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PART 3/3

COMMISSION STAFF WORKING DOCUMENT

Detailed Assessment of the National Policy Frameworks

Accompanying the document

COMMUNICATION FROM THE COMMISSISON TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Towards the broadest use of alternative fuels - an Action Plan on Alternative Fuels Infrastructure under Article 10(6) of Directive 2014/94/EU, including the assessment of national policy frameworks under Article 10(2) of Directive 2014/94/EU

{COM(2017) 652 final}

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5.5.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.5-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	3.07	13.08	-	-
CNG for vehicles	94.69	250	433	588

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.5-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding the electric vehicles, for the current situation, with 3.07, the index passes the assessment threshold of 10 AFV per recharging point. For 2020, the value 13.08 of the index suggests that the targeted number of recharging points in the Czech NPF may be insufficient. The Czech NPF objectives for 2020 contain a backbone network of 500 fast recharging points and an additional backbone network of 800 normal recharging points.

According to the visual assessment of spatial distribution of recharging points presented in the provided map and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one recharging point at least every 60 km is fulfilled, even starting from 2020. No clear numeric target is provided for the recharging network in 2025. The Czech NPF declares that recharging infrastructure development will depend on market needs with a further expansion being however expected.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The planned recharging point network for 2020 is supposed to ensure coverage of major urban agglomerations (cities) with a population of over 100,000 inhabitants and a location map is attached. The Czech NPF states that the regional centres will also be covered and a share of 27% of population will have access to the infrastructure which constitutes a promising objective. In 2025, according to the NPF, a further expansion is expected and all towns with more than 10,000 inhabitants (131 towns) will be covered by the recharging infrastructure, allowing 52% of the Czech Republic's population to have access to public recharging points.

Electricity supply at airports for use by stationary airplanes

The situation at the three airports (Prague, Ostrava and Brno) that are part of the TEN-T Network is presented. For Prague airport, considered a “major airport” in the NPF, the future installation of electricity supply for all aprons is under consideration. For the other two airports, the Czech NPF does not consider advantageous to establish any objectives in terms of infrastructure for electricity supply for stationary airplanes at airports. No detailed justification is given for this decision.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The NPF identifies a current (Brno dam) and possible future demand (Prague), but considers that the installation of shore-side electricity supply is not efficient. The Czech NPF does not contain a detailed justification for this consideration. However, a reanalysis of the situation is envisaged for the future.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.5-3 shows that the established targets for CNG refuelling points pass the threshold value of one CNG refuelling point per 600 vehicles, and can be considered sufficient.

The 2025 target of 300 public CNG refuelling points and their spatial distribution presented in a map allow the visual assessment of a sufficiently uniform geographical coverage without important gaps and indicate the fulfilment of the distance requirement of at least one CNG refuelling point every 150 km. During the period 2020 to 2025, the Czech NPF states that a greater focus will be placed on the motorway network (including TEN-T Core Network) and the distance requirement will be clearly overachieved.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

At least 131 towns with over 10,000 inhabitants (including the 77 former district towns) are foreseen for installation of CNG refuelling points. The chosen quantitative threshold will assure the access to the CNG infrastructure of a 52% share of the Czech Republic's population, which is an ambitious target.

Road LNG refuelling points along the TEN-T Core Network (2025)

At country level, a target of 5 LNG refuelling points is established and the future coordination with neighbouring countries (Germany, Austria) is under consideration. This target is presented by the Czech NPF to be sufficient in order to extend the Blue Corridors system in the territory of the Visegrad countries to the Czech Eastern border. If a uniform distribution along the TEN-T Core Network is assumed, the proposed number of LNG refuelling points is assessed as sufficient and fulfilling the distance criteria of at least one refuelling point every 400 km. A visual assessment was not possible since the map mentioned in the text of the NPF is not present.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

Not applicable since the Czech Republic has no maritime ports.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Very limited deployment of LNG vessels is expected by the Czech NPF on the Elbe-Vltava waterway, at least during the initial phase (period to 2030). No demand for LNG for ships is anticipated, so no building of LNG refuelling points is foreseen in the NPF. This omission could have a negative impact on the circulation of LNG inland waterway vessels throughout the TEN-T Core Network. The decision not to include LNG refuelling at inland ports in the Czech NPF would have merited a more detailed discussion of market needs. Monitoring and possible revision in the future are envisaged by the Czech Republic.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

A target of 2-3 hydrogen refuelling points is established with location in the largest cities (Prague/Ostrava/Brno). Hydrogen refuelling points in Ústí nad Labem or Pilsen are taken into consideration for connecting with the existing hydrogen network in Germany (Dresden, Munich). The presented target is considered indicative, the Czech Republic stating the need of a feasibility study before confirming the commitment to it.

5.5.4 Deployment of alternative fuels vehicles and vessels

A main focus of the Czech NPF is on CNG vehicles. It estimates a share of roughly 1% CNG vehicles on the road in 2020. For electric vehicles, the ambition level is lower (estimate of 0.35% for 2020). For LNG heavy-duty vehicles, the Czech NPF estimates a share of 0.4% by 2025. The Czech NPF does not contain any estimates for LNG vessels. Altogether it can be concluded that the Czech NPF is based on the assumption that alternative fuels and vessels remain niche products until the 2020 time-frame.

5.5.5 Assessment of the measures to implement Article 3

The Czech NPF contains a total of 70 measures. However, many are targeting transposition provisions of the Directive or are very vaguely defined. 19 measures are in effect, 2 in process of adoption, and 49 under consideration. This, according to the assessment methodology, leads to low overall assessment scores for most of the fuels, modes and measure types addressed. In some cases, the lack of concrete information (for example budget) makes it difficult to assess the scope according to the same methodology.

Assessment of the measures that can ensure national targets and objectives

The measures of this category cover: AFI and AFV, many fuel types, modes of transport, financial and nonfinancial support. The totality of these measures can indeed address many of the deployment barriers and, as a consequence, the portfolio of all measures can be considered quite comprehensive. But as most are only under consideration there is a risk that they may not lead to adoption and consequently may not be sufficient to ensure attainment of the targets and objectives of the NPF.

From the alternative fuel and mode of transport clustering analysis, it resulted that most financial measures presented address CNG road vehicles, which is one important focus of the Czech Republic.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Czech NPF proposes 5 measures in this category, covering AFI and AFV, all fuel types and two modes of transport (road and rail). Four of these measures are of financial type (direct incentives), dealing with support of AFV acquisition and AFI building. Due to their low status (under consideration) and due to a lack of financial information, these measures were assessed as having a low score.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Czech NPF proposes one measure in this category, regarding the investment aid for the construction of corporate infrastructure for electric vehicles. Since the adoption status is low (under consideration), its score is low.

5.5.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

From the Czech NPF it is unclear whether the interests of regional and local authorities, as well as those of the stakeholders concerned have been considered. At one occasion, the Czech NPF mentions the intention to organise a working group in order to enable the revision of relevant legislation necessary to allow access of CNG vehicles to parking garages.

5.5.7 Assessment of MS cooperation and coordination with other Member States

Coordination is mentioned in the Czech NPF in the case of hydrogen infrastructure by considering the connection with the existing network of Germany. Regarding LNG refuelling points, coordination is foreseen with the neighbouring countries Germany and Austria for ensuring the continuity with the LNG Blue Corridor System. It can be concluded that for these fuels the Czech Republic shows intentions to cooperate with the neighbouring countries to ensure EU-wide circulation.

5.5.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	1,386	17,000	0.35	8.2	451 (EAFO) 164 (NPF)	1,300	34.7	3.07	13.08	L	c
CNG / vehicles / 2020	10,227	50,000	1.03	20.5	108	200	54.0	94.69	250	M	n
LNG / heavy duty vehicles / 2025		500	0.23		0	5	0.0		OK	M	n
LNG / seagoing ships / 2025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LNG / inland waterway vessels / 2030									X	X	-
H2 / vehicles / 2025					1	3 - 5	33.3-20.0		OK	L	n
Other fuels (LPG / vehicles)	179,000				1,100				X	L	n

The Czech NPF broadly addresses the requirements of Article 3. It contains an extensive discussion of the current state and future scenarios for alternative fuels in the transport sector. For most fuels and modes, it establishes sufficient targets as required by Article 3 of the Directive. It does not contain a target for LNG refuelling points at inland ports.

The Czech NPF puts a comparably low emphasis on electric vehicles and estimates only 0.35% electric vehicles on the road in 2020. Today, the spatial distribution of recharging points and specifically fast recharging infrastructure seems to appropriately cover the needs of electric vehicles in terms of distance requirements in the Czech Republic. For the future, the targeted ratio of only one public recharging point per 13 electric vehicles estimated for 2020 could evolve to become a barrier for the further market deployment of electric vehicles. This could also lead to market fragmentation within the EU, especially in the context of the rather low estimated EV shares in the Czech NPF. It will be important to closely monitor this development and correct infrastructure targets in line with the market developments. Regarding electricity supply for stationary airplanes the NPF only mentions that further installations for the Prague airport are under consideration. The NPF does not provide any targets for shore-side electricity.

The Czech Republic already today has a relatively dense network of CNG refuelling points and the NPF foresees that this will further grow in line with the expected market needs, which are comparably high in the NPF, with estimates of 1% CNG cars on the road in 2020.

The NPF has established targets for LNG refuelling points for heavy-duty vehicles that will likely ensure appropriate coverage of the road TEN-T Core Network on Czech territory.

The Czech NPF does not contain targets for LNG refuelling at inland ports. This omission could have a negative impact on the circulation of LNG inland waterway vessels throughout the TEN-T Core Network. The decision not to include LNG refuelling at inland ports in the Czech NPF would have merited a more detailed discussion of market needs. This may need to be revisited also in light of estimated market needs from other Member States.

