme

The CORSIA initiative is currently in the voluntary pilot phase of CORSIA, which started in 2021. The active elements of CORSIA are attribution of airlines, scope considerations and monitoring, reporting and verification (MRV), that are implemented by States. As of January 2022, more than 100 States have agreed to participate in CORSIA offsetting requirements: this is estimated to value around the 95% of the total CO<sub>2</sub> emissions of international civil aviation.



Fig.5 – CORSIA voluntary and Mandatory phases, and programme contribution to GHG emission reduction

The CORSIA package will undertake the planned period reviews, which are undertaken by the Council every three years, with the technical contributions of CAEP: this is particularly relevant in light of the COVID-19 pandemic impacts on CORSIA and its baseline.

## 2.5 The FitFor55 package and the proposed ReFuelEU Aviation Directive

The ReFuelEU Aviation<sup>10</sup>, proposed on 14<sup>th</sup> of July 2021 by the EU Commission in the frame of the FitFor55 package<sup>11</sup>, will introduce mandates also in the Aviation sector, so far not yet subject to obligations.

<sup>9</sup> Prussi, M., Lee, U., Wang, M., Malina, R., Valin, H., Taheripour, F., ... & Hileman, J. I. (2021). CORSIA: The first internationally adopted approach to calculate life-cycle GHG emissions for aviation fuels. *Renewable and Sustainable Energy Reviews*, 150, 111398.

<sup>10</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021PC0561&from=EN>

<sup>11</sup> [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_21\\_3541](https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541)

One of the main scope of ReFuelEU is to set a level playing field among different MS, avoid fragmentation (including those possible due to National transposition of the Directive (EU) 2018/2001, REDII) in the air transport market. It aims at preventing divergent requirements across the Union that would exacerbate refuelling practices distorting competition between aircraft operators or putting some airports at competitive disadvantage with others.

First, key definitions are given in the ReFuelEU Aviation. Among others, these are particularly relevant for the issue examined in this report:

- ‘Union airport’ means an airport as defined in Article 2(2) of Directive 2009/12/EC of the European Parliament and of the Council, where passenger traffic was higher than 1 million passengers or where the freight traffic was higher than 100000 tons in the reporting period, and is not situated in an outermost region, as listed in Article 349 of the Treaty on the Functioning of the European Union;
- ‘aircraft operator’ means a person that operated at least 729 commercial air transport flights departing from Union airports in the reporting period or, where that person may not be identified, the owner of the aircraft;
- ‘commercial air transport flight’ means a flight operated for the purposes of transport of passengers, cargo or mail for remuneration or hire, or business aviation flights;
- ‘aviation fuel’ means the fuel manufactured for direct use by aircraft;
- ‘sustainable aviation fuels’ (‘SAF’) means drop-in aviation fuels that are either synthetic aviation fuels, advanced biofuels as defined in Article 2, second paragraph, point 34 of Directive (EU) 2018/2001, or biofuels produced from the feedstock listed in Part B of Annex IX to that Directive, which comply with the sustainability and greenhouse gas emissions criteria laid down in Article 29(2) to (7) of that Directive and are certified in accordance with Article 30 of this Directive
- ‘synthetic aviation fuels’ means fuels that are renewable fuels of non-biological origin, as defined in Article 2, second paragraph, point 36 of Directive (EU) 2018/2001, used in aviation;
- ‘conventional aviation fuels’ means fuels produced from fossil non-renewable sources of hydrocarbon fuels, used in aviation;
- ‘aviation fuel supplier’ means a fuel supplier as defined in Article 2, second paragraph, point 38 of Directive (EU) 2018/2001, supplying aviation fuel at a Union airport;

It is worth to note that here Synthetic Aviation Fuels are defined as the RFNBO in REDII. This also corresponds to the so called PtL (Power-to-Liquid) in the ICAO CORSIA programme. The use of three different terms to indicate the same type of renewable fuels should be carefully regarded, as possible source of misunderstanding in the operators and the general public.

With respect to the scope of this report, we selected the following three elements among the most relevant components in the Directive.

#### *Article 5 - Refuelling obligation for aircraft operators*

The yearly quantity of aviation fuel uplifted by a given aircraft operator at a given Union airport shall be at least 90% of the yearly aviation fuel required.

#### *Article 13 - Transitional period*

By way of derogation from Article 4, from 1 January 2025 until 31 December 2029, for each reporting period, an aviation fuel supplier may supply the minimum share of sustainable aviation fuel defined in Annex I as a weighted average over all the aviation fuel it supplied across Union airports for that reporting period.

