



## THE STATE OF ERS

**Analysis of AFIR and the state of ERS in other countries**





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## INTRODUCTION

The purpose of the pm is to assist the Swedish Transport Administration by providing an analysis of the AFIR process and the decision-making contexts in relevant countries. The analysis of the AFIR process begins with an overview of its background and structure and concludes with a review of potential arena for Swedish actions. The country analysis includes a general assessment of the situation, along with detailed evaluations for some relevant countries.

## AFIR

AFIR is short for Alternative Fuels Infrastructure Regulation and is EU's way to:<sup>1</sup>

1. Ensure minimum infrastructure to support the required uptake of alternative fuel vehicles across all transport modes and in all EU Member States to meet the EU's climate objectives;
2. Ensure full interoperability of the infrastructure; and
3. Ensure comprehensive user information and adequate payment options at alternative fuels infrastructure

The upcoming revision of AFIR is important for the future of ERS and Sweden has the possibility to influence the writings. In this chapter we try to support by describing and analyzing AFIR.

One notable update in AFIR compared to AFID, is the introduction of a clear definition for electric road systems. Apart from the definition, it is mostly what is in the appendix to AFIR that is interesting regarding electric road systems. For countries planning to expand infrastructure for electric road systems, the national status report is required to include information on the extent to which these goals have been achieved.

## HISTORY

14 Juli 2021, presented by the European Commission, proposal for a regulation of the European Parliament and of the Council on the deployment of alternative fuels infrastructure and repealing Directive 2014/94/EU (AFIR).

2 June 2022, after the ministers in the EU member states discussed the proposal, a common position was reached, a general approach on the proposal.

28 March 2023, after negotiations between the Council of the European Union and the European Parliament, a provisional agreement on Regulation was reached.

25 July 2023, the European Council adopted the new regulatory framework.

13 April 2024, Directive 2014/94/EU and Delegated Regulations (EU) 2019/1745 and (EU) 2021/1444 are repealed with effect from 13 April 2024.

13 April 2024, 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 (AFIR) shall apply from 13 April 2024.

13 April 2024, this Regulation shall be binding in its entirety and directly applicable in all Member States.

## UNDERLYING CAUSE

Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure (AFID) sets out a framework of common measures for the deployment of such infrastructure in the EU. It requires Member States to set up national policy frameworks to establish markets for alternative fuels. A key requirement is the establishment of a sufficient number of publicly accessible recharging and refuelling points, and to enable free cross-border circulation of such vehicles and vessels on the TEN-T network. In its report, COM (2021) 103 final, on the application of Directive 2014/94/EU on the deployment of alternative fuels infrastructure, the Commission noted some progress in the Directive's implementation. However, the shortcomings of the current policy framework are also clearly visible: as there is no detailed and binding methodology for Member States to calculate targets and adopt measures, their level of ambition in target setting and supporting policies in place varies greatly. The report concludes that there is

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<sup>1</sup> See [Alternative Fuels Infrastructure - European Commission](#)

no comprehensive and complete network of alternative fuels infrastructure across the EU. Likewise, the European Court of Auditors noted in its special report on recharging infrastructure that obstacles to travelling across the EU in electric vehicles remain and that the deployment of recharging infrastructure in the Union needs to accelerate, Special Report 05/2021. (European Court of Auditors (2021): Special Report 05/2021: Infrastructure for charging electric vehicles: more charging stations but uneven deployment makes travel across the EU complicated).

The Commission carried out an ex post evaluation of this Directive, SWD(2021) 637, “Evaluation of Directive 2014/94/EU of the European Parliament and of the Council on the deployment of alternative fuels infrastructure”. The evaluation found that the Directive is not well-adapted to the purpose of serving the increased climate ambition for 2030. The main problems include that Member States’ infrastructure planning on average lacks the level of ambition, consistency and coherence needed, leading to insufficient and unevenly distributed infrastructure. Further, interoperability issues with physical connections persist, while new issues have emerged over communication standards, including data exchange among the different actors in the electro-mobility ecosystem. Finally, there is a lack of transparent consumer information and common payment systems, which limits user acceptance. Without further EU action, this lack of interoperable, easy-to use recharging and refuelling infrastructure is likely to become a barrier to the needed market growth of low- and zero-emission vehicles, vessels and – in the future – aircraft.

## **EX POST EVALUATION**

A ‘REFIT’ ex post evaluation showed that the Directive has supported the development of policies and measures for the rollout of alternative fuels infrastructure in Member States, particularly through the requirement to develop national policy frameworks (NPFs), SWD (2021) 637.

However, shortcomings in the current policy framework have also been pointed out in the evaluation. Moreover, the Directive’s key objective, to ensure coherent market development in the EU, has not been met. Shortcomings particularly arise in the following three areas: (i) the lack of a complete network of infrastructure allowing seamless travel across the EU; (ii) the need for further common technical specifications to ensure interoperability considering emerging technologies; and (iii) the lack of full user information, uniform and easy-to-use payment methods and full price transparency across the Union.

The evaluation concluded that six years after the Directive’s adoption, the overall European market for alternative fuels infrastructure is still in a rather early development phase, though markets are maturing in some parts of the EU. Given the overall relevance of ensuring sufficient infrastructure to support the needed uptake of vehicles and vessels in light of the increased climate ambition for 2030, the evaluation of the Directive recommended retaining the legislation but revising it.