The NPF establishes targets for hydrogen refuelling points.

The Czech NPF contains a very comprehensive list of measures, which, if implemented, could help overcome deployment barriers. Since the adoption status of most of these measures is low, there is a certain risk that the national targets and objectives of the NPF may not be reached. The NPF also contains a list of considered support measures to promote the deployment of alternative fuels infrastructure in public transport services.

The Czech Republic, in its NPF, declares interest to cooperate with the neighbouring countries to ensure EU-wide circulation, especially for LNG and hydrogen for road transport. It may be advisable to extend this cooperation also for the other fuels and modes.

5.6 Germany

5.6.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Germany is 6,363 km and the length of motorways is 12,917 km. The length of the total road network in Germany is 217,460 km.

The following lengths of the TEN-T Road Corridors are present in Germany: 35% (1,393 km) of the North Sea - Baltic Corridor, 26% (1,398 km) of the Orient / East - Mediterranean Corridor, 30% (1,895 km) of the Scandinavian - Mediterranean Corridor, 50% (707 km) of Rhine - Alpine Corridor and 27% (1,191 km) of the Rhine - Danube Corridor.

Through the TEN-T Road Corridors, Germany is connected with the following Member States:
- Poland (through the North Sea - Baltic Corridor)
- Netherlands (through the North Sea - Baltic and the Rhine - Alpine Corridor)
- Belgium (through the North Sea - Baltic and the Rhine - Alpine Corridor)
- Czech Republic (through the Orient/ East Mediterranean and the Rhine - Danube Corridor)
- Austria (through the Scandinavian - Mediterranean and the Rhine - Danube Corridor)
- Denmark (through the Scandinavian - Mediterranean Corridor)
- France (through the Rhine - Danube Corridor)

Number of registered road vehicles

In 2014, according to Eurostat, Germany had 44,403,124 registered passenger cars. According to the German NFP, in 2016, it had 54,602,441 registered road vehicles of all types (motorcycles, passenger cars, microbuses and buses, goods vehicles, tractor units, trailers and semi-trailers and special vehicles). Of these, 0.9% were LPG vehicles, 0.2% used natural gas, and 0.1% were battery electric vehicles.

Number of main agglomerations

- 125 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 21 inland ports in the TEN-T Core Network
- 68 inland ports in the TEN-T Comprehensive Network
- 6 maritime ports in the TEN-T Core Network
- 15 maritime ports in the TEN-T Comprehensive Network

Through the TEN-T inland waterways network, Germany is connected with the Netherlands through the North Sea - Baltic and Rhine - Alpine Corridors, with Austria through the Rhine - Danube Corridor, with France through the Rhine-Alpine and the North Sea - Mediterranean Corridor, with the Czech Republic through the Orient/East-Mediterranean Corridor, with Luxembourg through the Rhine-Alpine Corridor and with Poland through the core network.

Number of airports in the TEN-T Core Network

- 11 airports in the TEN-T Core Network
- 13 airports in the TEN-T Comprehensive Network

5.6.2 Summary of the National Policy Framework submitted

Short description of the measures

The measures described in the German NPF cover a wide variety of types, addressing many deployment barriers. The number of measures is high and is covering various fuels and modes. All measures in the German NPF are already existing or adopted, and for some of them future extension is proposed. Measures are strongly focussing on electric vehicles and infrastructure for road, but measures are also proposed for other road AFI/AFV types as well as waterborne transport. For many measures, information on planned budget and boundaries is scarce such that they can be assessed only qualitatively.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.6-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	87,914	18,078	1,000,000	43,000				
Electricity for stationary airplanes		95% **						
CNG for vehicles	116,970	900						
LNG for road		4 (3****)				9		
LNG for	5/2*	4		Demand		Demand		Demand

inland ports		(3****)		oriented		oriented		oriented
LNG for maritime ports								
H_2 for road	215 (NPF) 109 (EAFO)	50		100		(400) ***		(1,000) ***

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuesl Recharging/Refuelling Points, *5 operating in Germany, 2 under German flag, **95% of terminal positions covered at 11 airports, *** maximum numbers, depending on the deployment of AFV, ****on TEN-T Core Network

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that many requirements of the Directive are covered. However, the NPF does not fulfil all requirements with regard to LNG, in particular it does not establish target numbers for LNG refuelling points in ports, nor does it define an LNG distribution system.

Table 5.6-2. Checklist results

Article of the Directive	Requirement		Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	(x)			Present overall alternative fuel share given, but no shares for single fuels, no target shares for their future exploitation; no explicit statements on combined use, cross-boarder continuity covered by a number of European Initiatives DE takes part in; AFI development plans given for road electricity, H2 (quantified goals), CNG (no further buildup), LNG (qualitative description)	8, 5,15, 21, 25, 27, 30, 33, 42-44
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x				
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x			Definition of the number of stations needed to have a network of charging stations covering the needs countrywide, thus implying urban/suburban, densely populated as well as other MS defined networks.	5, 25
4(1)	within networks determined by the MS	Road	Electricity	x		N.M.		5, 25
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport			x		N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	x				5, 13, 21f
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	x				30
5(1)	cross-border links	Road	Hydrogen	x			Cross-boarder inter-operability covered by 'Workshop European Coordination' for H2	44
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	(x)			Demand-oriented approach; currently, stationary infrastructure (shore-to-ship) is not economically viable; presented and future demand can be covered by truck-to-ship and potentially ship-to-ship concepts. Current ports that enable truck to ship refuelling are mentioned: Brunsbüttel, Bremerhaven, Hamburg, Mannheim, Rostock.	54ff
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG	(x)				
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG		(x)		For maritime north sea, LNG supply in the near future is covered by (planned) ship-to-ship facilities in Rotterdam and Zeebrugge; Brunsbuettel and Wilhemshaven are mentioned as potential locations for LNG import terminals; for inland Rhine, LNG coverage is given by Rotterdam, Mannheim (existing) and Weil, Basel (planned); Elbe and Danube can be covered truck-to-ship in a first step; baltic and further inland waterwyas not mentioned, thus no systematic coverage of maritime and inland waterways in the NFP	55f
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x			Demand-driven approach: supporting measures to increase demand; infrastructure buildup under the responsibility of harbors/industry	39f, 55f
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	x			European Forum for Sustainable Shipping, Working group on LNG for ships	43
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x			cost and benefits (also environmental) considered? 9 stations needed to cover TEN-T core network; 28 needed to cover TEN-T network; CBA is currently under development; no further infrastructure targets (on top of initial basic network) can be estimated at this point in time - unclear whether 'initial basic' network refers to TEN-T core	27f, 37f
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x		not explicitly mentioned; maritime/inland LNG supply is mostly to be handled truck-to-ship initially	
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x			Current number and placement is sufficient to cover agglomerations, TEN-T core and TEN-T total network	17f, 26
	within networks determined by the MS	Road	CNG	x		N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x			cost and benefits (also environmental) considered? Qualitative assessment of costs and benefits (not quantifying environmental benefits) with the results that shore sided electricity supply is not economically feasible for marine ports and only in few cases for inland ports	59f
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x			Qualitative consideration	61f
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x			No need, flexibly covered by truck-to-ship or ship-to-ship concepts	58
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	(x)			Agglomerations to be equipped not individually identified, but it is planned to achieve a countrywide full coverage	19
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x			Agglomerations to be equipped not identified individually, but full coverage of agglomerations already achieved	19
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				32-36
			CNG	x				32,38
			LNG	x				32,37f
			Hydrogen	x				32,41,46f
		Maritime	Shore Side Electricity	x				60
			LNG	x				6,32,39f
		Inland Waterway	Shore Side Electricity	x				60
			LNG	x				6,32,39f
		Airports	Electricity for stationary airplane		x			62
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				46f
			CNG	x				46
			LNG	x				46
			Hydrogen	x				46f
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	x				36.45
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	(x)			Bund-Laender-Dialog Electromobility; LNG waterborne	34, 6,
3(4)	Assessment of MS cooperation and coordination with other member states	All	All	x		N.M.		43f

5.6.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.6-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	4.86	23.26	-	-
CNG for vehicles	128.12	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.6-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points.

With regard to electricity, the German NPF states that existing recharging points result from a variety of initiatives and projects targeted towards research, thus not necessarily covering expected demand. The numbers of recharging points are particularly high in present project regions (Modellregionen, Schaufenster) such as around Stuttgart, Berlin, Bremen and Hamburg, as well as in Northrine-Westphalia. This is also visible from a map of public recharging points included in the NPF.

Germany intends to provide country-wide full coverage of fast recharging points as well as normal recharging points where vehicles can be expected to be parked (shopping, leisure activities and overnight). For 2020, the NPF estimates a need of 36,000 normal plus 7,000 fast charging points accessible to the public. When contrasting the total number with the target of 1 million electric vehicles on the road by 2020, an I_S of 23.26 results, thus significantly off the target value of 10, suggesting that the envisaged number of recharging points in the German NPF may be insufficient. When excluding PHEV, which may require a lower coverage of recharging points, and considering only BEV numbers of 250,000 to 500,000 mentioned in the NPF as scenario values, a more favourable index of 5.8 to 11.6 results. Based on the study 'LADEN2020', the AFI targets for electric recharging infrastructure are considered sufficient in the German NPF.