#### *Annex I (volume shares):*

- (a) From 1 January 2025, a minimum share of 2% of SAF;
- (b) From 1 January 2030, a minimum share of 5% of SAF, of which a minimum share of 0.7% of synthetic aviation fuels;
- (c) From 1 January 2035, a minimum share of 20% of SAF, of which a minimum share of 5% of synthetic aviation fuels;

- (d) From 1 January 2040, a minimum share of 32% of SAF, of which a minimum share of 8% of synthetic aviation fuels;
- (e) From 1 January 2045, a minimum volume share of 38% of SAF, of which a minimum share of 11% of synthetic aviation fuels.
- (f) From 1 January 2050, a minimum volume share of 63% of SAF, of which a minimum share of 28% of synthetic aviation fuels

These mandated volumes listed above are currently under discussion at EU and MS level, under the coordination of the French Presidency (COREPER).

Criteria for non-compliance penalties by Member States are also proposed, a very relevant element to ensure policy actual implementation. They cover Fuel Suppliers and Airlines.

- *Fuel suppliers*: At least twice the difference between the yearly average price of fossil jet fuel and SAF, times the amount of SAF required to meet the specified target. Separate penalties will apply to shortfalls in the advanced bio mandate and the synthetic fuel mandate.
- *Airlines*: At least twice as high as the yearly average price of conventional jet fuel, multiplied by the quantity of SAF that has not been uplifted.

SkyNRG estimations<sup>12</sup> of non-compliance penalties for Fuel Suppliers ranged from 1000 to 6000 € per tonne of fuel for the advanced bio and synthetic fuel mandates, respectively; the same estimation for Airlines, assuming an average market price of €600 per ton of jet fuel, airlines could risk a penalty of €1,200 per ton of non-tanked SAF.

Items as the possible adoption of Book&Claim approach has been proposed by some industrial operators. and discussed, together with the possibility to further increase, reduce, or maintain the ReFuelEU proposed share of biofuels. MS positions are diverse on this subject. Discussion is still ongoing at the present moment.

### 3 Engaging the Italian Ministries and bodies

The following Italian Ministries have been engaged in the discussion around SAF, REDII amendment/FitFor55 package, and related regulations (including the development of REDII linked Acts, as Delegated and Implementing Acts):

- MIMS – Ministero Infrastrutture e Mobilità Sostenibile<sup>13</sup> (Ministry for Infrastructure and Sustainable Mobility), in charge of the Aviation sector
- MITE – Ministero della Transizione Ecologica<sup>14</sup> (Ministry for Ecological Transition): in charge of renewable energies, and associated regulations, as Delegated and Implementing Acts

Meetings and calls have been held on the FitFor55 package and some specific issues for SAF large scale deployment in the market.

Since 2022 MIMS formally assigned to Politecnico di Torino (PoliTO), the group led by prof David Chiaramonti (also chairing RE-CORD), a technical support role to the Ministry as regards EU policy development and incorporation for the period 2022-2024.

In this function, PoliTO has been and is engaged in the discussion around the ReFuelEU aviation package and related measures, as well as other EU initiatives under the framework of the

---

<sup>12</sup> <https://skynrg.com/a-summary-of-the-proposed-sustainable-aviation-fuel-mandate/>

<sup>13</sup> <https://www.mit.gov.it/en>

<sup>14</sup> <https://www.mite.gov.it/>

FitFor55 Package today under discussion, as the revised Alternative Fuel Infrastructure Regulation<sup>15</sup>.

Also, on invitation by the Italian Government, PoliTO/RE-CORD offered technical expertise and participate to selected meetings of the REDII Committee on the Sustainability of Biofuels, Bioliquids, and Biomass Fuels. Here, the main contribution was about the technical analysis regarding the possibility to offset emissions through sustainable agronomic practices and biochar.

This option is also under discussion also at ICAO level, where we are Member State representative, as BioCCS/U options.

Finally, during this reporting period the National Authorities for Aviation, ENAC, which nominated PoliTO representatives as experts in ICAO-FTG and ECAC, established a National SAF Observatory, where all major stakeholders in the sector are participating (fuel producers, airlines, airports, R&D bodies, etc).

We are active member of this National SAF Observatory, currently bringing in the discussion the regulatory proposals here reported, and informing all stakeholders about that..

## 4 The regulatory proposal

The aim of this work is to offer a proposed regulation in the field, to exploit the experience of the Dutch model in the Southern EU Countries.