## **DIRECTIVE OR REGULATION**

While the Impact Assessment resulted in a Directive as the preferred policy option, the Commission made the choice to propose a Regulation. The choice of a Regulation ensures a rapid and coherent development towards a dense, widely spread network of fully interoperable recharging infrastructure in all Member States. The decision is particularly justified in view of the needed swift and coherent implementation of the national fleet-based minimum deployment targets set at Member State level and the mandatory distance-based targets along the TEN-T network, as the first proposed targets would have to be reached by 2025 already. With this timescale, building up a sufficiently dense, wide-spread network of recharging and refuelling infrastructure for zero- and low-emission vehicles throughout the Union at the same pace and under the same conditions is now of strong relevance to support the highly necessary accelerated market uptake of zero- and low-emission vehicles. This requires the design and development of Member State plans and measures to deliver on the targets already in the years before 2025. A new Regulation establishes clearly binding and directly applicable

obligations for Member States at national level, ensuring their EU-wide coherent and timely application and implementation at the same time. It avoids the risk of delays and inconsistencies in national transposition processes, thus also creating a clear level-playing field for markets, which will help the Union-wide roll-out of recharging and refuelling infrastructure. The Regulation will establish a more robust governance mechanism that tracks Member State progress in achieving the targets and that enables Member States to set the right incentives so that competitive recharging markets can develop. Clear timelines for the design and development of Member States' national policy frameworks to achieve the targets, robust monitoring and reporting mechanisms, as well as provisions for corrective measures by Member States can enable efficient overall monitoring and steering of efforts in Member States to achieve the targets. This initiative guarantees such an approach.

## PURPOSE OF AFIR

Alternative fuels infrastructure is a fast-developing area. The lack of common technical specification constitutes a barrier for the creation of a single market of alternative fuels infrastructure. Therefore, the power to adopt acts in accordance with Article 290 TFEU should be delegated to the Commission to norm technical specifications for areas where common technical specifications are outstanding but necessary. In particular, this should include the communication between the electric vehicle and the recharging point, the communication between the recharging point and the recharging software management system (back-end); the communication related to the electric vehicle roaming service and the communication with the electricity grid. It is also necessary to define the suitable governance framework and roles of the different actors involved in the vehicle-to-grid communication ecosystem. The IEC is currently undergoing a standardization process, which is inherently time-consuming<sup>2</sup>. To accelerate these efforts, the EU could consider allocating additional resources or funding to support international standardization initiatives. However, at present, the EU Commission and the IEC are at odds over matters related to the ownership and publication of standards. Moreover, emerging technological developments, such as electric road systems ('ERS') must be accounted for. AFID lacked a definition of what is meant by "Electric road system". AFIR now contains a definition. "Electric road system" means a physical installation along a road for the transfer of electricity to an electric vehicle while the vehicle is in motion, Article 2.21 AFIR. As concerns data provision, it is necessary to provide for additional data types and technical specifications related to the format, the frequency and the quality in which these data should be made available and accessible.

## EVALUATING AND REPORTING

Member States will have to adopt a revised national policy framework to develop the market for alternative fuels in the transport sector. The relevant infrastructure shall be used in line with the proposed enhanced provisions. This will enable the Member States to report to the Commission on implementation in a consistent manner. Data provision to the Member States' national and common access points will follow commonly agreed data quality standards. IT development and procurement selection will be subject to prior approval by the European Commission's Information Technology and Cybersecurity Board.

In addition, the European Alternative Fuels Observatory will be upgraded and continue to gather and frequently update vehicle uptake and infrastructure deployment in all Member States, [Homepage | European Alternative Fuels Observatory](#). The Commission will also continue to work together with its expert group, the Sustainable Transport Forum (and dedicated subgroups), to monitor market developments and identify related policy needs.

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<sup>2</sup> See [SEK Svensk Elstandard - Elfordonsladdning – System och infrastruktur](#) and [IEC - TC 69 Dashboard Scope](#)

By 31 December 2024, each Member State shall prepare and transmit to the Commission a draft national policy framework for the development of the market as regards alternative fuels in the transport sector and the deployment of the relevant infrastructure. The responsibility for this rests with the national governments.

By 31 December 2025, each Member State shall draft its final national policy framework in an easily readable and understandable form and notify it to the Commission. The responsibility for this lies at the national governments.

Those final national policy frameworks shall be made publicly available by the Commission, Article 14 AFIR. As far as we know, there is no draft by the government made for Sweden at the time of writing of this report (December 2024).

The national policy framework shall, among other things, contain the following elements:

An assessment of the current state and future development of the market as regards alternative fuels in the transport sector, and of the development of alternative fuels infrastructure, considering intermodal access of alternative fuels infrastructure and, where relevant, cross-border continuity and the development of alternative fuels infrastructure on islands and in the outermost regions.

Measures, planned or adopted, to promote the deployment of alternative fuels infrastructure for captive fleets, in particular for recharging stations and hydrogen refuelling stations for public transport services and recharging stations for car sharing.

Measures, planned or adopted, to encourage and facilitate the deployment of recharging stations for light-duty and heavy-duty vehicles in private locations that are not accessible to the public.

Measures, planned or adopted, to promote alternative fuels infrastructure in urban nodes, in particular with respect to publicly accessible recharging points.

Measures, planned or adopted, to remove possible obstacles with regard to planning, permitting, procuring and operating of alternative fuels infrastructure.

An overview of the state of play, perspectives and planned measures in respect of deployment of alternative fuels infrastructure including targets, key milestones and financing needed, for hydrogen- or battery-powered trains on TEN-T rail sections that cannot be electrified.

By 31 December 2027 and every two years thereafter, each Member State shall submit to the Commission a standalone national progress report on the implementation of its national policy framework. The report shall be drafted in an easily readable and understandable form and shall be made publicly available by the Commission, Article 15 AFIR. The national governments are responsible for reporting.

The national progress report shall cover the information listed in Annex 1 and shall, where appropriate, include a relevant justification of the level of achievement of the national targets and objectives referred to in Article 14.2, as well as an indication of the measures to be taken to achieve those targets and objectives in the future.

## REPORTING

The national progress report referred to in Article 15.1 shall include at least, Annex I AFIR, the following elements:

1. Target setting
  - a) Vehicle uptake projections for 31 December of the years 2025, 2030 and 2035 for:
    - Light-duty vehicles, separately for battery electric light-duty vehicles, plug-in hybrid light-duty vehicles and hydrogen-powered light-duty vehicles.
    - Heavy-duty vehicles, separately for battery electric heavy-duty vehicles and hydrogen-powered heavy-duty vehicles.