While no information is given regarding the geographical distribution of planned recharging points, a total number of 107 recharging points would be sufficient to fulfil the average distance requirement of one recharging point at least every 60 km along the TEN-T Core Network. Given the much higher numbers of targeted recharging points, it is highly likely that the German plans are in accord with the requirement of TEN-T coverage, even starting from 2020. No target is quantified for the recharging network in 2025.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The German NPF defines agglomerations as cities with more than 100,000 inhabitants and at least 1,000 inhabitants per km^2, in accord with German immission protection regulation. While the NPF states that the need of recharging infrastructure has been deduced on the basis of use patterns, transport demand and special distribution requirements, no information on the spatial distribution of planned recharging points is included in the NPF.

Electricity supply at airports for use by stationary airplanes

According to the German Airports Association as cited in the NPF, 95% of existing terminal positions are equipped with ground power supply at 11 German airports. It is not mentioned whether this relates to the 11 German airports in the TEN-T Core Network (Berlin, Bremen, Düsseldorf, Frankfurt am Main,

Hamburg, Hannover, Köln-Bonn, Leipzig-Halle, München, Nürnberg, Stuttgart). About 25% of tarmac positions and outside parking spaces are served with mobile ground power units, i.e., diesel-based electricity generation as of 2016. The NFP presents a sceptic position with regard to the cost-benefit relation of equipping tarmac positions with ground power supply. Some pilot studies for alternative fuels use for ground power units are mentioned, but no AFI targets are specified.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

Germany has 6 maritime ports and 21 inland ports within the TEN-T Core Network. The German NPF describes the installation of shore-side electricity supply for maritime ports as economically unfavourable and technically difficult, whereas perspectives were more promising with regard to inland ports, where energy requirements are lower and emissions and noise reduction requirements play a more important role. Several pilot projects have been launched. No targets are set. According to the NPF, responsibility for infrastructure development in inland and maritime ports lies with the federal states and support programmes should be addressed at that level.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

As Table 5.6-3 shows, CNG infrastructure sufficiency is given as of today in Germany, with an I_S of presently 128.12 AFV per refuelling point. The average distance of CNG refuelling points is less than 150 km between points even in the TEN-T Comprehensive Network according to the NPF. On German highways, on average there are approximately two CNG refuelling points per 100 km within a radius of 2 km, which are often deployed along two-sided motorway service areas. On the A20, however, there is only one petrol station with natural gas available on a route of 322 km. Maps included in the NPF show that CNG points are geographically well distributed, and that in most of the German territory, the nearest CNG refuelling point can be reached within less than 20 min driving time. The NPF does not foresee any further CNG infrastructure targets. The currently available 900 public CNG refuelling points in Germany could probably support more than 500,000 CNG vehicles on German roads, five times more than currently on the road.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The German NPF defines agglomerations as cities with more than 100,000 inhabitants and at least 1,000 inhabitants per km^2, in accord with German immission protection regulation. According to the NPF, in German agglomerations the closest CNG refuelling point can be reached within a maximum 15 minute driving time, thus the NPF concludes that urban agglomerations are well equipped within the meaning of the Directive.

Road LNG refuelling points along the TEN-T Core Network (2025)

With regard to LNG, the NPF sets the target to establish a basic network which ensures the movement of LNG HDV across Europe by 2025. According to the plan, the TEN-T Core Network can be covered by a network of 9 points, with exemplary optimised locations shown in a map included in the NPF. For LNG trucks circulating on the TEN-T Core Network this may imply deviating from the shortest route in order to refuel. According to the NPF, the assessment of costs and benefits of LNG infrastructure, including environmental benefits, is currently ongoing. Thus, targets for an LNG supply infrastructure for road transport beyond the ‘initial basic network’ could not presently be derived. The formulation remains vague with regard to what is included in the ‘initial basic network’, thus the determination of Germany to build the 9 points needed for TEN-T coverage may need to be reconfirmed.

In the NPF, it is explained that there are currently no LNG refuelling points in Germany and existing vehicles are refuelled in the Netherlands. While it had been planned to build some points within the European project LNG Blue Corridor, this plan seems to have been abandoned due to lack of demand.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

There are six maritime ports in the TEN-T Core Network in Germany: Bremerhaven, Bremen, Hamburg, Lübeck, Rostock, and Wilhelmshaven. For maritime vessels, the declared NPF objective is to establish an LNG service station network by 2025 that allows the operation along the routes of the TEN-T Core Network. The equipment of ports should follow market requirements.

In Germany, there is currently no stationary LNG infrastructure for waterways, and shore-to ship concepts are seen as presently not economically viable. Truck to ship bunkering facilities are operational in the following maritime ports: Bremerhaven, Brunsbüttel, Hamburg and Rostock. In anticipation of more demand for LNG, the ports of Wilhelmshaven, Lübeck, Rostock, Hamburg and Brunsbüttel have announced interest for and declared intent of developing LNG bunkering facilities. According to the NPF, future demand can be covered by truck-to-ship and potentially ship-to-ship concepts. However, the fact that no quantified plans for maritime port LNG AFI build-up are announced raises some concern that lagging AFI construction might have negative impacts for the viability of LNG inland waterway vessels or seagoing ships.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

There are 21 inland ports in the TEN-T Core Network in Germany. For inland waterway vessels, the declared NPF objective is to establish an LNG refuelling network by 2030 which allows the operation along the routes of the TEN-T Core Network. The equipment of ports should follow market requirements.

In Germany, there is currently no stationary LNG infrastructure for waterways. Truck to ship bunkering facilities are operational in the following inland ports: Bremerhaven, Mannheim, Brunsbüttel and Hamburg, and future demand could be covered by truck-to-ship and potentially ship-to-ship.

The fact that no quantitative plans for inland port LNG AFI build-up are announced raises some concern that lagging AFI construction might negatively impact LNG vessel viability at some important inland waterways that cross German territory, such as the Danube, Main, Elbe and canals connecting these.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

By end 2016, 50 H_2 refuelling points provide a basic supply in the agglomerations Berlin, Hamburg, Stuttgart, Munich, Rhine-Main and Rhine-Ruhr and cover first locations on central transport axes. An industrial joint venture plans to provide basic coverage for Germany with approximately 100 H_2 refuelling points (700 bar) by 2020, which will cover the TEN-T Core Network. Further expansion will depend on the development of the hydrogen vehicle stock. Up to 400 H_2 refuelling points could be available in Germany by 2025.

5.6.4 Deployment of alternative fuels vehicles and vessels

A main focus of the German NPF is on electric vehicles. It estimates a share of roughly 1.8% electric vehicles on the road in 2020. For any of the other alternative fuels or transport modes the German NPF does not specify future estimates for alternative fuels vehicles. However, the German plan also allows for

potentially ambitious market uptake of CNG and H_2 vehicles, where infrastructure sufficiency is already given or planned to be achieved in the near future. The NPF specifies a target share of 4% of natural gas in 2030. For other alternative fuels and vehicle types, it can be concluded that the German NPF is based on the assumption that these will remain niche products until post-2020.

5.6.5 Assessment of the measures to implement Article 3

The German NPF contains a big portfolio of measures. The measures in the German NPF are already existing or adopted, and for some of them future extension is proposed. According to the assessment methodology, a high overall assessment score is derived for hydrogen for road vehicles, and medium scores for electricity and LNG on the road. For the other fuels and modes the assessment score is low, as in a number of cases the lack of concrete information (for example budget ceiling) makes it difficult to assess the scope according to the same methodology.

Assessment of the measures that can ensure national targets and objectives

The measures of this category cover: AFI and AFV, several fuel types, modes of transport, financial and nonfinancial support. The totality of these measures can address many of the deployment barriers and, as a consequence, the portfolio of all measures can be considered quite comprehensive. For road electricity, many measures have been defined, including adopted or existing measures for both fast recharging and normal recharging infrastructure as well as vehicle subsidies and tax exemptions, with medium scores, such that it can be derived that the German NPF seems to have defined appropriate measures in order to attain the defined targets and objectives for road electro-mobility. The same can be said for road H_2 infrastructure build-up, where a programme for installing 50 refuelling points has already been put into practice, and further support for infrastructure is available, leading to an overall high measure assessment. For CNG, the overall measure assessment is low but still in line with AFI targets, as these have already been fulfilled for road CNG. LNG road measures have a medium score. The most promising measure for supporting road LNG deployment is a reduction of energy tax for LNG which is currently granted up to 2018. A draft legislation for extending the measure beyond 2018 is under discussion. Due to absence of assessable information on measures targeting LNG infrastructure, it may need to be reconfirmed if road LNG measures suffice with view to the target.

Measures for LNG in ports have low scores, partly due to the absence of assessable information, which however is commensurate with the target ambition.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The German NPF contains several measures in this category, covering AFI and AFV, all fuel types and two modes of transport (road and rail). Measures focus on applied R&D support and market introduction projects. With little information given about budget and target numbers, the measures were assessed as having a low overall score.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The German NPF contains a few measures in this category, including income tax exemption of charging and charging devices employees receive from their employer, and subsidies for private infrastructure of buses (M2, M3) and commercial vehicles (N2, N3). Measure scores were assessed as low.

5.6.6 *Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered*

The German NPF has been established respecting the interests of regional and local authorities, as well as those of some stakeholders concerned. One element of consultation mentioned in the NPF is the dialogue between the Federal Government and the Länder with regard to recharging infrastructure development, which seems to have involved municipalities as well. For LNG for ships, a dialogue among harbours, federal ministries, and authorities is coordinated by the Federal Government.

5.6.7 *Assessment of MS cooperation and coordination with other Member States*

Germany has cooperated with other member states through different fora. The NPF mentions Germany's involvement in the Government Support Group (GSG) for harmonizing national strategy frameworks, the Sustainable Transport Forum (STF) as a forum for exchange on alternative fuels, the European Forum for Sustainable Shipping (ESSF), institutionalised bilateral cooperation with France, Italy and UK, and the Workshop European Cooperation for interoperability of H_2 infrastructure.

