

LOW-CARBON FUELS: DECODING EU LEGISLATION FOR THE TRANSPORT SECTOR

The EU has recently adopted new legislation on the use of renewable and low-carbon fuels in the transport sector. The new rules include important technical criteria for fuel producers and set binding targets for Member States, airlines and shipping companies. In this briefing, we look at the different types of fuels and consider the impact of the new rules.

E-FUELS UNDER EU LAW

What are e-fuels?

"E-fuels" is an overarching term used to describe electrofuels, synthetic aviation fuels or renewable fuels of non-biological origin (RFNBOs). Typically, e-fuels are differentiated from synthetic or advanced biofuels, which are synthesised from biomass, waste or biofuels using chemical or thermal processes. The term "e-fuels", however, is not defined as such in any of the newly adopted EU texts.

The Fit-for-55 package sets specific binding targets for the various types of e-fuels to reduce the greenhouse gas (GHG) intensity of gas consumed and boost the demand for, and supply of, these low-/zero-carbon fuels.

EU targets for e-fuels

In July 2021, the European Commission proposed the Fit-for-55 package, an ambitious set of legislative proposals to respond to the requirements in the EU Climate Law to reduce Europe's net GHG emissions by at least 55% by 2030.

Both the revised Directive 2018/2001/EU (RED III) and the ReFuelEU Aviation regulation (ReFuelEU) set specific targets for the consumption of e-fuels in the transport sector and aim to address the current factors that impede their uptake: low supply and prices much higher than those of fossil fuels.

The Commission notes that the aviation sector accounts for 13.9% of the emissions from transport, making it the second largest source of transport GHG emissions after road transport, while in 2021 maritime transport represented 3-4% of the EU's total CO₂ emissions – over 124 million tonnes of CO₂.

In this context, the recently adopted EU Regulation 2023/1805 on the use of renewable and low-carbon fuels in maritime transport (FuelEU Maritime

Key issues

- RED III sets a minimum requirement of 1% for RFNBOs in the share of renewable energy supplied to the transport sector in 2030.
- Under ReFuelEU, aviation fuel suppliers will have to blend increasing amounts of SAF with kerosene, starting with a 2% minimum blend in 2025, rising to 70% in 2050.
- Low-carbon synthetic aviation fuels produced from nuclear energy count towards the overall SAF target under the ReFuelEU Aviation regulation.
- Unlike the application of hard targets to the aviation sector, the FuelEU Maritime Initiative sets greenhouse gas reduction targets, providing incentives for the use of RFNBOs and a 1% RFNBO target for blended bunkering by 2031.

Initiative), instead of setting hard e-fuel consumption targets – like ReFuelEU does for the aviation sector – sets specific targets for the gradual reduction of GHG intensity of fuels used by the shipping sector by 2050. Naturally, to achieve these decarbonisation targets, ship operators will need to replace fossil fuels with biofuels and e-fuels.

The strategic importance of these fuels is further emphasised by the EU institutions' inclusion of sustainable aviation fuel (SAF) in the final list of "net zero technologies" under the Net Zero Industry Act, which is expected to rationalise approval processes and reduce the administrative burden for the development of new e-fuel and SAF projects, both at an EU and at a Member State level. You can read more in our briefing: [The European Net Zero Industry Act](#).

Notwithstanding the common interpretations of the terms "e-fuels" and "biofuels", as a result of the inter-institutional negotiating process and the large number of fuel production technologies, the newly adopted EU legislation contains several definitions and technical criteria with which fuels producers will need to comply in order for their products to count towards the relevant binding targets.

KEY EU LEGISLATION

Renewable Energy Directive III (RED III)

In October 2023, after nearly two years of inter-institutional negotiations, the revision of RED II (RED III) was published. The long-awaited RED III sets binding targets for the reduction of GHG in the transport sector, giving Member States the possibility of selecting one of the following two options:

- a 14.5% reduction in GHG intensity in transport from the use of renewables by 2030; or
- a share of at least 29% of renewables within the final consumption of energy in the transport sector by 2030.

RED III sets a binding combined sub-target of 5.5% for advanced biofuels (biofuels derived from non-food-based feedstocks) and RFNBOs (mostly renewable hydrogen and hydrogen-based synthetic fuels) in the share of renewable energies supplied to the transport sector. Within this target, there is a minimum requirement of 1% of RFNBOs in the share of renewable energies supplied to the transport sector by 2030. In addition to this, Recital 72 of RED III states that "*Member States with maritime ports should endeavour to ensure that from 2030 the share of [RFNBOs] in the total amount of energy supplied to the maritime transport sector is at least 1.2%*".

