Legislative acts and key measures for achieving the EU's low-emissions objectives in maritime sector*

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1. Introductory remarks. - 2. The EU emissions trading system Directive (EU-ETS). - 3. FuelEU Maritime Regulation. - 4. Regulation on Deployment of Alternative Fuels Infrastructure (AFIR). - 5. A revised Directive on Energy Taxation (ETD). - 6. The EU RED legal framework. - 7. Conclusions.

1. - *Introductory remarks.* The European Union has set out the legislative framework[1] for the transition towards zero-emission in the transport sector with special attention to the innovation of ports and ships and to the promotion of specific support schemes for the production and diffusion of sustainable fuels. Concerning maritime sector, key legislative acts have been passed through in order to reduce GHG emissions and achieve EU's climate objectives by 2030: a revised Directive on the EU emissions trading system (EU-ETS) which started covering emissions from maritime transport since January 2024; the FuelEU Maritime Regulation which invites shipping companies to provide accurate, complete and reliable data on the GHG emission intensity, on the sustainability characteristics of fuels and on the use of onshore power supply; a new Regulation on Deployment of Alternative Fuels Infrastructure (AFIR) with focus on innovation, digitalisation and adaptation of ports and ships; a proposal of Directive on Energy Taxation which will support GHG emission reduction by putting forward minimum rates of taxation on the relevant fuels used for intra-EU ferry, fishing and freight vessels; a revised Renewable Energy Directive on the promotion of energy from renewable sources which is in line with the objectives of the Commission communication of 12 May 2021, entitled *Pathway to a Healthy Planet for All EU Action Plan: Towards Zero Pollution for Air, Water and Soil*.

2. - *The EU emissions trading system Directive (EU-ETS).* Article 17 of the Kyoto Protocol identifies the Emission Trading as a System that allows countries with excess of emissions units, to sell this excess capacity to countries that are over their targets. Art. 10, par. 3 of ETS revised Directive (EU) 2023/959 requires from Member States to outline the management of the revenues generated and used from auctioning of allowances, ensuring that such revenues should be utilised for environmental and climate purposes in accordance with the list provided therein.
The ability of one country to pass units to another country through emission trading systems requires

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[1] The European Green Deal was presented by the Commission in 2019. The first adopted legislative act was the European Climate Law Regulation, enshrining the EU's climate goals in secondary legislation which led to the publication of the first 'Fit for 55' package in July 2021.The legislative package is unprecedented in its size and contains a total of 13 proposals. For extensive reading see: S. ZUNARELLI - M.M. COMENALE PINTO, *Manuale di Diritto della navigazione e dei trasporti*, 5ª ed., Milano, Wolters Kluwer, 2023; J.M, MARTÍN OSANTE, *Incidencia de la digitalización en los seguros de transporte*, in *Revista Española de Seguros*, n. 189/190, 2022, 119 ss.; H. SCHEUING - J. KAMM, *The EU on the road to climate neutrality - is the 'Fit for 55' package fit for purpose?*, in *Renewable Energy Law and Policy Review*, Volume 10, Issue 3-4, 1 April 2022, RELP 3-4: 4-18; J. WELLER, *Update of the REPowerEU plan and "Fit for 55" package*, in *International Energy Law Review*, 2023, 6, 196-199; A. METAXAS, *On the way to EU's clean energy transition: new approaches and challenges for Gas Regulation in the EU*, in *J World Energy Law Bus* (2024) 17 (1): 69.