5.6.8 *Conclusions and possible recommendations*

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	87,914	1,000,000	2.14	8.8	18,078	43,000	42.0	4.86	23.26	M	c
CNG / vehicles / 2020	116,970				913	913	100.0	128.12		L	c
LNG / heavy duty vehicles / 2025					0	9	0.0		OK	M	c
LNG / seagoing ships / 2025					4 (3***)				(OK)	L	n
LNG / inland waterway vessels / 2030	5/2*				4 (3***)				(OK)	L	n
H2 / vehicles / 2025	215 (NPF) 109 (EAFO)				50 (NPF) 18 (EAFO)	400**	12.5		OK	H	c
Other fuels (LPG / vehicles)	476,000				7,000				X	L	n

*5 operating in Germany, 2 under German flag, ** maximum numbers, depending on the deployment of AFV, *** on TEN-T Core Network

The German NPF addresses most of the requirements of Article 3. It presents the current state of alternative vehicle uptake and infrastructure and derives targets for future recharging points, LNG refuelling points (road), and H_2 refuelling points (road). It does not establish targets for LNG refuelling points in ports beyond the already existing facilities.

A main focus of the German NPF is on electric vehicles. It estimates a share of roughly 2% electric vehicles on the road in 2020. This is a comparably high estimate and will require a rapid growth of EV deployment in Germany in the coming years. While the targeted number of recharging points seems adequate to cover the needs of electric vehicles in terms of distance requirements in Germany, the ratio of only one public recharging point per 23 electric vehicles estimated for 2020 could evolve to become a barrier for the further market deployment of electric vehicles. This could also lead to market fragmentation within the EU. It will be important to closely monitor this development and correct infrastructure targets in line with the market developments. The NPF does not provide any targets for

further deployment of electricity supply for stationary airplanes. For shore-side electricity, it does not contain targets. Instead, it refers to pilot projects with a focus on inland ports.

The NPF enables for potentially significant further market uptake of CNG vehicles. Germany has already today a relatively dense network of CNG refuelling points, offering a good coverage in most regions and in all urban agglomerations. Available infrastructure could probably support more than five times the CNG vehicles on the road in Germany today. No CNG infrastructure build-up beyond present levels is intended.

The German NPF defines a network of nine road LNG refuelling points that could guarantee fulfilment of the maximum distance requirement for LNG refuelling points for heavy-duty vehicles along the TEN-T Core Network on German territory. However, LNG propelled heavy-duty vehicles may have to deviate from the shortest route in order to refuel when travelling on the TEN-T Core Network.

The NPF does not establish target numbers for LNG refuelling points for ports, nor does it define an LNG distribution system as required by the Directive. According to the NPF, LNG infrastructure build-up will be pursued depending on market needs.

The German plan allows for potentially ambitious market uptake of H_2 vehicles, where infrastructure sufficiency is planned to be achieved in the near future.

The German NPF contains a comprehensive list of measures which are already existing or adopted. Measures are focussed on electric vehicles and infrastructure for road, but measures are proposed also for other road AFI/AFV types as well as for waterborne transport. Most of them can be considered having a medium or low impact on market actor's decisions. Some measures attain a low overall measure score due to scarce information on planned budget and boundaries which allows for qualitative evaluation only. Measures presented seem sufficient to contribute to the achievement of the targets set in the NPF. The NPF also contains several support measures to promote the deployment of alternative fuels infrastructure in public transport services.

Interests of regional and local authorities as well as stakeholders have been considered during the drafting of the German NPF. Germany is actively involved in coordinating its plans on alternative fuels infrastructure with other Member States as well as collaborating with them in this field.

5.7 Denmark

5.7.1 Description of the MS

Length of the road TEN-T Core Network

In Denmark, the length of the road TEN-T Core Network is 813 km and the length of motorways is 1,216 km. The length of the total road network in the country is 74,130 km.

The length of the TEN-T Road Corridors present in Denmark is 7% (456 km) of the Scandinavian – Mediterranean Corridor, which connects Denmark with Sweden and Germany.

Number of registered road vehicles

The Danish NPF provides data on the number of registered road vehicles as of August 2016. In Denmark, there were 2,912,085 road vehicles (cars, buses, light and heavy goods vehicles) in that year, of which 2,460,023 were cars. About 99% of the total vehicle stock is currently powered by either gasoline or diesel.

Number of main agglomerations

- 4 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- No inland ports in the TEN-T Core Network
- No inland ports in the TEN-T Comprehensive Network
- 2 maritime ports in the TEN-T Core Network (Copenhagen and Aarhus)
- 20 maritime ports in the TEN-T Comprehensive Network

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network (Copenhagen – Kastrup)
- 3 airports in the TEN-T Comprehensive Network

5.7.2 Summary of the National Policy Framework submitted

Short description of the measures

A reasonable number of policy measures of relevance to the Directive is mentioned, mainly targeting passenger cars. The infrastructure requirements for biogas and biofuels are disregarded, for the NPF assumes that those can be met with available infrastructure. Denmark considers that no further specific measures related to alternative fuels infrastructure for public transport (buses) and electricity supply for trains and stationary airplanes are needed. Government policy does not currently address hydrogen.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.7-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	10,228	2,540	30,621*	3,000	65,621*			
Electricity for stationary airplanes								
CNG for vehicles	226	13		20				
LNG for road		0						
LNG for maritime ports	1	2				Demand oriented		
H_2 for road	82	10						

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points, *the number of electric buses, LDVs and HDVs are assumed to remain constant from 2016, due to undefined estimates for these vehicle categories in the NPF.

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that the Danish NPF does not meet all the requirements of article 3 of the Directive.

Table 5.7-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			See Chapters 3 and 4 of the NPF.	18-31
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Rail electrification also considered.	29
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				26
4(1)	within networks determined by the MS	Road	Electricity	x		N.M.	The NPF contains a map.	21
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen			N.A.	"Hydrogen is not currently included in Government policy".	28
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen			N.A.	"Hydrogen is not currently included in Government policy".	28
5(1)	cross-border links	Road	Hydrogen			N.A.	"Hydrogen is not currently included in Government policy".	28
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG		x			
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG			N.A.	"Denmark does not have any inland ports" in the TEN-T core network.	10
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG.	Maritime and Inland ports	LNG	x			"LNG installations are in place or have decided upon at three ports in Denmark".	23-24
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x			"It is emphasised on the Danish side that development is market-driven […]. Denmark will therefore continuously monitor development of the market".	23; 30
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network.	Maritime and Inland ports	LNG		x			
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG		x			
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x		"The Government does not expect that market-based development in which LNG refuelling facilities are located along the TEN-T road network in Denmark will arise in the period up to 2025".	28
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x			"The Government expects that in 2020 a network of gas refuelling stations will be established in Copenhagen and the surrounding urban and suburban agglomerations".	27
	within networks determined by the MS	Road	CNG	x			The NPF contains a map that shows planned CNG stations.	21
6(8)	Definition of an appropriate number of refuelling points for CNG accessible to the public to be put in place by 31 December 2025 along the existing TEN-T Core Network.	Road	CNG		x			
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x			"An initiative has already been taken to lower the electricity tax on shore-side electricity supply".	29
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes.	Airports	Electricity	x			"The three largest airports […], which account for more than 97% of all passenger flights, have already established an electricity supply for stationary aircraft".	24
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x			"LNG installations are in place or have decided upon at three ports in Denmark […]. The LNG terminal in Hirtshals opened in 2015 […]. The Port of Frederikshavn […] it is anticipated that the facility will open at the end of 2017 […]. A mobile LNG bunkering unit […] in Hou".	23-24
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x			"It is additionally expected that as a result of market-driven deployment of recharging points a supply can be established in urban/suburban agglomerations around the largest cities in Denmark (Copenhagen, Aarhus, Odense, Aalborg and Esbjerg)".	26
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x			"Users of gas vehicles in urban and suburban agglomerations in Copenhagen, Odense, Aalborg and the 'Triangle Region' of Jutland are deemed to have basic access to gas refuelling points […]. The Government expects that in 2020 a network of gas refuelling stations will be established in Copenhagen and the surrounding urban and suburban agglomerations".	27
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				32; 34-35
			CNG	x				35
			LNG		x			
			Hydrogen			N.A.		
		Maritime	Shore Side Electricity	x				23; 29
			LNG		x			
		Inland Waterway	Shore Side Electricity			N.A.		
			LNG			N.A.		
		Airports	Electricity for stationary airplane	x			Denmark is already well-advanced in this area	24; 31
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				35
			CNG	x				27; 29
			LNG		x			
			Hydrogen			N.A.		
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		x			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All		x			
3(4)	Assessment of MS cooperation and coordination with other member states	All	All		x	N.M.		

5.7.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.7-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	4.03	10.21	-	-
CNG for vehicles	17.38	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.7-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Currently, an index of 4.03 is determined for electric vehicles. Hence, this technology passes the assessment threshold of 10 AFV per recharging point. For 2020, an index value of around 10 suggests that the targeted number of recharging points for Denmark is in line with the proposed threshold. The share of fast recharging points is about 23%.

The Danish NPF highlights that 33 motorway service areas were equipped with electric recharging points in 2016. Based on a visual inspection of spatial distribution of recharging points along the TEN-T Core Network, the distance requirement of one recharging point at least every 60 km appears to be fulfilled already today.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The NPF designates urban and suburban agglomerations around the country's largest cities: Copenhagen (200 publicly available recharging points in place), Aarhus (35), Odense (7), Aalborg (9) and Esbjerg (9). Therefore the four Danish cities identified as main urban agglomerations are served by existing recharging points. The area surrounding the capital appears to benefit from a well-established network.