- b) Targets for 31 December of the years 2025, 2027, 2030 and 2035 for:
- Recharging infrastructure dedicated to light-duty electric vehicles: number of recharging stations and power output (classification of recharging stations in accordance with Annex III)
  - Development of recharging stations for light-duty electric vehicles not accessible to the public, if applicable
  - Recharging infrastructure dedicated to heavy-duty electric vehicles: number of recharging stations and power output
  - Development of recharging stations for heavy-duty electric vehicles not accessible to the public, if applicable
  - Hydrogen refuelling stations: number of refuelling stations, capacity of the refuelling stations and connector provided
  - Road refuelling stations for liquefied methane: number of refuelling stations and capacity of stations
  - Refuelling points for liquefied methane in maritime ports of the TEN-T core network and TEN-T comprehensive network, including location (port) and capacity per port
  - Shore-side electricity supply in maritime ports of the TEN-T core network and TEN-T comprehensive network, including exact location (port) and capacity of each installation within the port
  - Shore-side electricity supply in inland waterway ports of the TEN-T core network and TEN-T comprehensive network including location (port) and capacity
  - Electricity supply for stationary aircraft, number of installations per airport of the TEN-T core network or airport of the TEN-T comprehensive network
  - Other national targets and objectives for which no Union-wide mandatory national targets exist, if applicable. For alternative fuels infrastructure in ports, airports and for rail the location and capacity/size of the installation has to be reported.
- 2) Utilisation rates: for the categories under point 1(b), reporting the utilisation of that infrastructure
- 3) the level of achievement of the national targets reported for the deployment of alternative fuels in the different transport modes (road, rail, water and air)
- level of achievement of the infrastructure deployment targets as referred to in point 1(b) for all applicable transport modes, in particular for recharging stations, electric road system (if applicable), hydrogen refuelling stations, shore-side electricity supply in maritime ports and inland waterway ports, liquefied methane bunkering in TEN-T core maritime ports, other alternative fuels infrastructure in ports, electricity supply to stationary aircrafts
  - for recharging points, specifying the ratio of public to private infrastructure
  - deployment of alternative fuels infrastructure within urban nodes
- 4) the review of the cases in which the Member States have made use of the derogations laid down in Article 3, paragraphs (6), (7) and (8), Article 4, paragraphs (6), (7) and (8) and Article 6, paragraph (4) AFIR
- 5) legal measures: information on legal measures, which may consist of legislative, regulatory or administrative measures to support the build-up of alternative fuels infrastructure, such as building permits, parking place permits, certification of the environmental performance of businesses and recharging and refuelling stations concessions
- 6) information on the policy measures supporting the implementation of the national policy framework, including:
- Direct incentives for the purchase of means of transport that use alternative fuels or for building the infrastructure

Availability of tax incentives to promote means of transport that use alternative fuels and the relevant infrastructure

Use of public procurement in support of alternative fuels, including joint procurement

Demand-side non-financial incentives, for example preferential access to restricted areas, parking policy and dedicated lanes

7) public deployment and manufacturing support, including:

Annual public budget allocated for the deployment of alternative fuels infrastructure, broken down by alternative fuel and by transport mode (road, rail, water and air)

Annual public budget allocated to support manufacturing plants for alternative fuel technologies, broken down by alternative fuel

Consideration of any needs during the initial phase of the deployment of alternative fuels infrastructure

8) research, technological development and demonstration (RTD & D):

annual public budget allocated to support alternative fuels RTD & D.

## STANDARDIZATION

The European Commission may within the limitations of the competences laid down in the Treaties, request one or several European standardization organizations to draft a European standard or European standardization deliverable within a set deadline. European standards and European standardization deliverables shall be market-driven and take into account the public interest as well as the policy objectives clearly stated in the Commission's request and based on consensus. The Commission shall determine the requirements as to the content to be met by the requested document and a deadline for its adoption, Article 10.1 Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardization (Regulation No 1025/2012 on European standardization).

The European standardization organisations shall inform the Commission about the activities undertaken for the development of the documents. The Commission together with the European standardization organisations shall assess the compliance of the documents drafted by the European standardization organisations with its initial request, Article 10.5 Regulation No 1025/2012 on European standardization.

Pursuant to Article 10.1 of Regulation (EU) No 1025/2012 of the European standardization, the European Commission requested the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) to develop and adopt appropriate European standards, or to amend existing European standards, for electricity supply for road, maritime transport and inland navigation; hydrogen supply for road transport; natural gas, including biomethane supply for road, maritime transport and inland navigation, (2) Commission Delegated Regulation (EU) 2019/1745 of 13 August 2019.

The standards developed by CEN and CENELEC have been accepted by the European industry to ensure Union-wide mobility with vehicles and vessels running on different fuels. CEN and CENELEC recommended to the Commission to include those standards into the Union legal framework, (3) Commission Delegated Regulation (EU) 2019/1745 of 13 August 2019.

Technical specifications for interoperability of recharging and refuelling points should be specified in European or international standards. The European standardization organisations should adopt European standards in accordance with Article 10 Regulation No 1025/2012 on the European standardization. It is important that those standards be based on current international standards or ongoing international standardization work, where applicable. To that end, it is important that European standardization processes for recharging and

refuelling infrastructure proceed quickly, supporting prompt adherence to the timeline necessary for planning, tendering and building the infrastructure required under this Regulation. It is also important to initiate or accelerate the standardization processes for a Union-wide harmonized recharging infrastructure for stationary and dynamic recharging, (71) AFIR.

Alternative fuels infrastructure is a rapidly developing area. The lack of common technical specifications constitutes a barrier for the creation of a single market of alternative fuels infrastructure. Therefore, it is necessary to lay down technical specifications for areas where common technical specifications are necessary but do not yet exist. Those technical specifications should cover the communication between the electric vehicle and the recharging point, the communication between the recharging point and the recharging software management system (back-end), the communication related to the electric vehicle roaming service and the communication with the electricity grid, while ensuring the highest level of cybersecurity protection and protection of final customers' personal data. It is also necessary to establish a suitable governance framework, and the roles of the different actors involved in the vehicle-to-grid communication sector. Moreover, emerging technological developments, such as electric road systems, in particular dynamic overhead power supply via a pantograph, dynamic ground level power supply through conductive rails and inductive power supply through coils in the road, have to be accounted for. As regards data provision, it is necessary for additional data types, such as the data related to the existence of facilities offering associated services to end users, the data related to the accepted payment methods, the data related to the available languages on the infrastructure and the data related to providing smart and bidirectional recharging services, to be added to the data on publicly accessible recharging, (75) AFIR.