registries like the national ones, which are available in each Country-party to Kyoto Protocol, or the Clean Development Mechanism (CDM) registry[2]. At regional level, the European Union emissions trading scheme is the world's first international emissions trading system, and as yet the largest and the most important in operation.
The EU ETS was adopted in 2003 and launched in 2005 and it is now in its fourth phase (2021-2030). In January 2024, the Commission proposed to gradually extend EU's Emissions Trading System (EU ETS)[3] to cover carbon dioxide (CO_2) emissions from all ships with 5000 gross tonnage and above[4] entering ports in the EU regardless of flag State.
The extension of the EU ETS to maritime transport includes the coverage of a share of the emissions from both incoming and outgoing voyages between the Union and third countries. In particular, includes half of the emissions from ships arriving in a Member State from a third country and from ships performing voyages departing from a Member State and arriving at a port outside UE. Additionally, it includes all of the emissions from ships arriving at a Member State from a port of another Member State and all of the emissions within a port of a Member State. The EU ETS extension to maritime transport requires shipping companies to buy emission allowances for each tonne of reported CO_2 emitted (or CO_2 equivalent, from 1 January 2026) and sets a cap on the total emissions from industry, aviation, and shipping combined.
Among the relevant environmental objectives that have been established in the amended art. 10 par. 3(f) of EU ETS Directive (EU) 2023/959 there are measures in order to achieve the decarbonisation in maritime sector such as the improvement of vessels' energy efficiency, measures regarding ports, technologies and the deployment of alternative fuels infrastructure.
In accordance with what stated in art. 10 par. 3(f) such allowances could be directed to finance investments in research and innovative technologies and to ensure the availability of sustainable alternatives fuels in maritime sector.

3. - ***FuelEU Maritime Regulation.*** FuelEU Maritime regulation aims to promote the introduction of sustainable marine fuels and zero emission marine propulsion technologies with ultimate goal the decarbonisation of EU maritime sector. The Regulation applies in principle to all ships with a gross tonnage of more than 5.000 calling at European ports (Article 2) and is addressed to EU and non-EU registered cargo and passenger vessels equally[5] with the view in the future to be extended to ships below 5.000 following regular re-evaluations. The new legislative framework sets an upper limit for the GHG content of the energy used by ship operators (Articles 4, 5), whilst passenger ships and container ships are required to use onshore power supply unless they can demonstrate the use of an alternative zero-emission technology.
It provides legal certainty on the use of renewable and low-carbon fuels in maritime transport since a valid document of compliance for a specific ship is issued by a legal entity (called verifier)[6], carrying out verification activities. Such document gives assurance that the ship concerned has fulfilled the obligations

[2] CDM allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one tonne of CO_2. These credits can be traded and sold, and used by industrialized countries to a meet a part of their emission reduction targets under the Kyoto Protocol. See: *https://cdm.unfccc.int/Registry/index.html*.
[3] Cfr. J. WELLER, *Update of the REPowerEU plan and Fit for 55 package*, cit.
[4] According to EU ETS Directive (EU) 2023/959 by 31 December 2026, the Commission will examine the feasibility and economic, environmental and social impacts of the inclusion in Directive 2003/87/EC of emissions from ships below 5.000 gross tonnage, including offshore ships.
[5] The rules laid down in FuelEU Maritime (UE) 2023/1805 Regulation should not apply to warships, naval auxiliaries, fish-catching or fish-processing ships, wooden ships of a primitive build, ships not propelled by mechanical means, or government ships used for non-commercial purposes.
[6] Art. 3, (27), FuelEU Maritime (UE) 2023/1805.

referred to in FuelUE Maritime Regulation.
To keep a record of actions related to verification activities, including the actions related to payment of the FuelEU penalties imposed under Article 23 and of the issuance of the FuelEU document of compliance, Article 19 ensures the functioning of an electronic database. FuelEU database is accessible to the companies, the verifiers, the competent authorities and any authorised entity, with responsibilities for the implementation of the FuelEU Maritime Regulation[7].
The competent authority of the administering State in respect of a shipping company may, for any of its ships, conduct additional checks and in case of non-conformities or miscalculations resulting in a non-conformity with the provisions of FuelEU Maritime Regulation, shall notify to the company concerned the corresponding amount of the FuelEU penalty[8]. The revenues from the FuelEU penalties are expected to promote the production and diffusion of renewable fuels and ultimately to contribute to the emissions reduction. The competent authority shall re-issue the relevant FuelEU document of compliance only when an amount equal to the FuelEU penalty has been paid, provided that the other conditions set out in the FuelEU Maritime Regulation for holding the FuelEU document of compliance are fulfilled by the company (Art. 17, par. 3 FuelEU Maritime Reg.).
The entity responsible for compliance with the FuelEU Regulation can be either the shipowner, or any other entity, organisation or person, distinct from the shipowner, responsible for compliance with the legislative provisions.
The Regulation applies from 1st January 2025, with the exception of Articles 8 and 9 which are in effect since 31 August 2024 concerning the submission of the monitoring plan. All the relevant information from the implementation of the FuelEU Maritime Regulation should be shared with IMO and other international organisations to enable and simplify the development of international rules on maritime decarbonisation. Where amendments or agreements on a global approach are achieved on matters related to FuelEU Regulation, the European Commission is committed to review the Regulation and align it with the international rules[9].
4. - *Regulation on Deployment of Alternative Fuels Infrastructure (AFIR).* European Union has introduced with new legislative provisions the establishment of a comprehensive and complete network of alternative fuels infrastructure across the Union. To modernise the European transport system, the new legal framework supports the deployment of shore-side electricity supply at both inland and maritime ports and ensures an efficient, multimodal, and high-quality transport infrastructure across the EU.
In order to achieve its objectives, Regulation (EU) 2023/1804 (AFIR) of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure[10] invites each Member State to prepare and transmit to the Commission by 31 December 2025 a national policy framework for the development of the market concerning the alternative fuels in the transport sector and the deployment of the relevant infrastructure (art. 14).