Electricity supply at airports for use by stationary airplanes

The airports in Copenhagen – Kastrup, Billund and Aalborg account for more than 97% of all passenger flights in the country. These airports are equipped with devices that enable electricity supply for stationary airplanes. The number of ground power units is not communicated in the NPF and no future targets are provided.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

Given the absence of TEN-T Core Network inland ports in Denmark, this area is excluded from the analysis. With regards to maritime ports, no targets are defined in the NPF. The decision to invest in shore-side electricity supply in Danish maritime ports is basically entrusted to the private sector.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.7-3 shows that the number of CNG refuelling points currently available in Denmark is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. Once the 6 CNG refuelling points planned enter into operation, there will be 20 such points in Denmark. This infrastructure could support approximately 12,000 CNG vehicles. In 2016, the stock of CNG vehicles was 327.

The index values for 2020 and 2025 are not calculated because of the lack of future CNG vehicle estimates. Under the assumptions of 20 CNG refuelling points in operation from 2020 onwards, the

sufficiency levels for 2020 and 2025 would still be appropriate even if the CNG vehicle share would grow significantly.

A map showing where CNG refuelling infrastructure is placed and planned accompanies the NPF. Based on this map, it can be concluded that the requirement of one CNG refuelling point at least every 150 km along the TEN-T Core Network is not met. It seems that neither CNG refuelling points exist nor are planned in: (i) Aarhus (preventing trips on a CNG vehicle between either Aalborg or Vejle to Aarhus); (ii) Esbjerg (preventing a round-trip from Vejle to Esbjerg); (iii) Herning (preventing a round-trip from Vejle to Herning); and (iv) Hirtshals (preventing a round-trip from Aalborg to Hirtshals). Furthermore, no refuelling of CNG is possible on the way Odense – Copenhagen. Last, Southern Zealand and Falster and Lolland islands have no CNG refuelling infrastructure.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

According to the NPF, the main Danish urban and suburban agglomerations are well served by current CNG refuelling infrastructure. Aalborg, Odense, Jutland's 'Triangle Region' and Copenhagen are mentioned. Another main agglomeration, Aarhus, is not cited in this context.

Road LNG refuelling points along the TEN-T Core Network (2025)

The expectation of the Danish government is that the development of road LNG refuelling points along the TEN-T network will not take place before 2025. Denmark, according to its NPF, will act only once the experiences of other Member States with road LNG infrastructure are known.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

The Danish NPF identifies the ports of Frederikshavn and Hirtshals as candidates for LNG refuelling to vessels. Whereas the LNG terminal in Hirtshals opened in 2015, the LNG facility in Frederikshavn is expected to be complete at the end of 2017. These two ports are part of the TEN-T Comprehensive Network. For ports of Copenhagen and Aarhus, the only ones that belong to the TEN-T Core Network, financial sustainability studies with EU funds have been prepared. The NPF endorses the continuation of EU funding for this purpose.

The Danish government highlights to role to be played by market forces in this sector and contemplates two feasible solutions: in the short-run, truck-to-ship LNG bunkering; in the long-run, ship-to-ship. The government of Denmark opens up the door to a reassessment of its position in the future, in view of the needs of the TEN-T Core Network.

No 2025 target for LNG infrastructure in maritime ports is defined.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Not applicable since Denmark has no inland ports in the TEN-T Core Network.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Although there are 10 hydrogen refuelling points and 68 hydrogen vehicles in use in Denmark, the government has decided to exclude, at present, hydrogen from the policy framework. This is motivated by the government's expectation that significant cost reductions for this technology are unlikely to occur before 2025.

5.7.4 Deployment of alternative fuels vehicles and vessels

Drawing from the projections by the Danish Energy Agency, the NPF does not envision a rapid uptake of electric, natural gas and hydrogen vehicles. Despite this, the NPF focuses on electric vehicles for road transport. In 2016, electric cars accounted for ca. 1.4% of new car sales. Denmark expects growth in the stock of electric cars from 8,043 to 65,000 units between 2016 and 2025. Estimates for other types of vehicles or vessels are not indicated in the NPF.

5.7.5 Assessment of the measures to implement Article 3

Despite the slow market penetration of electric, natural gas and hydrogen vehicles envisioned in the NPF, the government of Denmark has provided support to alternative fuels infrastructure deployment.

Though not wide-ranging, the policy measures described in the NPF touch upon key aspects of the Directive. They focus on electricity for road transport. Most measures are of a financial nature and refer to existing legislation, rather than measures under consideration. Based on clustering analysis, three policy packages addressing electricity, CNG and other alternative fuels (biogas and biofuels) for road transport have been identified. Only the package dealing with electricity is deemed to be comprehensive.

Assessment of the measures that can ensure national targets and objectives

A set of almost 20 policy measures that can ensure national targets and objectives could be found based on the information provided by the NPF. The majority of these measures addresses electro-mobility, targeting both vehicles and infrastructure. Several demonstration projects and trials have also been implemented. However, some of the policy measures (e.g. incentives for building alternative fuels infrastructure over the period 2013-2015) listed in the NPF were introduced in the past and did no longer exist at the time the NPF was produced.

The Danish government signals its willingness to re-consider public support if conditions vary substantially on various policy issues (e.g. in the context of phasing-in the registration tax for electric cars). The phasing-in of this tax resulted in a lower number of electric cars sold in 2016 compared to late-2015, as indicated in the NPF.

Other modes receive little attention in terms of concrete support measures. For instance, the only policy measure targeting shore-side electricity supply mentioned in the NPF is lower electricity taxation, in compliance with the EU minimum tax.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

In Denmark, there are a few measures defined for alternative fuels infrastructure deployment in connection with public transport services.

In the NPF, a distinction between bus and rail operations is drawn for public transport. Concerning the former, the government finds that the tendering process in place is satisfactory and foresees no extra measures to promote alternative fuels infrastructure deployment. For the railway network, the government expects that, without further policy measures, electricity will deliver 85% of train services in 2030. To achieve that, the government seems to rely on the Finance Act for 2017. The size of the funds is not mentioned, however. With the information contained in the NPF, it is not possible to assess whether this is a realistic course of action.

Finally, the NPF states, within the context of public procurement and tendering, that a gas refuelling network is envisaged in Copenhagen and surrounding agglomerations for 2020.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

Neither data nor discussion of measures that could promote the deployment of private electro-mobility infrastructure are given in the Danish NPF.

5.7.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Danish NPF provides little information on this aspect of the Directive. Cooperation with stakeholders is mentioned only in the context of the market development for LNG in the shipping sector.

5.7.7 Assessment of MS cooperation and coordination with other Member States

No information on ongoing or planned cooperation and coordination activities with other member states could be found in the Danish NPF.

5.7.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	10,228	30,621*	0.94	33.4	2,540	3,000	84.7	4.03	10.21	M	c
CNG / vehicles / 2020	226				13	20**	65.0	17.38		M	n
LNG / heavy duty vehicles / 2025					0				X	X	-
LNG / seagoing ships / 2025	1				2				(OK)	X	-
LNG / inland waterway vessels / 2030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H2 / vehicles / 2025	82				10				X	X	-
Other fuels (LPG / vehicles)	20				4				X	M	n

*the number of electric buses, LDVs and HDVs are assumed to remain the constant from 2016, due to undefined targets for these vehicle categories in the NPF. **for road CNG infrastructure, no 2020 targets are defined. Since there are 14 points and 6 planned, the assumption of 20 is adopted.

The Danish NPF addresses most of the requirements of Article 3. It presents the current state of alternative vehicle uptake and infrastructure and derives targets for future recharging points and CNG refuelling points (road). It discusses LNG refuelling in maritime ports and H_2 refuelling points (road). It does not establish targets for LNG refuelling points for heavy-duty vehicles. The government in Denmark is committed to achieve the goal of becoming a low-emission society, independent of fossil fuels by 2050. The Danish government seeks to promote a market-driven (i.e. determined by market players) development of infrastructure deployment and to limit public financial aid, so that greater pressure on public finances can be avoided. Technology neutrality is emphasised in the NPF.

For electricity, the Danish NPF is relatively well-balanced in terms of future targets and description of policy measures. Notwithstanding, the latter is fundamentally based on current, rather than planned measures. The NPF estimates that the EV share (of all vehicles on the road) will remain below 1% until

2020. The prospects of shore-side electricity supply in Danish maritime ports are not good. The only policy measure mentioned in the NPF is a tax relief for electricity. However, this incentive was not sufficient to make the investment in shore-side electricity supply attractive in the context of the Nordhavn expansion of the Port of Copenhagen. At the opposite extreme lies the status of electricity supply for stationary airplanes. Denmark considers itself a leader in this matter. Notwithstanding, communication of the number of ground power units installed in the three largest airports would facilitate the assessment.

For other alternative fuels, the NPF is not comprehensive.

The NPF highlights the lack of market momentum for private ownership of CNG cars. The NPF does not contain any future estimates for CNG vehicles. Although the sufficiency index for CNG refuelling points is adequate, it seems that Aarhus in particular could benefit from CNG infrastructure deployment for two reasons: it is the second-largest city in the country and it is located along the TEN-T Network between Aalborg and Vejle.

In terms of LNG for road transport, no infrastructure targets are given.

There appears to be a lack of policy measures targeting LNG in the Danish maritime ports.

At present, Denmark foresees insignificant market uptake for hydrogen vehicles before 2025.

The support measures defined in the Danish NPF are unlikely to have a high impact on removing market barriers.