Directive 2014/94/EU has been repealed. Commission Delegated Regulation (EU) 2019/1745 of 13 August 2019 supplementing and amending Directive 2014/94/EU of the European Parliament and of the Council establishes undated technical specifications for certain types of alternative fuel infrastructure. The same applies to Commission Delegated Regulation (EU) 2021/1444 of 17 June 2021 supplementing Directive 2014/94/EU of the European Parliament and of the Council. These specifications are now dated and listed in Annex II AFIR.

In Annex II AFIR, the following technical specifications are listed:

1. Technical specifications for electricity for road transport
2. Technical specifications for communication exchange in the electric vehicle recharging sector
3. Technical specifications for hydrogen supply for road transport vehicles
4. Technical specifications for methane for road transport

CENELEC aims to deliver European technical specifications. A kind of pre-standard that serves as a starting point for future standardization. In CENELEC, SEK Svensk Elstandard is the Swedish member. It is through SEK as Swedish stakeholders – i.e. companies, authorities, etc. – participate and get involved. Within CENELEC, among other things, the following projects have been run. There are two solutions that are current. In one, the vehicles receive power from below from rails in the roadway, and in the other, power comes from above via a contact line.

Work on common guidelines for electric roads is ongoing at European level, especially for the interface between the vehicle and the fixed installation. There are two European projects underway for this, one for each type of feeding (conductive and inductive). Both must standardize the physical and electrical interfaces between the vehicle and the fixed installation, but it is also about technical conditions for the system that distributes the electricity to the road's busbars and catenary lines.

One project, CENELEC TS 50712, shall define interfaces for pantographs for overhead contact lines. After all, cable cars and other road vehicles are different from trains and tramways, because there is no rail that can lead the current back. There has already been a European standard for trolleybuses, with the Swedish

designation SS-EN 50502, but since they are now targeting road traffic and higher speeds, they have chosen an interface that is more similar to that used for electric trains. The main features have previously been described in the standard for contact lines for railways, SS-EN 50119.

The other project, CENELEC TS 50717, deals in the same way with electric roads where the vehicle is powered from below. It is, in return, a relatively unproven technology. The project must define the interface between the vehicle and the fixed rail in or on the road and must specify what is required to maintain electrical safety, both in vehicles and in feeding systems. Unlike the previous project, this one does not only concern vehicles for commercial use.

These projects deal with the interface itself. They also provide an outline of the structure of the electric road system. The pantograph and contact line are the intersection between the electrical system in the vehicle and the fixed network with its various functions for power supply and monitoring. Special consideration must also be given to the presence of other vehicles and pedestrians in the facility, link: [SEK Svensk Elstandard - Elvägar – Arbete pågår.](#)

## THE DEVELOPMENT OF TEN-T

### ***Commission staff working document for planning TEN-T***

There is a methodology for planning the trans-European network (TEN-T). This methodology is based on the methodology used by the European Commission, The European Parliament and the Council in the legislative procedure adopting Regulation (EU) No 1315/2013.

This methodology is used to identify a comprehensive and a core trans-European transport network. The methodology means that a number of criteria are applied consistently. In a first step, the comprehensive network is identified. In a second step, parts of the comprehensive network are identified as the core network or as the extended core network. The comprehensive network consists of components for all modes of transport i.e. rail, road, inland waterway, air and maritime and their connecting points and corresponding traffic information and management systems. Essentially, the comprehensive network is a result of updating and adjusting the current TEN-T as defined in Regulation (EU) No 1315/2013.

A number of principles follow as a result of the methodology used.

For example:

- 1) Updating the current TEN-T to reflect progress in its implementation. If necessary, adapt it to changes in national planning, in line with planning at EU level.
- 2) Eliminate dead ends and isolated links in the current TEN-T, unless justified by geographical features of the TEN-T.
- 3) Ensure that minimum standards for infrastructure and equipment are met in accordance with relevant legislation.
- 4) Identify the urban nodes that have a population of 100.000 or more inhabitants.

The core network is a subset of the comprehensive network. It consists of the strategically most important nodes and links in the trans-European transport network. Only parts of the comprehensive network are selected for the core network.

In order to enable modal integration and multimodal operation, the core network is multi-modal. The network covers all modes of transport and their connections, as well as relevant ICT systems. Exceptions from the

multimodality principle can only be accepted where a particular mode of transport does not exist. Furthermore, a strong focus is given to interoperability within and across the modes.

The core network is identified in the following steps:

The nodes that have the highest strategic importance in the EU must first be identified.

- main nodes for passengers and freight
- main nodes for freight only
- main nodes for passengers only.

There are two classes of main nodes:

Before the network is shaped, “primary main nodes” are selected which meet the corresponding criteria.

“Secondary main nodes” are not used to shape the core network. Instead, they are identified based on the core network shaped based on the primary nodes, with the exception of the “last mile” link at local level.

In order to enhance the step-wise implementation of the TEN-T, an extended core network is identified.

The extended core network consists of the following sections:

- Sections of the European Transport Corridors, in particular the principal and diversionary lines of the Rail Freight Corridors.
- Sections relevant for the establishment of a European high speed railway network that cannot be realised by 2030.
- Sections necessary to achieve multimodality along the European Transport Corridors.

## ***Ex-post evaluation***

The evaluation of the TEN-T Regulation (SWD(2021)117final) concluded that the TEN-T provides all relevant actors (i.e. Member States, regions, cities, transport industry, infrastructure managers of all transport modes, users) with a common policy framework which works towards the gradual completion of the common and consistent European transport infrastructure network.