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[7] J.S. DEHNER, *Vessel-Source Pollution and Public Vessels: Sovereign Immunity v. Compliance, Implications for International Environmental Law*, 9 *Emory Law Journal* 507 (1995); K.R. MACK, *Navigating the Waters: A Comparative Analysis of Vessel GHG Emissions Regulations Under the Clean Air Act and MARPOL*, 48 *Tul. Mar. L.J.* 253 (2024), 269 ss.
[8] M. RAJAVUORI - K. HUHTA, *Digitalization of security in the energy sector: evolution of EU law and policy, J World Energy Law Bus* (2020) 13 (4): 353, 1st August 2020.
[9] J. WELLER, *Update of the REPowerEU plan and "Fit for 55" package*, cit.; MCKINSEY & COMPANY, *How the European Union could achieve net-zero emissions at netzero cost*, 2020; EU Focus 2022, 411, 43-44, *New transport proposals target greater efficiency and more sustainable travel*; EU Focus 2023, 429, 40-42, *New proposals to support clean and modern shipping*, cit.; H.K. JESWANI, *Environmental sustainability of biofuels: a review*, Proceedings of the Royal Society A, Vol. 476, 2020, 3.
[10] Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU, *OJ* L 234, 22.9.2023, 1-47. The regulation is applicable since 13 April 2024.

Alternative fuels are identified [Article 2, point (4)][11] in biomass fuels, synthetic and paraffinic fuels, where non-renewable alternative fuels and transitional fossil fuels are for example the natural gas in gaseous form [compressed natural gas (CNG)] and liquefied form [liquefied natural gas (LNG)], liquefied petroleum gas (LPG), synthetic and paraffinic fuels produced from non-renewable energy[12].
At present, liquefied methane is used in maritime transport, where no economically viable zero emission powertrain technology is currently available. In contrast with the situation in maritime transport, in inland waterway transport, with normally smaller vessels and shorter distances, zero-emission powertrain technologies, such as hydrogen and electricity are expected to enter the market more quickly[13].
Indeed, TEN-T[14] Regulation (EU) 2024/1679 (Article 26) in concert with the provisions of AFIR Regulation (EU) 2023/1804[15] on the deployment of alternative fuels infrastructure requires that an appropriate number of refuelling points for liquefied methane in TEN-T core maritime ports should be available by 2025 to provide hydrogen refuelling opportunities for long haul trucks when they are being loaded or unloaded.
Additionally, AFIR Regulation invites for a minimum shore-side electricity supply by 2030. More precisely, Member States should provide each year shore-side electricity supply for seagoing container ships and seagoing passenger ships in TEN-T maritime ports for which the annual number of port calls of ships that are moored at the quayside, averaged over the last three years, by seagoing container ships is above 100 or by seagoing passenger ships is above 40 with further distinction to this latter group between seagoing ro-ro passenger ships and seagoing high-speed passenger crafts[16]. Such ship types, i.e. container ships and bulk carriers, are the leading contributors to shipping carbon dioxide emissions while they are moored at the quayside and a minimum shore-side electricity supply should be ensured by 2030 (Art. 9, 10 Reg. AFIR).
In the same way, Regulation FuelEU Maritime (UE) 2023/1805[17] on the use of renewable and low-carbon fuels in maritime transport sets in Art. 1(b) a corresponding legal requirement for ships to connect to on-shore power supply (OPS) infrastructure or zero-emission technology in ports under the jurisdiction of a Member State, which is coordinated with the legal requirement for ports to provide on-hore power