The NPF does not provide any information on stakeholder engagement and cooperation with other Member States.

5.8 Estonia

5.8.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Estonia is 481 km and the length of motorways is 140 km. The length of the total road network in Estonia is 16,489 km.

The length of the TEN-T Road Corridors present in Estonia is 5% (192 km) of the North Sea - Baltic Corridor.

Through the TEN-T Road Corridors, Estonia is connected with Latvia through the North Sea - Baltic Corridor.

Number of registered road vehicles

According to the Estonian statistics agency, Estonia had 703,100 registered passenger cars and 961,300 registered road vehicles of all types in 2016. Presently less than 0.7% AFV are driving on Estonian roads, out of which 0.31% are LPG vehicles, 0.21% use CNG, and 0.13% are electric vehicles.

Number of main agglomerations

- 3 cities > 50,000 inhabitants: Tallinn, Tartu, Narva (source – Eurostat)

Number of ports in the TEN-T Core Network

- no inland ports in the TEN-T Core Network / TEN-T Comprehensive Network
- 1 maritime port in the TEN-T Core Network (Tallinn)
- 7 maritime ports in the TEN-T Comprehensive Network

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network (Tallinn)
- 4 airports in the TEN-T Comprehensive Network (Tartu, Pärnu, Kuressaare, Kärdla)

5.8.2 Summary of the National Policy Framework submitted

Short description of the measures

Estonia prioritises increasing the proportion of alternative fuels use in road transport. By 2020, Estonia seeks to increase the use of renewable energy sources in road transport to 10% of the amount of fuel consumed. This objective is to be achieved through three types of fuel – liquid biofuels, biomethane and electricity.

In the medium term, according to the Estonian NPF, gaseous fuels (apart from LPG) are considered the most cost-effective alternative fuels having the potential to reduce greenhouse gas emissions. Emphasis is on methane because it can easily be substituted by biomethane from renewable sources. Biomethane is considered beneficial from an environmental and energy security perspective.

The number of proposed measures by the Estonian NPF is very limited and their descriptions lack important details necessary for their assessment. They cover road transport and shore-side electricity supply.

All the measures for electricity in road transport in the Estonian NPF are already expired and no measure is existing anymore or is planned.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.8-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	1,257	384		384		384		
Electricity for stationary airplanes		5		5		5		5
SSE for maritime ports		>1		>11		>11		
CNG for vehicles	2,000 (NPF)	6 (NPF)		>16				
LNG for road		0		1				
LNG for maritime ports	1	0		>=1				

H_2 for road		0		1				
LPG for road	3,000 (NPF)	>200						

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Public Alternative Fuels Recharging/Refuelling Points

The NPF does not provide future estimates for alternative fuels vehicles and vessels.

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that the requirements of the Directive are only partially covered.

Table 5.8-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	X			partial (no information about the future development of the AFV market is provided)	3-9
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	X			information about the rail transport is included (current use of electricity, plans to test an LNG-powered locomotive) and considerations are given about maritime use of hydrogen	5, 7, 9
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated	Road	Electricity		X		vague target (>100) regarding only the high-power recharging points and no information about the settlements given in the NPF (information collected from the electro-mobility programme website http://elmo.ee/charging-network-2/)	3-4, 6-7
4(1)	within networks determined by the MS	Road	Electricity		X	N.M.		
4(1)	at public transport stations	Road	Electricity		X	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	X				5, 9
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	X			>1 at 2020 within pilot project, in which the University of Tartu and the private sector plan to jointly create a hydrogen refuelling point and production facility in Pärnu, on the TEN-T core road network.	9
5(1)	cross-border links	Road	Hydrogen		X			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	X			1 vessel existing, 1 terminal to be finished in 2017	8
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG		X	N.A		
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	X			1 terminal at Harbour Muuga part of TEN-T Core Network maritime port of Tallinn (to be finished in	8
6(3)	consideration of market needs	Maritime and Inland ports	LNG	X			after the terminal completion, the real degree of interest and need for the creation of refuelling points beyond the TEN-T Core network will be investigated	8
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	X			first LNG vessel began sailing the Tallinn-Helsinki line in 2017, if the project proves profitable they could imagine vessels moving gradually to LNG use	8
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	X			alongside the terminal at Harbour Muuga (on TEN-T Core Network), a distribution system will also be developed, including loading facilities for LNG tank vehicles	8
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of	Road	LNG	X			alongside the terminal at Harbour Muuga (on TEN-T Core Network), a distribution system will also be developed, including loading facilities for LNG tank vehicles	8
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	X			target number provided (>10 for biomethane) but no concrete information regarding their spatial distribution is given (it is said it will cover the whole country)	7 - 8
	within networks determined by the MS	Road	CNG		X	N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG		X			
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	X			>11 in 2020 (exact locations not provided and TEN-T Core network not mentioned)	7
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	X			electricity supply to stationary aircraft at airports that offer international flights is already provided	5
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	X			after the terminal completion, the real degree of interest and need for the creation of refuelling points beyond the TEN-T Core network will be investigated	8
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity		X			
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in	Road	CNG		X			
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity		X		no existing or future measures provided, only expired	4
			CNG	X				5, 7
			LNG		X			
			Hydrogen	X				9
		Maritime	Shore Side Electricity	X				7
			LNG		X			
		Inland Waterway	Shore Side Electricity			N.A		
			LNG			N.A		
		Airports	Electricity for stationary airplane		X		no measures provided, electricity supply to stationary aircraft at airports that offer international flights is already provided	5
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity		X			
			CNG	X			buses procurement	7
			LNG		X			
			Hydrogen	X			planning stage - public buses procurement (pilot project)	9
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		X			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All		X		The Estonian NPF does not explicitly mention consultation with regional and local authorities. The NPF just mentions a pilot project supported by the government in which the University of Tartu and the private sector plan to jointly construct a hydrogen refuelling point and a production facility in Pärnu.	9
3(4)	Assessment of MS cooperation and coordination with other member states	All	All	X		N.M.	Estonia-Latvia cross-border cooperation programme, Memorandum of Cooperation between the port of Tallinn and some other ports in the Baltic Sea	5, 7, 9

5.8.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.8-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	3.28	-	-	-
CNG for vehicles	333.33	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points.

In March 2011, the Estonian government entered into a contract with the Mitsubishi Corporation for the sale of emission allowances, in order to launch an electro-mobility programme in Estonia. They received 507 I-Miev cars for social workers in return, offered an incentive of up to 50% of the price but not more than 18,000 € for the purchase of a BEV, and installed 165 public CHAdeMO high power recharging points. The incentive scheme started in 2011 and was discontinued in 2014, when the funds allocated to it were exhausted. With this electro-mobility programme Estonia achieved an impressive 1.36% EV average share of total registrations in the period 2011-2014, but the reduction of this average share to 0.25% in the period 2015-2016 indicates that this momentum could not be sustained without the high purchase incentive. This may also suggest that a large-scale deployment of public recharging infrastructure cannot guarantee a success in EV deployment if it is not accompanied by other support measures.

The index for public recharging points, with 3.28, is sufficient by a large margin. This situation is possible to continue also in the future due to the relative large number of electric recharging points and the slow increase of electric vehicle number after 2014, when EV incentives disappeared.

In fact, the Estonian NPF considers the present recharging infrastructure sufficient and only adjustments are planned in the future (e.g. adding 'Combo 2' sockets to the existing CHAdeMO sockets for the high-power recharging points). Since imprecise targets (>100) were provided only for the public high power recharging infrastructure, the current number of public recharging points available in the country (from EAFO) was considered to be maintained.

The NPF states that the current high power recharging infrastructure covers the whole country, the average distance between points being 40 to 60 km. However, no spatial distribution details are presented in the NPF. According to the map provided at the Estonian electro-mobility programme website (http://elmo.ee/charging-network-2/) the spatial distribution seems quite homogeneous.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

On this matter, the Estonian NPF contains insufficient information since it does not provide any detail about the recharging infrastructure existing or planned in urban/suburban agglomerations. According to the Estonian electro-mobility programme website (http://elmo.ee/), all settlements with over 5000 inhabitants are equipped with public high power recharging points, For the bigger cities the coverage is as follows: 38 in Tallinn, 11 in Tartu, 5 in Pärnu, 3 in Viljandi, and 2 in Narva).

Electricity supply at airports for use by stationary airplanes

The NPF states that electricity supply for stationary airplanes at Estonian airports with international flights is already present. It does not provide any further details or future plans.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

According to the NPF, Estonia's TEN-T ports are now equipped with shore-side electricity supply, and if there is demand and the costs are proportionate to the benefits, including environmental benefits, the Estonian government will also consider installing shore-side electricity supply at other ports by 2025.

The port of Tallinn cooperates with other Baltic ports to implement a shared system of standards for electrical connections at those ports. Under the Estonia-Latvia cross-border cooperation programme, a network of small ports will be created by 2019: 10 ports will be reconstructed or built and shore-side electricity supply will be available for all of them.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

There are now 6 CNG refuelling points in Estonia, which cover the road TEN-T Core Network at intervals of at most 150 km. The current situation for CNG is satisfactory (the current sufficiency index I_S value is equal to 333.33 and Estonia is meeting the requirement of at least one CNG refuelling point per estimated 600 CNG vehicles) but the lack of estimated vehicle data does not allow to assess the future one.

The NPF mentions a 2030 Energy Management Development Plan named "Increasing the introduction of alternative fuels in transport" that promotes the use of natural gas in road transport. For the next period, the activities of the plan will focus on the creation of a comprehensive network of CNG refuelling points covering the whole country and on the promotion of biomethane production.