The evaluation also concluded that efforts need to be stepped up in order to reach new political targets. Since the establishment of the TEN-T Regulation in 2013 the policy context has changed significantly, particularly through the adoption of the European Green Deal and the Sustainable and Smart Mobility Strategy as well as the Zero Pollution Action Plan. The links between the conclusions of the ex-post evaluation, including the shortcomings identified resulted in a proposal for revising the existing Regulation.

The proposal aims to increase the quality of the TEN-T and ensure that this quality is preserved over the lifetime of the infrastructure. Further measures are introduced to advance on interoperability and accessibility of the network. It broadly maintains the network structure and the completion deadlines but adds a new intermediate deadline (2040) to ensure a stepwise approach toward 2050. The proposal reinforces the requirements in line with the needed contribution to the objectives of the European Green Deal for all transport modes.

In the proposal, measures are defined to strengthen the service and user perspective of the TEN-T especially in relation to passenger transport. Measures targeted at an alignment of standards and requirements between the two network layers (comprehensive and core networks) in fields such as railway infrastructure, alternative fuels or urban nodes are also defined. The TEN-T Regulation has been very effective in identifying thousands of projects on the basis of a single European policy framework. The framework for identifying projects on the network is maintained in the proposal. However, there are still problems of delays for a number of projects caused by complex preparatory procedures, remaining divergences between agreed European objectives and

national infrastructure and investment planning or limited EU level governance tools. The proposal establishes measures to ensure that national interests and areas of responsibility are aligned with the TEN-T objectives.

The proposal establishes measures further strengthening existing EU instruments (for example core network corridors, work plans, implementing decisions of the Commission). It also defines measures aimed at improving the resilience of the network. The core network corridors, including the European Coordinators, have proven to be both a very relevant and effective instrument. The proposal further extends and develops the corridor concept and strengthens the role of the European Coordinators.

As regards the reporting and monitoring obligations set out in the TEN-T Regulation, there is some scope to rationalize and strengthen these tools. The proposal establishes measures to rationalize the monitoring instruments and facilitate reporting. While coordination between Core Network Corridors and Rail Freight corridors has led to some efficiency gains, there is untapped potential in a better alignment between the two instruments in terms of investment planning and project identification. The proposal ensures a geographical adaptation of both corridor instruments into European Transport Corridors. It further strengthens the coordination between the two instruments.

Achieving the objectives of the European Green Deal requires that the TEN-T infrastructure is fully adapted to the provisions resulting from other policy initiatives in the fields of Alternative Fuels (AFIR), FuelEU Maritime and ReFuelEU Aviation. The proposal ensures full alignment with other policy initiatives on alternative fuels.

### ***The European Commission proposal, Strasbourg, 14.12.2021***

The European Commission proposal for a Regulation of the European Parliament and of the Council on Union guidelines for the development of the trans-European transport network (TEN-T), amending Regulation (EU) 2021/1153 and Regulation (EU) No 913/2010 and repealing Regulation (EU) 1315/2013.

The aim of the TEN-T Regulation is to build an effective EU-wide and multimodal network of rail, inland waterways, short sea shipping routes and roads which are linked to urban nodes, maritime and inland ports, airports and terminals across the EU.

The TEN-T revision aims at reaching four main objectives. Firstly, it aims at making transport greener by providing the appropriate infrastructure basis to alleviate congestion and reduce greenhouse gas (GHG) emissions and pollution of air and water by making each mode of transport more efficient and by enabling increased transport activity by more sustainable forms of transport. It aims in particular to facilitate an increase in the share of rail, short sea shipping and inland waterways in view of a more sustainable modal composition of the transport system and consequently to reduce its negative externalities. Secondly, it aims at facilitating seamless and efficient transport, fostering multimodality and interoperability between the TEN-T transport modes and better integrating the urban nodes into the network.

Removing bottlenecks and missing links and improving multimodality and interoperability in the European transport system will contribute to the completion of the internal market. Thirdly, it strives to increase the resilience of TEN-T to climate change and other natural hazards or human-made disasters. TEN-T must be resilient to the potential adverse impacts of climate change in order to protect public investments and safeguard their continued usability in the new climate; and they should support climate-neutrality by integrating the costs of greenhouse gas emissions in the cost-benefit analysis. Last but not least, it points at improving the efficiency of the TEN-T governance tools, at streamlining the reporting and monitoring instruments and at reviewing the TEN-T network design.

This network will contribute to the good functioning of the internal market, to the economic, social and territorial cohesion of the European Green Deal objectives. It should be gradually developed in steps, with intermediate deadlines in 2030 and 2040.

As the main pillar of EU transport infrastructure policy, the TEN-T Regulation acts as enabler and also depends on complementary policies. The standards and requirements set in the TEN-T Regulation are directly connected with the relevant objectives and needs in other transport sectors/fields and thus with other more sector-specific legislation. This means, for example, that TEN-T road infrastructure must meet and comply with EU legislation on road safety.

The TEN-T Regulation performance on indicators such as those related to modal shares, better service quality, the uptake of recharging/refuelling infrastructure depends on coordinated efforts with related policy fields. This particularly relates to the synergies between TEN-T and the deployment of alternative fuels infrastructure (AFIR proposal) as well as TEN-T and Intelligent Transport Systems (ITS), since both are intrinsically dependent on each other. For instance, the AFIR regulates the provision of charging/fuelling points on the TEN-T whilst the TEN-T Regulation provides the infrastructure basis for their wide deployment in a European network perspective. Both AFIR and ITS need a definition of the TEN-T for their implementation (i.e. a geographical scope of application), which is provided by the maps contained in the TEN-T Regulation. The TEN-T Regulation means that the European transport corridors, for the different transport modes, are coordinated. This ensures coherence in the network development and contributes to build synergies between the infrastructures and the operational aspects of the network.

### ***Provisional agreement, 18.12.2023***

On 18 December 2023, the European Parliament and the Council presidency have reached a provisional agreement on a revised regulation on EU guidelines for the development of the trans-European transport network (TEN-T). The new legislation aims to build a reliable, seamless, and high-quality transport network that ensures sustainable connections across Europe without physical interruptions, bottlenecks and missing links.