[11] Article 2 (4), Regulation (EU) 2023/1804.: alternative fuels means fuels or power sources which serve, at least partly, as a substitute for fossil oil sources in the energy used for transport and which have the potential to contribute to its decarbonisation and enhance the environmental performance of the transport sector, including: (*a*) alternative fuels for zero-emission vehicles, trains, vessels or aircraft: - electricity, - hydrogen, - ammonia, (*b*) renewable fuels: - biomass fuels, including biogas, and biofuels as defined in Article 2, points (27), (28) and (33), respectively, of Directive (EU) 2018/2001, - synthetic and paraffinic fuels, including ammonia, produced from renewable energy, (*c*) non-renewable alternative fuels and transitional fossil fuels: - natural gas in gaseous form (compressed natural gas (CNG)) and liquefied form (liquefied natural gas (LNG)), - liquefied petroleum gas (LPG), - synthetic and paraffinic fuels produced from non-renewable energy.
[12] See: P. CAZZOLA ET AL, 2023, *Research for TRAN Committee: Assessment of the potential of sustainable fuels in transport*, European Parliament, 58; Z. DING - B. MAYER, *Climate Change Mitigation in the Aviation Sector: A Critical Overview of National and International Initiatives*, in *Transnational Environmental Law*, 12:1 (2023), 14-41.
[13] Recital (7), Regulation (EU) 2023/1804.
[14] European Council adopted Regulation (EU) 2024/1679 on Union guidelines for the development of the trans-European transport network. The regulation introduces a network with a dual-layer structure consisting of a comprehensive network aimed to be completed within 2050 and a core network to be completed within 2030 through realization of new infrastructures that will modernise and replace the current ones. The aim is to ensure accessibility and connectivity of all regions in the EU by linking the most strategically important urban and other transport nodes such as ports, airports and border-crossing points.
[15] Recital (52), Regulation (EU) 2023/1804.
[16] H. SCHEUING - J. KAMM, *The EU on the road to climate neutrality - is the 'Fit for 55' package fit for purpose?* , cit.
[17] Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC, *OJ* L 234, 22.9.2023, 48-100.

supply (OPS)[18] (Art. 9, AFIR Regulation).
Therefore, according to Art. 1 of FuelEU Maritime Regulation there are two legal requirements for ships, the first one concerns the limit on the greenhouse gas (GHG) intensity of energy used on board and the other one relates to the obligation to use on-shore power supply (OPS) or zero-emission technology in ports under the jurisdiction of a Member State starting from 1st January 2030 for all its electrical power demand at berth (Art. 6)[19]. In addition to OPS, ships could also use other technologies in ports with equivalent environmental benefits whenever the use of an alternative technology is demonstrated to be equivalent to the use of OPS[20].
In article 6(5) of FuelEU Maritime Regulation are listed some exceptions to the obligation to connect to onshore power supply with some of them to be related to the conditions at berth in the port of call, i.e. incompatibility between port and ship OPS equipment, unavailable OPS connection in the port, lack of sufficient power supplied from OPS. In all the other circumstances, whenever companies fail to comply, their ships may be expulsed from ports, and potentially experience restricted access to ports in multiple Member States (Article 25).
In ports, usually the activities related to port management, terminal operations, and shipping operations, involve a variety of bodies, organizations and individuals with the implication of terminal operators, port authorities, customs officers, haulage operators and transport companies just to mention the most important ones.
To this end, blockchain technology[21] guarantees the traceability of all documents and information in real time and provides reassurance to all the parties involved[22] as it can be used to improve the efficiency of customs officers for counterfeit checking[23]. Moreover, it has been proved crucial in the realization of smart ports since it makes available all the information of the operations between the parties to the transaction by handing over the digitalization and dematerialization of the companies and the