Focusing on three main Southern EU Countries Italy, Spain and Portugal, the way the system could be designed is depicted in the following schemes three. In all cases, a National body is issuing the certificates in each Member State: the Gestore Servizi Energetici (GSE) in Italy, the Comisión Nacional de los Mercados y la Competencia (CNMC) in Spain, and the Entidade Nacional Para O Mercado de Combustiveis (ENMC) for Portugal.

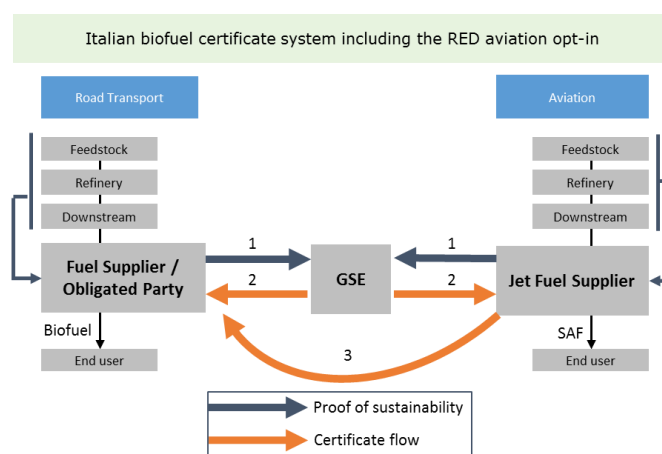


Fig.6 – Proposed opt-in (bioticket scheme) for Italy

The GSE (Gestore Servizi Energetici) accredited by the Ministry for Economic Development issues the certificates (called “CIC”, Certificates of Immission into Consumption) on an annual basis. Each certificate verifies that 10 GCal of biofuels have been made available for consumption. The obligated parties are: “The parties who sell gasoline and diesel to be used in road transport.” The certificates are tradable through bilateral negotiations. The certificates are issued to the fuel supplier (figure above). The fuel supplier hands over the proof of sustainability,

<sup>15</sup> [https://ec.europa.eu/info/files/revision-directive-deployment-alternative-fuels-infrastructure\\_en](https://ec.europa.eu/info/files/revision-directive-deployment-alternative-fuels-infrastructure_en)

together with an independent audit, to the GSE (flow 1). After checking sustainability, the GSE issues the certificates (flow 2). The jet fuel supplier does not need the certificates and can therefore sell them to the obligated party in the road transport sector (flow 3).

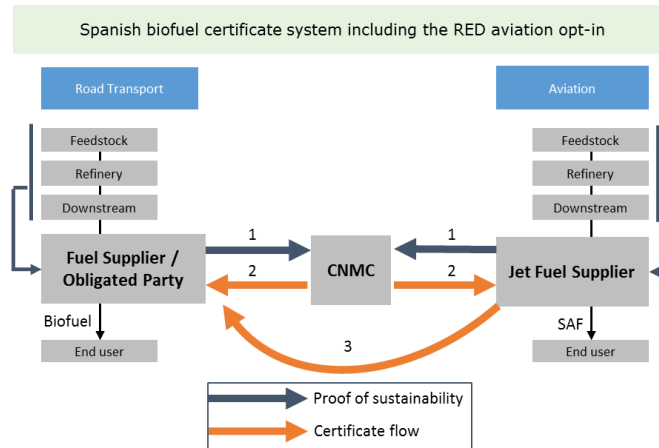


Fig.7 – Proposed opt-in (bioticket scheme) for Spain

The Spanish certificate system is administrated and controlled by the Comisión Nacional de los Mercados y la Competencia (CNMC). Certificates are provided per tonne of oil equivalent. The figure above, shows an overview of how the certificate system works. The certificate registrant needs to show the proof of sustainability of the biofuel, gathered from the supply-chain (flow 1). The CNMC issues the certificates to the biofuel supplier (flow 2). If this system would include an aviation opt-in, the jet fuel supplier gets a certificate from CNMC, which can then be sold to the obligated party (flow 3).