The network must be expanded or upgraded step by step. The revised regulation sets clear deadlines for the completion of the trans-European transport network in three layers: the core network should be completed by 2030, newly added extended core network by 2040 and comprehensive network by 2050.

The network shall contribute to the achievement of the EU's objectives for sustainable mobility, to a well-functioning internal market and to economic, social and territorial cohesion in the EU.

The provisional agreement maintains the overall ambition to develop a coherent, connected and high-quality transport infrastructure throughout the EU.

The different starting points of the member states as well as their priorities and approaches towards a greener transport are taken into account.

Member States shall decide how projects of common interest shall be prioritized in line with realistic technical and prioritized requirements aimed at a uniform, high- performance and fully interoperable infrastructure to contribute to the phasing out of fossil fuels in the transport sector and its multimodality.

The requirements laid down in the revised Regulation are proportionate to the expected benefits, functions and investments required by Member States.

The provisional agreement also takes into account the available financial resources of the Member States, as well as the investment needs for the expansion of infrastructure, which could be quite considerable, especially for the comprehensive TEN-T network.

The provisional agreement confirmed the need for Member States to have the necessary flexibility to manage road safety in a way that suits local conditions.

All core and extended core network roads will be specially designed, built or upgraded for motor traffic. They will provide separate carriage ways

Roads will be provided with separated carriage ways for both directions of traffic, separated from each other by a dividing strip, which is not intended for traffic or, exceptionally, by other means.

The co-legislators also agreed on the deployment of safe and secure parking areas on the core and extended core network. Such areas will be deployed within an average maximum distance of 150 km on the core and the extended core network.

The co-legislators agreed on a plan for sustainable urban mobility. A long-term, comprehensive integrated freight and passenger mobility plan for the entire functional urban area. This should be established by 2027 for each urban node.

All major cities located along the TEN-T network are required to draw up plans for sustainable urban mobility. This to promote emission-free mobility and increase and improve public transport and the infrastructure for walking and cycling.

Furthermore, the co-legislators maintained the obligation to have at least one multimodal freight terminal per urban node by 31 December 2040, where economically viable.

The European Coordinators will continue to guide the implementation of the TEN-T corridors and overall priorities and involve a wide number of stakeholders throughout the completion of the TEN-T network.

In order to achieve the objectives of the TEN-T Regulation, the provisional agreement supports their role as a mediator in the whole process.

Huge financial commitments are required to implement the measures that are established. The new regulation therefore introduces a financial guarantee for the Member States.

A revised framework for the application of the new Regulation was also agreed, mainly by streamlining the current instruments for reporting on and monitoring the TEN-T implementation.

### **The adoption of a revised regulation, 13.06.2024**

On 13 June 2024, the Council of the European Union adopted the revised regulation on EU guidelines for development of the trans-European transport network (TEN-T). The purpose of the new law is to build a reliable, seamless and high-quality transport network that provides sustainable connectivity throughout Europe without physical interruptions, bottlenecks and failed links.

The adoption of the revised Regulation is definitely a milestone on the way to a sustainable and resilient network in Europe, which should meet the concerns of citizens and businesses regarding mobility in the years to come. Through the new regulation, the TEN-T network will be developed or upgraded step by step. The new regulation sets clear deadlines for completion in three phases: up to 2030 for the core network, 2040 for the extended core network and 2050 for the comprehensive network.

The new interim deadline of 2040 was introduced to speed up the completion of large-scale, mainly cross-border projects, such as missing rail connections, ahead of the 2050 deadline for the wider overall network.

To ensure that infrastructure planning corresponds to real operational needs and by integrating rail, road and waterways, the new regulation merges the core network corridors with the rail freight corridors into the so-called "European Transport Corridors".

As regards the development of sustainable and multimodal freight and passenger transport flows in Europe, the corridors are of great strategic importance.

After adoption, the legislative act is signed by the presidents of the Council and the European Parliament before being published in the EU's Official Journal in the coming weeks. The revised regulation enters into force 20 days after publication.



## Conclusion

In Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the development of the infrastructure for alternative fuels (AFID), there was a lack of definition of what is meant by “electric road system”. But nowadays there is a definition in AFIR. Electric road system refers to a physical installation along a road for the transfer of electricity to an electric vehicle while the vehicle is in motion, Article 2.21 AFIR.

In AFIR, a requirement has been introduced for Member States to submit a standalone national progress report to the Commission. It must be submitted no later than 31 December 2027 and every two years thereafter. The report shall be drafted in an easy-to-read form and comprehensible form and must be made available to the public by the Commission, Article 15.1 AFIR. If a country lacks national targets for the expansion of electric road system infrastructure, ERS will not be included in the reporting.

There are minimum requirements for what must be included in the standalone national progress report. It must, for example, include the information referred to in Annex 1 AFIR, according to Article 15.2 AFIR. The appendix shows that the national progress report, among other things, must contain information on the extent to which goals for the expansion of infrastructure for electric road systems have been achieved, in applicable cases. In the event that a country has set national targets for the expansion of infrastructure for electric road systems, follow-up is required in the form of reporting to the Commission. But if the country lacks targets regarding the expansion of infrastructure for electric road systems, no reporting is required.

A member state does not have to have as a national goal that infrastructure for electric road systems should be expanded. There is no possibility to make this demand with the support of AFIR. AFIR loses its power when this target is missing. As a result, it is also not possible to demand follow-up in the form of reporting to the Commission. This “catch 22” is one of the reasons for the revision of AFIR.

A revision of AFIR is required so that requirements for planning and expansion of infrastructure for electric road systems can be placed on member states with the support of AFIR. AFIR needs to be binding on this objective. There needs to be a requirement in AFIR that each member state must have a national goal regarding the expansion of infrastructure for electric road systems in the member state.

Below is a description of the process for bringing about a revision of the AFIR.

### The European Commission

The European Commission is the only EU institution that can propose new laws or the revision of a law. It is a politically independent and executive EU institution consisting of 27 Commissioners, one from each country.