[18] On-shore power supply (OPS) means the system to supply electricity to ships at berth, at low or high voltage, alternate or direct current, including ship-side and port-side installations [Art. 3 (24) Reg. FuelEU Maritime (UE) 2023/1805].
[19] According to Article 9, par. 1 FuelEU Maritime Regulation: From 1st January 2030, a ship moored at the quayside in a port of call which is covered by Article 9 of Regulation (EU) 2023/1804 and which is under the jurisdiction of a Member State shall connect to OPS and use it for all its electrical power demand at berth. See: *New proposals to support clean and modern shipping*, EU Focus 2023, 429, 40-42, Sweet & Maxwell and its Contributors; H.K. JESWANI, *Environmental sustainability of biofuels: a review*, cit.
[20] L. ZHU - X. LI - ST. LI, *Examining existing measures for regulating shipping decarbonisation and exploring the way forward*, JIML 28 (2022) 2, 106-115; B. GARCÍA - A. FOERSTER - J. LIN, *Net Zero for the International Shipping Sector? An Analysis of the Implementation and Regulatory Challenges of the IMO Strategy on Reduction of GHG Emissions*, in *J Environmental Law* (2021) 33 (1): 85 1 March 2021, 86 ss.; H. SCHEUING - J. KAMM, *The EU on the road to climate neutrality - is the 'Fit for 55' package fit for purpose?*, cit.
[21] On blockchain technology see: A. GHIANI, *Blockchain: linee guida. Dai casi pratici alla regolamentazione*, Torino, 2022, 10 ss.; S. CAPACCIOLI (a cura di), *Cripto attività, criptovalute e bitcoin*, Milano, 2021, 61 ss.; P. MAUME - M. FOMBERGER, *Regulation of Initial Coin Offerings: Reconciling US and EU Securities Law*, in *Chicago Journal of International Law,* 2019, 548 ss.
[22] See P. TODD, *Electronic bills of lading, blockchains and smart contracts*, in *International Journal of Law and Information Technology,* 2019, 27, 339-371; T. KREBBS, *Electronic bills of lading, transnational and English law: blocking the blockchain?*, in *Uniform Law Review*, 2023, 28, 323-338.
[23] R. PHILIPP - G. PRAUSE - L. GERLITZ, *Blockchain and smart contract for entrepreneurial collaboration in maritime supply chains*, in *Transports and Telecommunication*, 20 (4), 2019, 365-378.; B. BEHDANI - B. WIEGMANS - V. ROSO - H. HARALAMBIDIS, *Port-hinterland transport and logistics: emerging trends and frontier research*, in *Maritime Economics & Logistics,* 22, 2020, 1.

organizations involved[24].

5. - *A Revised Directive on Energy Taxation (ETD).* To ensure the proper functioning of the internal market in consistency with the EU objectives, Directive 2003/96/EC of 27 October 2003 on the taxation of energy products and electricity (Energy Taxation Directive or ETD) offers the opportunity to the Member States to remove disadvantages for clean technologies and to introduce higher levels of taxation for inefficient and polluting fuels.
However, the ETD Directive does not adequately promote greenhouse gas emissions reductions and alternative fuels (renewable hydrogen, synthetic fuels, advanced biofuels, etc.) since a wide range of tax exemptions and reductions on fossil fuels are applied, fact which implicitly support rather than reduce the production and use of fossil fuels.
As a result, the ETD Directive was evaluated in 2019 and in 2021 a proposal was presented for a Council Directive[25] restructuring the Union framework for the taxation of energy products and electricity. The proposal for the new directive once it is adopted will contribute to the GHG reduction by setting higher rates to fossil fuels and lower rates to renewables products, discouraging in that way the use of fossil fuels trough Member States in view of EU's climate objectives.
In order to promote the diffusion of sustainable fuels in the maritime sector encouraging as well the development of (near) zero-emission vessels, the Revision of the Energy Taxation Directive together with Regulation (UE) 2023/1805 (FuelEU Maritime)[26] on the use of renewable and low-carbon fuels in maritime transport announces a key measure according to which fossil fuels used as fuel for intra-EU maritime transport and fishing should no longer be fully exempt from energy taxation in the EU. Such measure is highly important considering the environmental impact of energy emissions and fossil fuel pollution in these sectors. Furthermore, the Revision of the Energy Taxation Directive specifies that conventional fossil fuels, such as gas oil and petrol will be taxed at the highest rate. For a transitional period of ten years two-thirds (2/3) of the reference rate will apply to fuels that are fossil based but are less harmful and still have some potential to contribute to decarbonisation in the short and medium term such as natural gas, LPG and hydrogen of fossil origin. Thereafter this rate will increase to the full reference rate. Also, for the same transitional period, half (½) of the reference rate will apply to sustainable but not advanced biofuels whilst the lowest rate will apply to electricity, regardless of its use, advanced biofuels, bioliquids, biogases and hydrogen of renewable origin.
To give financial assistance to Member States and especially to regions that lack efficient national support schemes for the green transition process, the European Union has adopted[27] Regulation (EU) 2021/1056, establishing the Just Transition Fund.
The scope of the Just Transition Fund (JTF) is to provide support to the communities, economies and the environment of territories that face serious socio-economic challenges and they are struggling to achieve the EU's climate objectives. The specific objective[28] of the JTF, is to assist regions and people with the social, employment, economic and environmental impacts of the transition, carrying out the