The NPF establishes the objective for the percentage of methane fuels in energy consumption for road vehicles to 5% in 2020 and 10% in 2030. This may in the future require significantly more CNG vehicles on the road and then the coverage of CNG refuelling points may become insufficient.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Estonian NPF provides limited information on this aspect of the Directive, only the cities Tartu and Võru are mentioned having had projects related to infrastructure for refuelling natural gas-powered buses.

Road LNG refuelling points along the TEN-T Core Network (2025)

The NPF mentions that an LNG terminal including an LNG bunkering terminal is due to be completed in 2017, at the Harbour of Muuga, part of the Tallinn port. Alongside the terminal, a distribution system will also be developed, including loading facilities for LNG tank vehicles.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

The first LNG vessel in Estonia began sailing the Tallinn–Helsinki line in 2017. The NPF mentions that an LNG terminal including an LNG bunkering terminal is due to be completed in 2017, at the Harbour of Muuga, part of the Tallinn port, the only maritime port of the TEN-T Core Network in Estonia. Alongside the terminal, a distribution system will also be developed. The future creation of LNG refuelling points beyond the TEN-T Core Network of maritime ports will depend on the demand that will appear after the completion of this terminal.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Not applicable since Estonia has no inland ports along the TEN-T Core Network.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

The Estonian NPF considers that, in the long term, hydrogen could become a very important energy carrier in the transport sector, providing that the price of vehicles with hydrogen fuel cells falls significantly. The Estonian government has expressed its support for a first pilot project, in which the University of Tartu and the private sector plan to jointly create a hydrogen refuelling point and production facility in Pärnu, on the road TEN-T Core Network. In the context of this project, there are also plans to acquire the first hydrogen-powered public buses; afterwards being possible to assess more accurately the potential for using hydrogen-powered vehicles.

5.8.4 Deployment of alternative fuels vehicles and vessels

The Estonian NPF does not indicate future estimates for alternative fuels vehicles and vessels. The NPF seems to implicitly assume, given the focus of the plan and the proposed measures, future growth for vehicles using methane-based fuels.

The NPF provides the current number of LPG vehicles and refuelling points stating that the infrastructure is increasing rapidly. Nevertheless, the NPF does not contain any future projections of the market development for LPG vehicles nor infrastructure.

5.8.5 Assessment of the measures to implement Article 3

The Estonian NPF has presented only a reduced number of support measures that are very vaguely defined. The lack of concrete information (for example budget ceiling) makes their assessment difficult. Some of the measures are in process of adoption or only under consideration and therefore their assessment score is low.

Assessment of the measures that can ensure national targets and objectives

The Estonian NPF contains a limited number of measures ensuring national targets and objectives.

No future or existing measures are presented in the NPF regarding electricity as alternative fuel. Only five measures that are already expired are presented related to this field (they were active in the period 2011-2014). The rest of 6 presented measures concern shore-side electricity supply (2), natural gas and biomethane based fuels (2), hydrogen (1) and biofuels (1) for road transport. Among these three are financial support measures (two with a low score and one with a medium score). The cluster with two measures concerning CNG and biomethane can be considered. The NPF mentions also biofuels are promoted in the short term and that Estonia's energy policy regulates the blending shares of biofuels in petrol and diesel (gradually increasing up to at least 10% as of 2020).

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The NPF presents two financial support measures regarding public transport that relate to the public procurement of buses. Firstly, a direct incentive for building natural gas refuelling points for buses. Secondly, a pilot project that involves also plans to acquire hydrogen-powered public buses. Both measures were assessed as having a low score.

Information about rail transport is included in the NPF (current use of electricity, plans to test an LNG-powered locomotive).

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

Neither data nor a discussion of measures that could promote the deployment of private electro-mobility infrastructure are provided in the Estonian NPF.

5.8.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Estonian NPF does not explicitly mention consultation with regional and local authorities. The NPF just mentions a pilot project supported by the government in which the University of Tartu and the private sector plan to jointly construct a hydrogen refuelling point and a production facility in Pärnu.

5.8.7 Assessment of MS cooperation and coordination with other Member States

The NPF mentions that, under the Estonia-Latvia cross-border cooperation programme, a network of 10 small ports with shore-side electricity supply will be created by 2019. The port of Tallinn cooperates with other Baltic ports for the implementing shared standards for shore-side electricity supply.

5.8.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	1,257				384	384	100.0	3.28		X	-
CNG / vehicles / 2020	2,000 (NPF)				6 (NPF)	16	37.5	333.33		M	C
LNG / heavy duty vehicles / 2025					0	1	0.0		(OK)	X	-
LNG / seagoing ships / 2025	1				0	1	0.0		(OK)	X	-
LNG / inland waterway vessels / 2030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H2 / vehicles / 2025					0	1	0.0		(OK)	L	N
Other fuels - LPG / vehicles / 2025	3,000 (NPF)				200				(OK)	X	-

The Estonian NPF addresses partially the requirements of Directive's Article 3. For many aspects more details would have been needed for an accurate assessment. The NPF does not contain any future estimates for alternative fuels vehicles. Vague targets are provided concerning AFI for 2020 (>100 for high power recharging points and >10 for biomethane refuelling points). Spatial distribution details or references to urban areas and the TEN-T network are not presented. Estonia is focusing on increasing the proportion of alternative fuels use in road transport and is seeking to increase the use of renewable energy sources in road transport to 10% of the amount of fuel consumed. The objective is to be achieved through three types of fuel – liquid biofuels, biomethane and electricity.

The Estonian NPF lacks concrete targets for EV infrastructure and information about the future EV vehicle market development. It neither contains targets for further deployment of electricity supply for stationary airplanes nor shore-side electricity.

One of the Estonian NPF's main objectives is the introduction of methane-based fuels in transport. Longer term preference is biomethane because of its environmental and energy security benefits. Promoting the creation of a comprehensive network of natural gas refuelling points is considered to be the main challenge in the period leading up to 2020.

Regarding LNG, the NPF mentions that an LNG terminal including an LNG bunkering terminal is due to be completed in 2017, at the Harbour of Muuga (part of the Tallinn port) where a distribution system will also be developed, including loading facilities for LNG tank vehicles.

For hydrogen, a first pilot project is pointed out, in which the University of Tartu and the private sector plan to jointly create a hydrogen refuelling point, a production facility in Pärnu.

The Estonian NPF contains a reduced and vaguely described portfolio of existing and proposed measures covering road transport and shore-side electricity supply. All the measures concerning the use of electricity for road transport (private or public infrastructure) have expired and no future ones are proposed. Support measures for natural gas infrastructure and the promotion of biomethane are vaguely mentioned and lack concrete information (e.g. start year, budget). Biofuels are promoted in the short term and Estonia's energy policy regulates the blending shares of biofuels in petrol and diesel (gradually increasing up to at least 10% as of 2020). For LNG, no measures are proposed at this moment but the degree of interest and need will be further investigated after the completion of the first terminal in 2017. The NPF presents two measures regarding public transport that relate to public procurement of CNG and hydrogen public buses.

The NPF mentions cross-border cooperation focussing on shore-side electricity supply.

5.9 Greece

By 1st October 2017 (cut-off date for the Commission NPF assessment) Greece had not notified an NPF to the Commission. [1]

5.10 Spain

5.10.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Spain is 5,706 km and the length of motorways is 14,981 km. The length of the total road network in Spain is 165,362 km.

The following lengths of the TEN-T Road Corridors are present in Spain: 48% (2,727 km) of the Mediterranean Corridor and 46% (2,040 km) of the Atlantic Corridor.

[1] However, by adoption date of this SWD Greece had notified its NPF.

Through the TEN-T Road Corridors, Spain is connected with the following Member States:
- Portugal (through the Mediterranean Corridor)
- France (through the Mediterranean and the Atlantic Corridor)

Number of registered road vehicles

In 2015, according to the Spanish NPF, Spain had 30,623,318 road vehicles of all types, of which 22,355,022 passenger cars. There are presently few (0.23%) AFV on Spanish roads, with for example just 0.06% of electric passenger cars.

Number of main agglomerations

- 24 cities > 250,000 inhabitants (source – NPF)
- 111 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 1 inland port in the TEN-T Core Network
- 13 maritime ports in the TEN-T Core Network
- 24 maritime ports in the TEN-T Comprehensive Network

Number of airports in the TEN-T Core Network

- 10 airports in the TEN-T Core Network
- 29 airports in the TEN-T Comprehensive Network

5.10.2 Summary of the National Policy Framework submitted

Short description of the measures

The measures presented in the Spanish NPF are established within the regulatory framework of the "Strategy to promote alternative energy vehicles in Spain, 2014-2020" approved in June 2015. The strategy seeks to place Spain as a reference country in the sector of alternative fuels vehicles for road transport and contains 30 concrete measures. The measures proposed in the Spanish NPF cover various fuels and modes. They comprise a wide variety of types, addressing many deployment barriers; however, most of them are nonfinancial as a consequence of the last years financial crisis and budgetary restrictions. The majority of measures in the NPF already exist and, for instance, fiscal incentives for AFV are included in the Spanish Regulations.

Spain considers electricity, hydrogen, CNG, LNG and LPG as main alternative fuels to comply with Directive 2014/94/EU. While most of the measures cover all these AF, Spain has also established some measures specific for the deployment of low emission vehicles (EV and FCV) and related recharging/refuelling infrastructure. The measures are presented in a well-structured and logical manner. They are often very limited in time and budget, with annual extension foreseen. This could be perceived by market actors as a lack of predictability in terms of stability of support measures.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.10-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	12,883	1754	38,000 – 150,000				2,600,000	
Electricity for stationary airplanes		410		410		410		410
CNG for vehicles	2,929 (EAFO) 4,366 (NPF)	45	17,200	54		76		76
LNG for road	306	19	800	44		44		44
LNG for maritime ports	0		3			13		
LNG for inland ports								1
H_2 for road	11	4	500	20		20		20
LPG for road	50,000 (NPF)		200,000-250,000					

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that most of the requirements of the Directive are covered. The Spanish NPF does not contain a 2020 target for recharging points.