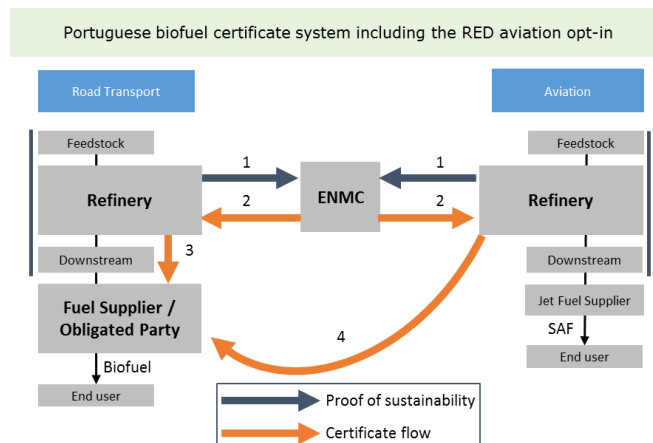


Fig.8 – Proposed opt-in (bioticket scheme) for Portugal

The obligation is controlled with a biofuel certificate system. The certificates “Titulo de Biocombustíveis” (TdBs) are provided for each tonne of oil equivalent of biofuels put on the market. The obligated parties are “all entities that incorporate fuels on the market for end consumption for the road transport sector”. The Entidade Nacional Para O Mercado de Combustiveis (ENMC) issues the TdBs to the party that refines the biofuel, this could either be the SAF refinery or the road fuel refinery. Aviation fuel could potentially be incorporated under TdBo’s (a special category within the TdB system) When SAF is refined, and sustainability is proven (flow 1), the tickets issued by the ENMC (flow 2) can then be sold to the obligated party in the road transport sector (flow 4).



In addition to this, a proposal for the inclusion of Carbon offsetting mechanism is here also given. In short, EU Airlines, Fuel Producers and major Airports are subject to the Emission Trading Scheme regulation (currently under revision).

The possibility to adopt offsetting measures to cover part of the due Carbon removals by the obligated stakeholders could be considered by EU as a strategy to generate additional benefits in other sectors and to other EU Policies: a win-win approach.

More specifically, we propose to include biochar as a method to offset GHG emissions while using the obtained Carbon in difficult soils, subject to desertification and marginalization, a typical land where low-ILUC feedstocks are produced. The case of these areas, much abundant in Southern EU Countries, has been well treated and GIS documented for decades by the European Institutions/Commission (European Environment Agency reports, Joint Research Center World Atlas of Desertification, EU R&D projects as S2BIOM, etc).

As this form of long-lived Carbon sequestration is now recognized by EC and included in the EC Implementing Act by EC as sustainable agronomic practice (with the highest GHG removal threshold, 45 g<sub>CO<sub>2</sub>eq</sub>/MJ of fuel), the use of biochar for offsetting a share of mandated emissions in ETS could not only permanently remove CO<sub>2</sub> from the atmosphere, but also – at the same time – favor the transition to a more sustainable and organic farming (EU Green Deal Farm to Fork; EU Communication on Carbon Farming of 15.12.21). It is worth to remind that biochar has been addressed by IPCC through various studies<sup>16</sup> as a form of long-lived Carbon sequestration, and a formula to calculate mineralized Carbon was given in its IPCC 2019 Guidelines<sup>17</sup>: thus, the topic is well addressed by the major International Institution dealing with Climate Change. In order to do this, an action is being developed at EC level to open a discussion about the use of biochar as offsetting measure (Innovation Deal). In parallel, it is also under discussion at ICAO, as a form of BioCCS/U.

From a policy dimension point of view, it would mean an effective and unique integration among the EU Energy Directives, the ETS Directive, the Agricultural Policy and the Climate policy.

## 5 Conclusions

The present report aims at proposing a possible regulatory scheme transferring the Dutch bioticket experience to other EU Member States in the Southern Mediterranean area, in agreement with the BIO4A workplan.

The proposed scheme connects to National bodies already engaged in managing the Renewable Energy Sector, issuing certificates to recognized installations and elaborating National Statistics, so to make use of existing MS bodies with the necessary skills and expertise to handle the bioticket scheme. The wider adoption of the suggested scheme, replicating to the Dutch approach to several other Member States, looks possible and feasible.

However, the incoming ReFuel EU Aviation Initiative (in the frame of the FitFor55 package) could require some revision when the Initiative will be finalized.

Indeed, the current situation of the whole EU energy market, first heavily impacted by the pandemic (aviation in particular) and then by the Ukraine war, will necessarily necessitate a further analysis as soon as these cases will be set and the market brought back to a new equilibrium.

---

<sup>16</sup> <https://www.ipcc.ch/sr15/page/2/?s=biochar>

<sup>17</sup> [https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4\\_Volume4/19R\\_V4\\_Ch02\\_Ap4\\_Biochar.pdf](https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch02_Ap4_Biochar.pdf)