"RFNBOs" means renewable liquid and gaseous fuels of non-biological origin. It is a product group of renewable fuels defined in Article 2(36) of RED II. Although, under RED II, RFNBOs were only considered as transport fuels, RED III expands the scope of RFNBOs to all sectors in which they are deployed. These fuels are produced from renewable energy sources other than biomass. Therefore, gaseous renewable hydrogen produced by feeding renewables-based electricity into an electrolyser is considered a RFNBO. At the same time, liquid fuels, such as ammonia, methanol or e-fuels, are considered RFNBOs when produced from renewable hydrogen.

In June 2023, the Commission adopted the delegated act on a methodology for RFNBOs, which defines the conditions under which hydrogen, hydrogen-

E-fuels, such as e-methane, e-kerosene or e-methanol, are fuels in gaseous or liquid form that are produced from renewable (solar or wind power, for example) or decarbonised electricity synthesising captured CO₂ emissions and renewable or green hydrogen. E-fuels differ from **biofuels**, which are mainly produced using biomass feedstock.

based fuels and other energy carriers can be considered as RFNBOs, including the additionality requirement and the criteria on temporal and geographical correlation.

Under RED III, **advanced biofuels** are bio liquid fuels for transport produced from feedstock set out in Annex IX of RED II, such as algae, the biomass fraction of mixed municipal waste, the biomass fraction of industrial waste not fit for use in the food or feed chain, biowaste from households and animal manure.

In addition, RED III introduces a 2x multiplier for RFNBOs for the overall renewable energy consumption target (i.e. 42.5% by 2030). The RFNBOs that count towards that target include those used directly in transport, in biofuel production, and in petroleum refining.

ReFuelEU Aviation

ReFuelEU entered into force in October 2023 and started applying on 1 January 2024. The main objective of the regulation is to increase both demand for and supply of sustainable aviation fuels (SAF) – which have lower CO₂ emissions than fossil fuel kerosene – while ensuring a level playing field across the EU air transport market.

From 1 January 2025, ReFuelEU requires that:

- aviation fuel suppliers ensure that all fuel made available to aircraft operators at EU airports contains a minimum share of SAF and, from 2030, a minimum share of synthetic fuels, with both shares increasing progressively until 2050 (as illustrated in the table below); and
- aircraft operators ensure that the yearly quantity of aviation fuel uplifted at a given EU airport is at least 90% of the yearly aviation fuel required for the flights. This helps to avoid tankering practices, where an aircraft carries more fuel than it needs to reduce or avoid refuelling at its destination. Extra weight brings additional emissions.

ReFuelEU differs from RED III in an important aspect related to nuclear energy – a hotly debated issue during the inter-institutional negotiations. Specifically, although, only hydrogen which qualifies as an RFNBO counts towards the RED III targets), low-carbon aviation fuels produced from nuclear energy will count towards the overall SAF target for the purposes of ReFuelEU. However, they will not count for the sub-target of **synthetic** aviation fuels as these should be RFNBOs, as defined under RED II/III and the relevant delegated acts.

Unlike RED III, ReFuelEU is a regulation, and therefore it is directly applicable to, and binding on, all Member States and the relevant parties involved. It should be noted that ReFuelEU applies to commercial air transport flights and to airports with passenger traffic higher than 800,000 passengers or freight traffic higher than 100,000 metric tons in the previous reporting period. In the case of non-compliance with these requirements and targets, fines can be imposed on both fuel suppliers and aircraft operators.

Therefore, it is important to note the definitions of the various types of fuels covered under the regulation, as e-fuel producers must comply with these technical criteria in order for their fuels to count towards the supply and consumption targets.

Key Definitions

Sustainable aviation fuels (SAF) means aviation fuels that are either:

- (a) synthetic aviation fuels, i.e. aviation fuels that are RFNBOs;
- (b) aviation biofuels, i.e. (advanced) biofuels; or
- (c) recycled carbon aviation fuels, i.e. recycled carbon fuels (RCFs) as defined in RED II and compliant with the life cycle emissions savings threshold set out in the second delegated act under Article 27(3) of RED II.

RCFs are defined in RED II as "*liquid and gaseous fuels that are produced from 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*".