[24] G. BAVASSANO - C. FERRARI - A. TEI, *Blockchain: How Shipping Industry is Dealing with the Ultimate Technological Leap*, in *Research Transp. Busin. Manag*, 34, 2020, 1 ss.; S. TSIULIN - H.H. REINAU - O.P. HILMOLA - N. GORYAEV - A. KARAM, *Blockchain-Based Applications in Shipping and Port Management: A Literature Review towards Defining Key Conceptual Frameworks*, in *Rev. Int'l Business Strategy*, 2020, 201-224.
[25] Proposal COM (2021) 563 for a Council Directive restructuring the Union framework for the taxation of energy products and electricity (recast), 14.7.202, COM (2021) 563 final, 2021/0213(CNS).
[26] Regulation (EU) 2023/1805.
[27] Regulation (EU) 2021/1056 of the European Parliament and of the Council of 24 June 2021, in force since 1st July 2021, establishing the Just Transition Fund, *OJ* L 231, 30.6.2021, 1-20.
[28] Article 2, Regulation (EU) 2021/1056.

principles and strategic goals of the Fund Package set up by Regulation EU 2021/1060[29].
For this purpose, Regulation (EU) 2021/1056 establishing the Just Transition Fund introduces incentives to give full access to JTF resources to those Member States that present concrete results on achieving the EU transition targets whilst access to the JTF should be limited to 50 % of the national allocation for those Member States that have not yet committed to implement the objectives, with the other 50 % being made available for programming upon acceptance of such a commitment. Furthermore, Article 5 introduces the Green Rewarding Mechanism with distribution of the additional resources among Member States succeeded to achieve a reduction in greenhouse gas emissions.
In the transport sector the Just Transition Fund finances investments in low-carbon transportation and sustainable urban mobility. Investments for sustainable infrastructures and for the sustenance of multimodal transport hubs are covered also by Regulation (EU) 2021/523, establishing the InvestEU Programme[30]. The InvestEU Programme prioritises areas under-invested for which additional financial support is required and it works in synergy with other relevant Union programmes in areas such as transport, energy and digitisation.
The InvestEU Programme contributes to Union policies with regard to seas and oceans through the development of projects and enterprises in the area of the blue economy with investments in maritime entrepreneurship and industry for a competitive maritime industry[31].