The political leadership is provided by the Commissioners – led by the Commission President, who decides who is responsible for which policy area.

You can submit proposals for the revision of a law by starting a Citizens’ Initiative. With a Swedish Citizens’ Initiative, the Commission can be asked to revise a law.

### That’s how it works step by step:

#### Step one

First, you must form a group of citizens consisting of at least seven EU citizens in seven different EU countries. They must be willing to support your cause.

The group of citizens must meet the following three requirements:

- It must consist of at least seven people who have reached voting age for European Parliament elections (18 years except in Belgium, Malta and Austria where the voting age is 16 and in Greece where it is 17).



- Members must be EU citizens and live in EU countries. Everyone must live in at least seven different EU countries, but they do not have to be citizens of seven different EU countries.
- None of the seven mandatory members may be members of the European Parliament.

Among the members of the organizational group, a representative and a substitute must be appointed. They must speak and act on behalf of the group.

They will act as the Commission's contact persons throughout the entire procedure.

A legal entity can be created to manage the initiative. This entity must be based on the relevant national law and be registered in an EU country.

If a legal entity is created, the representative must be authorized to act on behalf of the group.

### **Step two**

Signatures for your initiative must be collected. When an initiative has received one million signatures, the Commission will decide on what action to take.

But before collection of signatures can begin, you must ask the Commission to register the Citizens' Initiative.

The Commission only registers initiatives that meet certain criteria. It is not obliged to register all initiatives.

### **The Commission only registers initiatives that meet the following conditions:**

- the legal entity (if you are intending to use one) has been specifically set up to manage the initiative and your representative is authorized to act on its behalf
- the group of organizers has been formed and the contact persons named
- the initiative is not abusive, frivolous or offensive
- the initiative is in line with EU values, as set out in Article 2 of the Treaty on European Union and (ii) the rights in the EU's Charter of Fundamental Rights
- the initiative concerns an issue where the Commission has powers to propose an EU law

You must create an organizer account. The account will be used to manage your initiative and liaise with the Commission throughout its lifecycle.

In addition, the initiative as well as details and relevant documents about the group of organizers, funding received, etc. must be described in one of the official EU languages.

First, your initiative must be registered. The Commission must then assess whether it accepts it or not. You usually get a response within two to four months. If the Commission decides to register your initiative, this will be made public.

### **Step three**

At least one million EU citizens must support your cause. In addition, a minimum number of signatories of the initiative is required for at least seven different EU countries.

They must complete a special statement of support form available in all EU official languages.

### **Step four**

Within a 12-months period, a sufficient number of signatures must be collected. They must be sorted by nationality and sent to the respective country's responsible authority for control.

### **Step five**

Once you have received all the certificates from the national authorities, you have three months to submit your initiative to the Commission. Information about the support and funding you have received for the initiative must be attached.

## **Step six**

The Commission examines your initiative to assess whether it can be approved or not.

Within one month, you can meet representatives of the Commission to explain your initiative in more detail.

Within three months, you will have the opportunity to present the initiative at a public hearing at the European Parliament.

Within six months, the Commission will indicate whether any action will be taken or not. If the Commission chooses to take measures, these will be specified. Answers will be given regardless of what the Commission decides. This will be given in the form of a communication formally adopted by the College of Commissioners and published in all official EU languages. You will have the opportunity to meet representatives of the Commission. They will explain their decision about your initiative in more detail.

## **Assessment**

The EU Commission assesses the consequences before a decision is taken. The expected significant impacts are not only environmental, social and economic. Strategic foresight is also an important part in the creation of future-proof strategies in all sectors.

The Commission may decide that legislation is an appropriate response to your initiative. But there is no obligation to propose legislation.

If the Commission concludes that revision of the law should be done in accordance with the proposal, a formal proposal must be drawn up.

Once the proposal has been adopted by the Commission, it is submitted to the European Parliament and the Council of the European Union.

## **Decision-making process**

In the Council of the European Union, representatives of the EU's 27 member states hold meetings in several working parties. They will exchange views on the legislative proposals. It will prepare the basis for a Council agreement.

Discussions will continue, based on the work at expert level in the working parties, between representatives of all member states in the Permanent Representatives' Committee (Coreper). This is to be able to agree on the Council's position on each legislative proposal.

The Council may sometimes adopt a political agreement, a so-called general approach. During Council meetings, ministers from EU's 27 member states will discuss the proposal to try to reach a general approach.

The Council can use this document to give the European Parliament an indication of its position on the Commission's legislative proposal.

Once the ministers have agreed on the general approach on a proposal, the tripartite meetings can begin.

Most proposals follow the ordinary legislative procedure where the Council and the European Parliament will negotiate during so called tripartite meetings.

There are no specific provisions about what tripartite meetings must contain. They can include anything from technical discussions to political discussions with ministers and commissioners.

The Council and the European Parliament will negotiate to harmonize their positions. Tripartite meetings can be used to reach an agreement between the Parliament and the Council on legislative changes.

If the European Council and the European Parliament manage to agree at a tripartite meeting, the compromise texts are formally adopted by the Council and Parliament. They then become legislation to be applied in all member states.

## **STATUS UPDATE ON ERS IN EU COUNTRIES.**

### **COMPREHENSIVE ANALYSIS**

No EU countries have yet made decisions on large-scale investments in electric roads. However, several countries are allocating funds to continue investigating electric roads and carrying out test projects. For a large-scale expansion of electric roads to take place in Europe, it is clear that coordinated efforts between countries are required. In order to dare to make larger investments, many countries want to wait for decisions from other countries or a collective decision. This has led to inaction for a period and few new concrete initiatives have been taken in Europe. To move on from the current deadlock and for an electric road expansion to take place, a joint initiative is necessary. In addition, a common technical solution is a prerequisite for many countries, which means that a pan-European decision would be necessary for a common expansion to develop. The lack of large-scale national decisions has meant that the initiatives taken regarding the expansion of electric roads are currently more informal and of a local nature rather than comprehensive national strategies and investments.