In the case of RFNBOs and RCFs, when calculating the carbon intensity of the end-product, the fossil-sourced CO₂ that is captured from power plants during the RFNBO/RCF production process counts for zero emissions until 2036, and until 2041 for all other fossil industrial sources.

It is worth noting that, from 2041, CO₂ will have to be sourced from either direct air capture or biomass combustion (provided that any CO₂ captured from biomass has not already received credits for emission savings from CO₂ capture and replacement related to biomass-based fuel production under RED II (Annex V and Annex VI)).

Recital 25 of RED II provides that "*when produced from renewable electricity and carbon captured **directly from the air**, synthetic aviation fuels can achieve as much as 100% emissions savings compared to conventional aviation fuel*".

Low-carbon aviation fuels are synthetic low-carbon aviation fuels or low-carbon hydrogen for aviation:

- *Synthetic low-carbon aviation fuels* are aviation fuels of non-biological origin, the energy content of which is derived from non-fossil, low-carbon hydrogen, which meet a life cycle emissions savings threshold of 70% and the methodologies for assessing such life cycle emissions savings pursuant to relevant EU law.
- *Low-carbon hydrogen for aviation* is hydrogen for use in aircraft, the energy content of which is derived from non-fossil, non-renewable sources (i.e. pink but not blue hydrogen), which meets a life cycle emissions savings threshold of 70% and the methodologies for assessing such life cycle emissions savings pursuant to relevant EU law.

Biofuel feedstocks

ReFuelEU allows for a smaller number of biofuel feedstocks to be used for the production of SAF compared to the list under RED III. In particular, it excludes food- and feed-based fuels, intermediate crops, palm fatty acid distillate and all other palm- and soy-derived materials, and soap stock and its derivatives. Nevertheless, if any of these feedstocks are included in Part B of Annex IX of RED II, they can count towards the SAF targets. In addition, any biofuels

produced from feedstocks not listed in Part A or Part B of Annex IX of RED II cannot count more than 3% towards the SAF targets.

Effective dates	Sustainable aviation fuels	Synthetic aviation fuels
1 January 2025	2%	
1 January 2030	6%	
1 January 2030		Average share of 1.2%, with a minimum share of 0.7% in each year
1 January 2032		Average share of 2%, with minimum shares each year of 1.2% as of 1 January 2032, until 31 December 2033, and 2% as of 2034
1 January 2035	20%	5%
1 January 2040	34%	10%
1 January 2045	42%	15%
1 January 2050	70%	35%

FuelEU Maritime Initiative

In September 2023, the EU adopted the FuelEU Maritime Initiative, a regulation aimed at supporting the decarbonisation of the shipping industry by setting specific GHG intensity reduction targets for the fuels used on board ships. As a result of such GHG intensity reduction targets, the FuelEU Maritime Initiative indirectly requires ship operators to increase gradually the share of renewable and low-carbon fuels in the fuel mix of international maritime transport in the EU.

The regulation applies to all ships in the EU with a gross tonnage more than 5,000 in commercial passenger transport or cargo regardless of the jurisdiction in which they are registered. The GHG reduction target applies to all energy used during voyages within the EU, while it also applies to 50% of the energy used for voyages entering or leaving the EU.

Under Article 4 of the FuelEU Maritime Initiative, the yearly average GHG intensity of the energy used by a ship during a reporting period must not exceed certain limits. These limits are calculated by reducing the reference value of 91.16 grams of CO₂ equivalent per megajoule (MJ) of energy by the following percentage:

- 2% from 1 January 2025;
- 6% from 1 January 2030;
- 14.5% from 1 January 2035;
- 31% from 1 January 2040;
- 62% from 1 January 2045; and
- 80% from 1 January 2050.

The eligible fuels under the FuelEU Maritime Initiative are biofuels, biogas, RFNBOs and RCFs, as well as low-carbon gases as defined in the recently adopted revised Gas Directive, which could include hydrogen produced from fossil fuels with carbon capture and storage and certified according to the delegated acts under the revised Gas Directive (i.e. "blue hydrogen"). A delegated act is expected to be adopted by the end of 2024 setting out the specific requirements for hydrogen to qualify as low-carbon.

According to the FuelEU Maritime Initiative, any fuel that has a well-to-wake GHG intensity within the above limits would satisfy the Initiative's requirements. For instance, under certain conditions, a ship could use LNG and still comply with GHG targets until 2039. Therefore, in order to incentivise the use of sustainable fuels from the early stages, the FuelEU Maritime Initiative provides that the use of RFNBOs will be double-counted towards the GHG reduction of a ship until the end of 2033, and RFNBOs must constitute at least 1% of all fuels used by 2031.