6. - *The EU RED legal framework.* Directive (EU) 2018/2001 (RED II) of 11 December 2018, which is a recast of the Directive 2009/28/EC (RED I), came into effect on 1st July 2021 and put in place a common framework for the promotion of energy from renewable sources[32] in the EU alongside with rules on financial support to enhance the use of renewable energy usage.
In particular, Directive (EU) 2018/2001 moved towards an EU framework (instead of a national one in the previous legislative context) with eligibility criteria for support schemes. In Article 29, par. 1, it is, in fact, specifying that energy from biofuels, bioliquids and biomass fuels in order to be eligible for receiving financial support should fulfil the criteria laid down therein and comply with the Directive's sustainability and greenhouse gas emissions saving criteria[33].
To better prevent fraud in the supply chains for bioenergy and recycled carbon fuels, Directive (EU)

[29] Regulation (EU) 2021/1060 of the European Parliament and of the Council of 24 June 2021 laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund and the European Maritime, Fisheries and Aquaculture Fund and financial rules for those and for the Asylum, Migration and Integration Fund, the Internal Security Fund and the Instrument for Financial Support for Border Management and Visa Policy, *G.U.* L 231 del 30.6.2021, 159-706.
[30] Regulation (EU) 2021/523 of the European Parliament and of the Council of 24 March 2021, establishing the InvestEU Programme and amending Regulation (EU) 2015/1017, *G.U.* L 107 del 26.3.2021, 30-89.
[31] In the maritime sector the revision of the Energy Taxation Directive together with Regulation (EU) 2023/1805 (FuelEU Maritime) announces key measures in terms of climate friendly policies which will contribute to the transition to cleaner energy and achieve EU's climate neutrality objectives.
[32] According to the definition given in Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (Renewable Energy Directive, RED II) adopted in December 2018: Energy from renewable sources or renewable energy is defined as energy from renewable non-fossil sources, namely wind, solar (solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, and biogas. See: A. ZYGIEREWICZ - L.S. SANZ, EPRS European Parliamentary Research Service Ex-Post Evaluation Unit PE 662.619 - March 2021.
[33] See: A. SAVARESI - L. PERUGINI, *Balancing Emissions and Removals in the Land Sector: The View from the EU* (2021) CCLR 1, 49, 2021, in *Carbon and Climate Law Review*, Volume 15, Issue 1, 1 March 2021, 49; H.K. JESWANI, *Environmental sustainability of biofuels: a review*, cit.; A. SWINBANK, *The WTO's Agreement on Agriculture: Where Next?*, 14(1) *Trade L. & Dev*. 54 (2022), 25 e ss.

2018/2001 encourages the cooperation of the Member States in exchanging information from their national databases. To this end a Union database has been set up to enable the tracing of liquid and gaseous renewable fuels and recycled carbon fuels. The Union database has become operational on 15 January 2024 with the aim to improve traceability of biofuels, avoid double counting, and address concerns about fraud as it provides comprehensive monitoring of the production and consumption of those fuels in terms of transparency, traceability and supervision. The relevant economic operators should also declare in the Union database all the information related to whether financial support has been provided for the production of a specific consignment of fuel, and if so, specify the type of support scheme received. Those data may be entered into the Union database via national databases which can be used for the collection of information and for reassigning them into the Union database[34].

The European Commission has recently revised the provisions with Renewable Energy Directive (RED III) 2023/2413 in 20 November 2023[35] with the addition of important amendments regarding the support schemes for the production of renewable and sustainable fuels. Member States had a 21 May 2025 deadline to bring into force the laws, regulations and administrative provisions necessary to comply with the Directive with the EU Commission to take action for those who have not met the deadline.

Regarding the biomass harvesting and collection, measures should ensure that energy from biomass[36] is produced in a way that minimises undue distortive effects on the biomass raw material market and an adverse impact on biodiversity[37], the environment and the climate[38]. To avoid incentives to non-sustainable schemes Directive (UE) 2023/2413 (RED III) has introduced a series of limitations regarding the approval of subsidies and financial support schemes. Member States should not grant direct financial support (except tax benefits which are not considered to be direct financial support) for the production of energy from saw logs, veneer logs, industrial grade roundwood, stumps and roots. Furthermore, they should avoid support schemes that would frustrate targets on treatment of waste and would bring to the inefficient use of recyclable waste. Also, Member States should not grant new support or renew any financial support for electricity-only plants, unless the installations are located in regions with a specific use status as regards their transition away from fossil fuels.