There is also a possibility that the upcoming revision of AFIR 2027 may mean that electric roads are equated with stationary charging infrastructure, i.e. with explicit requirements for expansion (in the current AFIR, expansion of electric roads is permitted but not forced). If mandatory writings are to be lifted into AFIR, there are a number of questions to think about, above all how the recommendation should be designed (stationary charging and hydrogen have tightness requirements, which might be replaced by electrification rate for ERS) and whether the inclusion of electric roads means that hydrogen must still be left.

The fact that the decision-making situation among decision-makers in Europe regarding large-scale electric road systems is in a wait-and-see mode has also affected how the vehicle and electric road manufacturers view electric roads and its future. Instead of waiting for international decisions, actors work together to develop solutions based on market needs more locally. Test projects in inductive technology are underway in many countries in the world, including France, Italy, Israel, Germany, the USA, China, Japan and Sweden. Corresponding tests for conductive technology are also carried out in several countries. There are also some collaborations between electric road companies and vehicle manufacturers which indicate that a market is emerging from a more needs-driven user perspective and for the market segments where the private actors can see a profitable business case in the long term. A clear trend is that the market is consolidating through larger international companies entering the smaller electric road manufacturers (indicating both market maturity and market confidence).

The issue of the development of AFIR is dealt with in E-CORE (Electrified Corridor Europe) and in the subgroup for "charging and refuelling infrastructure for heavy vehicles with zero emissions" which is a European network and information exchange cooperation between stakeholders such as EU member states, vehicle manufacturers and electrified road manufacturers. Within E-CORE, stakeholders are working to develop a feasibility study for an electrified corridor from the Netherlands via Germany and Austria to Hungary, specifically for heavy goods vehicles. The E-CORE project is also investigating the synergies of a combination of electric road systems and fast charging points and the potential of bidirectional charging processes to reduce emissions.

One area where electric road systems have been highlighted as particularly relevant is within self-driving vehicles. Actors are working to find business models that can fit in more local areas and for specific routes.

This could, for example, be taxis in metropolitan areas that charge wirelessly. In these cases, it is about initiatives being created based on a demand from the market and where the companies involved are willing to take the investment risk because they see business potential in the solutions.

International cooperation is ongoing, but electric roads are still mainly national affairs in the European countries. Although there are international collaborations such as COLLERS and PIARC, we are far from addressing the necessary issues such as financing solution, choice of technology and corridor choice at the international policy level that would be needed to bring about a joint plan. Little research is done and only a few policy initiatives have been taken. If this does not change soon, the likelihood of a jointly agreed large-scale electric road system being developed in Europe is small. On the other side, there are local initiatives taken in some countries that can create momentum for electric roads and that can create market-driven demand. This means that it is more likely that a large-scale shared electric road system is built based on a bottom-up political scenario.

The article "The possible future of electric road systems in Europe—time to decide and act"<sup>3</sup> summarizes the decision situation for ERS and the different ways forward. The article was written within the COLLERS collaboration and is recommended for the interested reader.

## **STATUS IN SOME FOR ERS IMPORTANT EU COUNTRIES**

### **Netherlands**

In the autumn of 2024, the Dutch government has set aside 115 million euros for the development of electric road systems. Financing is provided from the "Truck Tolling and Climate Fund". In the Netherlands they will use overhead line technology for the motorways as it is the most mature technology. The plan is for the first section Rotterdam – Antwerp (which is approx. 100–120 km long) to be completed and a second section Rotterdam – Venlo (180–200 km) which is supposed to be completed in 2032 if all financing comes to place and decisions are taken.

### **Germany**

Germany was initially a leading country for testing electric roads, but the current German government is more cautious. This has resulted in no new initiatives from Germany in recent years, and it in turn affects other countries that have largely looked at Germany as the leading player in electric roads and as a "first mover" (some European countries have adopted a strategy of following Germany's approach) Germany has three demonstration projects running since 2019 and 2021, on which tests are being carried out that were supposed to form the basis of a decision regarding a large-scale investment in electric roads in 2024 or 2025. However, it looks like these investments will not be made.

### **Austria**

Austria has ambitious targets for emission-free heavy road traffic by 2035, as an Alpine country has a challenging topography and has a large share of transit traffic. Against this background, ERS is seen as a possible solution, an investigation by the Austrian Energy Authority points out a road network for ERS. The focus in Austria is overhead line technology.

### **France**

ERS has been discussed increasingly intensively in France. In 2021 and 2022 published two national studies that were positive until ERS: Several tests have been carried out in France. The tests that have taken place

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<sup>3</sup> [The possible future of electric road systems in Europe—time to decide and act - IOPscience](#)



so far have mostly taken place on test tracks, during 2025 and 2026 tests are planned on motorway sections. The French tests concern inductive and conductive terrestrial technology. Working groups at the national level are working towards a national strategy, but no national plan for large-scale rollout has been decided. The working group reports emphasize the importance of international cooperation on ERS and highlight COLLERS as exemplary.

### **Denmark**

Denmark is an important transit country for traffic from and to Sweden. It is difficult to envision a corridor from Sweden that does not pass through Denmark. Denmark has not done any tests of ERS. A national study of ERS was carried out in 2024 which showed low profitability (which was likely a consequence of focusing on domestic traffic, for which ERS is unlikely to be needed as the distances in Denmark are short).

## **THE REST OF THE WORLD**

### **USA**

In the US, pilot projects for electric roads have also been carried out in several places, including in Florida, Utah, Indiana, Detroit and Michigan. One of the larger projects being built right now involves an electrified highway in Indiana that will involve a test bed with inductive technology. The plant is expected to be able to start being used as a pilot in 2025.

### **China**

In the fall of 2024, China took an important step in bringing electric road systems to market when they signed a contract for a first major demonstration project. The project is a stretch of 14 kilometers with overhead line technology. It has also been testing inductive technology in combination with self-driving vehicles in a closed road system in the China FAW Technology Innovation Base since 2023. In China, there are also further plans to test inductive technology for buses and trucks, where the first step is to test the technology in an industrial park for buses in Shandong.

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