If companies fail to meet the 2031 goal, a 2% target will apply in 2034 if the Commission concludes that there are no issues related to the availability, cost or distribution of RFNBOs. As with ReFuelEU, ships that do not meet the limits on the yearly average GHG intensity of the energy used on board could be subject to a penalty calculated as the difference between the required and actual GHG intensity, multiplied by energy use (the FuelEU penalty).

The FuelEU Maritime Initiative will apply from 1 January 2025, while the requirements for companies to prepare and submit a monitoring plan for each of their ships indicating the method for monitoring and reporting the amount, type and emission factor of energy used on board by ships and other relevant information will apply from 31 August 2024.

KEY CONSIDERATIONS

It is evident from the above that demand-side measures are essential to support the development of a market for low-carbon fuels that will then contribute to the EU's 2050 decarbonisation targets.

The EU is the first jurisdiction to adopt a comprehensive regulatory framework classifying the various types of sustainable fuels, while setting binding targets at Member State as well as sector level.

It is important for biofuel and e-fuel producers to be aware of the applicable regulatory framework and the requirements that their products need to meet in order to qualify as sustainable fuels for the purposes of the underpinning legislation. At the same time, under each act, different entities are required to meet the relevant targets. RED III sets energy consumption targets to be met by Member States; ReFuelEU imposes binding targets on fuel suppliers and airlines; while shipping companies are responsible for complying with the FuelEU Maritime Initiative.

These criteria differ depending on the sector in which different fuels will be used. RefuelEU Aviation sets strict (sub-)targets for the consumption of e-fuels in the aviation sector, while the FuelEU Maritime Initiative focuses on the reduction of GHG emissions regardless of the fuels that will be used to achieve those targets.

On the specific characteristics of both aviation and maritime fuels, low-carbon fuels (such as low-carbon hydrogen) that meet certain emission thresholds are

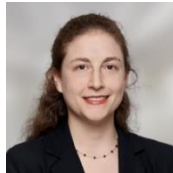
allowed irrespective of whether they are produced from renewable energy sources only or other energy sources such as nuclear power.

AUTHORS



Gauthier Martin
Partner, Paris

T +33 1 4405 5181
E gauthier.martin
@cliffordchance.com



Epistimi Oikonomopoulou
Senior Associate, Paris

T +33 1 4405 5110
E epistimi.oikonomopoulou
@cliffordchance.com



Philip Walsh
Counsel, Amsterdam

T +31 20 711 9547
E philip.walsh
@cliffordchance.com

CONTACTS



Jaime Almenar
Partner, Madrid

T +34 91 590 4148
E jaime.almenar
@cliffordchance.com



Liesbeth Buijter
Partner, Amsterdam

T +31 20 711 9326
E liesbeth.buijter
@cliffordchance.com



Jonathan Castelan
Partner, Houston

T +171 382 12831
E jonathan.castelan
@cliffordchance.com



Mel Chan
Counsel,
Singapore

T +65 6506 2771
E mel.chan
@cliffordchance.com



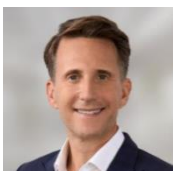
Stephen Chance
Head of Asset Finance,
MENA, Abu Dhabi

T +971 2 613 2482
E stephen.chance
@cliffordchance.com



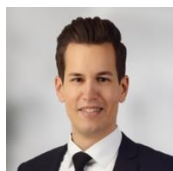
Sandy Hall
Partner,
London

T +44 207006 6806
E sandy.hall
@cliffordchance.com



Florian Mahler
Partner, Düsseldorf

T +49 211 4355 5232
E florian.mahler
@cliffordchance.com



Frederic Mainka
Senior Associate, Düsseldorf

T +49 211 4355 5355
E frederic.mainka
@cliffordchance.com



Paweł Puacz
Partner, Warsaw

T +48 22429 9532
E pawel.puacz
@cliffordchance.com

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www.cliffordchance.com

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London, E14 5JJ

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CONTACTS CONTINUED



Patrice Viaene
Partner, Brussels

T +32 2 533 5925
E patrice.viaene
@cliffordchance.com



Thomas Voland
Partner, Düsseldorf

T +49 211 4355 5642
E thomas.voland
@cliffordchance.com