To satisfy the needs of the green transition, Directive RED III (EU) 2023/2413[39] now includes renewable fuels of non-biological origin, related to liquid and gaseous fuels derived from renewable sources other than biomass. The latest amendments of the Directive set binding targets for the use of renewable fuels

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[34] Art. 31 *bis*, Directive (EU) 2023/2413. See: F. VETRÒ, *Sviluppo sostenibile, transizione energetica e neutralità climatica, profili di governance: efficienza energetica ed energie rinnovabili nel "nuovo ordinamento" dell'energia,* in *Riv. it. dir. pubbl. comunitario*, Issue 1, 1 February 2022, 53.

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

[36] J. GLAUBER - C. HEBEBRAND, *Food versus Fuel v2.0: Biofuel policies and the current food crisis*, International Food Policy Research Institute, 2023 where there are some significant data on global biofuels produced from food and feed crops: 22% of sugarcane production and 16% of maize production is used for ethanol production. About 15% of vegetable oil production [mostly palm oil, soybean oil and rapeseed (canola) oil] go into biodiesel production. By contrast, wheat, other feed grains (such as sorghum) and sugar beets account for a relatively small share of total production (less than 2%).

[37] See: A. SAVARESI - L. PERUGINI, *Balancing Emissions and Removals in the Land Sector: The View from the EU*, cit.; H.K. JESWANI, *Environmental sustainability of biofuels: a review*, cit.; A. SWINBANK, *The WTO's Agreement on Agriculture: Where Next?*, cit.

[38] European Court of Auditors Special Report Sustainable finance: More consistent EU action needed to redirect finance towards sustainable investment, September 2021. *https://www.eca.europa.eu/Lists/ECADocuments/SR21_22/SR_sustainable-finance_EN.pdf*; MCKINSEY & COMPANY, *How the European Union could achieve net-zero emissions at netzero cost*, cit. See also A.L. BOVENBERG - L.H. GOULDER, *Environmental Taxation and Regulation*, Cambridge, 2001.

[39] Art. 2, par. 2, *f*), (22a) of Directive RED III (EU) 2023/2413.

of non-biological origin (mostly renewable hydrogen and hydrogen based synthetic fuels) in industry and for the use of renewable fuels of non-biological origin in the transport sector. Especially, in shipping and aviation the directive promotes the use of renewable fuels, including hydrogen[40].
In particular, Article 25 establishes that each Member States in order to increase renewable energy and reduce greenhouse gas intensity in the transport sector shall set an obligation on fuel suppliers to ensure that the combined share of advanced biofuels[41], biogas and renewable fuels of non-biological origin in the energy supplied to the transport sector is at least 1% in 2025 and 5,5% in 2030[42] [of which a share of at least 1 percentage point is from renewable fuels of non-biological origin (RFNBO)]. This will contribute to greenhouse gas intensity reduction of at least 14,5% by 2030 in the transport sector.

7. - *Conclusions.* With the revision of the EU legislation, the deployment of alternative refuelling infrastructure and the advancement of new digital technologies is supported.
Furthermore, the new legal framework promotes the development of sustainable and innovative energy technologies and includes for the first time provisions on renewable fuels of non-biological origin and recycled carbon fuels, other than food and feed crops-based biofuels. The revision of the EU legislation, brought also to important amendments concerning the support schemes and financial aid for the production of sustainable fuels with minimized risk of negative impact on land-use and biodiversity. In this way the transition towards sustainable energy is widely supported in order to deliver on the EU's climate neutrality objectives.

[40] M.E. HARRIS, *The revision of the LULUCF Regulation: making Europe's countryside 'Fit for 55*, in *I Diritti Comparati*, *Comparare i diritti fondamentali in Europa*, 12 giugno 2023; A. SAVARESI - L. PERUGINI, *Balancing Emissions and Removals in the Land Sector: The View from the EU*, cit.; H.K. JESWANI, *Environmental sustainability of biofuels: a review*, cit.; A. SWINBANK, *The WTO's Agreement on Agriculture: Where Next?*, cit.
[41] Biofuels production in Europe has been increased to 39% in 2021 compared to 2013. Biodiesel represents almost the 80% of the consumption, in the second place there is bioethanol (18%) whereas biomethane with other biofuels liquid only 1%.
[42] RED III has increased the target of the share to 5,5% from 3,5% in the energy supplied to the transport sector to 5,5% in 2030.