Table 5.10-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x				16-33
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x				
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity		x		A target number is not provided in the NPF	62, 63
4(1)	within networks determined by the MS	Road	Electricity	x		N.M.		64
4(1)	at public transport stations	Road	Electricity	x		N.M.		64
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	x				74-80
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	x				74-80
5(1)	cross-border links	Road	Hydrogen	x			With FR	79,80
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	x				146-149
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG	x				148
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				149
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x				142, 143
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	x				142-145
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x				46, 47
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	x				18, 19
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x				46, 47
	within networks determined by the MS	Road	CNG			N.M.		20
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				46, 47
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x				155-161
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x				166-172
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x				147-149
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x				62-63
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x				47
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				88-128
			CNG	x				88-128
			LNG	x				88-128
			Hydrogen	x				88-128
		Maritime	Shore Side Electricity	x				163
			LNG	x				150
		Inland Waterway	Shore Side Electricity		x			
			LNG	x				150
		Airports	Electricity for stationary airplane		x		Not necessary as infrastructure is deployed	
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x			National Plan Smart Cities Regutory Environmental Criteria public Transport	104 112
			CNG	x				104 112
			LNG	x				104 112
			Hydrogen	x				104 112
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	x				96, 101, 108, 109
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x				15, 173, 174
3(4)	Assessment of MS cooperation and coordination with other member states	All	All	x		N.M.		15

5.10.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.10-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	7.34	-	-	-
CNG for vehicles	65.09	226.32	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.10-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding the electric vehicles, for the current situation, with 7.34, the index meets the assessment threshold of 10 AFV per (public) recharging point. It must be noted that the Spanish NPF assumes that EV recharging is, in 90% of the cases, made at private garages (at home or at work-place) and, according to that assumption, there will be almost one private recharging point available per EV. In addition to these private points, the public infrastructure is aimed to guarantee autonomy of EV passenger vehicles and to provide coverage for public transport (electric taxis) and the urban logistics sector. Since the NPF does not provide any targets for the number of recharging points in 2020, the sufficiency index could not be calculated.

According to the visual assessment of the spatial distribution of recharging points presented in the map https://www.electromaps.com/puntos-de-recarga/mapa and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one recharging point at least every 60 km is fulfilled, already today. The Spanish NPF objectives for 2025 contain a network of 40 fast recharging points, located along the TEN-T Corridors. The NPF also declares that the recharging infrastructure deployment will depend on the EV market evolution and on the efforts of regional and local authorities.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Spanish NPF states that at present there are 91 locations with public recharging points in urban areas. In the NPF, the urban/suburban agglomerations of more than 250,000 inhabitants were designated for the targets and priority will be given for deployment of recharging points in the biggest urban/suburban areas. The NPF declares that the four Spanish urban agglomerations with more than one million inhabitants, Madrid, Barcelona, Sevilla and Valencia, are currently already well covered with publicly accessible recharging points.

Electricity supply at airports for use by stationary airplanes

Nine of the ten Spanish airports in the TEN-T Core Network have, according to the NPF, fixed ground power units (343), most include pre-conditioned air. In several Spanish airports of the TEN-T Comprehensive Network a total of 67 fixed ground power units are available. The Spanish NPF provides a table with the foreseen investments in ground power supply units at the different airports for the period 2016-2030 and states that those investments are assumed to be mainly replacements of obsolete infrastructure.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The NPF mentions that Spain has shore-side electricity supply at one point in Melilla Port (TEN-T Comprehensive Network) and feasibility studies are being carried out for seven other ports. The NPF declares that the target for 2020 is to have shore-side electricity supply in four additional ports: La Luz-Las Palmas, St. Cruz de Tenerife, Palma de Mallorca (in the TEN-T Core Network) and Pasajes (TEN-T Comprehensive Network). In case that the private sector does not provide shore-side electricity, the Spanish Port Authority could step in.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.10.-3 shows that the currently available number of CNG refuelling points is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. The NPF acknowledges the good positioning of Spain regarding natural gas (7 regasification terminals, 250 tanker trucks, 932 satellite terminals, etc.) and mentions the interest of the private sector to build 11 CNG and 20 combined CNG/LNG refuelling points by 2020. The combined CNG/LNG refuelling points will be located in the urban agglomerations of the TEN-T Core Network.

According to the visual assessment of spatial distribution of CNG refuelling points presented in the map provided by the Iberian association for gas-powered mobility, GASNAM, (http://gasnam.es/estaciones-gas-natural-vehicular/) and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one CNG refuelling point at least every 150 km could be fulfilled by 2020.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Spanish NPF states that, taking into account the already existing CNG points and considering the planned ones, Spain is on good track to meet the requirement of an appropriate number of publicly accessible CNG refuelling points in urban/suburban agglomerations of more than 250,000 inhabitants by 2020.

Road LNG refuelling points along the TEN-T Core Network (2025)

Spain has already 15 publicly accessible LNG refuelling points and another 9 are under construction. They are located on or at a minimal distance to the TEN-T Core Network. To meet the requirements of an LNG refuelling point every 400 km, 10 new points will be needed, which will be deployed depending on market demand, the technology evolution, and the increase of LNG vehicles' autonomy. As the private sector will build 20 combined CNG/LNG refuelling points by 2020 located in the urban agglomerations of the TEN-T Core Network, the NPF declares that the maximum distance requirement for LNG refuelling points along the TEN-T Core Network would be fulfilled on the Spanish territory.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

Spain has already 277 LNG refuelling points in its ports, divided in 250 truck-to-ship and 27 container-to-ship facilities. The more than 900 satellite terminals provide enough capacity to cope with any potential increase in the NG demand for maritime transport, without any additional investment. The NPF declares that at present LNG supply in all the ports in the TEN-T Core Network can be covered by Truck-to-Ship bunkering. In addition, Spain can supply LNG to other EU countries (as done for instance in the Port of Naples to fuel the ship F.A Gauthier). However, in the frame of the project Core LNGas Hive (2015-2020) new supply infrastructure will be deployed before 2020, namely ship-to-ship bunkering in the ports of Barcelona, Valencia and Bilbao (TEN-T Core Network) and Ferrol (TEN-T Comprehensive Network) and 4 bunkering terminals in Barcelona, Cartagena, Bilbao (TEN-T Core

Network) and Ferrol. Further assessment of the LNG bunkering options will be made based on the market evolution and will be provided in future revisions of the Spanish NPF.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Spain has only one inland port (Sevilla) that can be covered by Truck-to-ship bunkering.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

A target of 20 hydrogen refuelling points is established for 2020. Currently, 6 hydrogen refuelling points (350 bar) are already in operation in Andalucía, Aragon and Castilla La Mancha. Roll-out of hydrogen refuelling points is being carried out in the frame of European initiatives (POCTEFA-INTERREG) and demo projects, co-funded through the FCH-JU and CEF. For the future deployment, coordination will be sought with the neighbouring countries France and Andorra to ensure an appropriate hydrogen infrastructure along the TEN-T Corridors.

5.10.4 Deployment of alternative fuels vehicles and vessels

The main focus of the Spanish NPF is on LPG vehicles, followed by natural gas and then electric vehicles. It estimates a share of roughly 1.3% AFV on the road in 2020. Currently, 50,000 LPG vehicles are registered and this number is expected to increase to 200,000-250,000 in 2020. CNG vehicles on Spanish roads are expected to increase from almost 4,400 today to 17,200. For electric vehicles the estimates of 150,000 in 2020 and 260,000 in 2030 seem rather ambitious taking into account that at present there are less than 20,000 electric vehicles registered in Spain and that the NPF does not contain any targets for public recharging infrastructure. For LNG heavy-duty vehicles, the estimate is 800 vehicles in 2020. The Spanish NPF does not provide any estimate for LNG ships; however, it does mention that 3 ferries (one just with an LNG auxiliary motor and two LNG propelled) will come into service by 2020.

5.10.5 Assessment of the measures to implement Article 3

The Spanish NPF contains almost 60 measures at national level and it also showcases measures at Autonomies and Region levels. Most of the measures cover all alternative fuels types (also biofuels) and are already in effect. Some of the financial support measures have a duration of one year and prolongation or termination is decided on an annual basis. According to the assessment methodology, a medium overall assessment score is derived for the majority of the measures. Nevertheless, it must be noted that Spain has put in place a considerable number of regulatory measures which may favour the deployment of AFV and AFI. In some cases, the lack of concrete information (for example budget or quantification of the incentives) makes it difficult to assess the scope according to the same methodology. Some of the measures are not adopted or only under consideration and therefore their assessment score is low.

Assessment of the measures that can ensure national targets and objectives

The measures of this category cover: AFI and AFV, several fuel types, modes of transport, financial and nonfinancial support. The totality of these measures can indeed address many of the deployment barriers and, as a consequence, the portfolio of all measures can be considered quite comprehensive. Since many of the measures are already in place and receive a medium score it can be derived that the Spanish NPF seems to have defined appropriate measures in order to attain the defined targets and objectives of the NPF. A large amount of support measures are only approved for one year at a time or receive a budget

appropriation that is likely to be depleted within a given year. This could be perceived by market actors as a lack of predictability in terms of stability of support measures.

From the alternative fuel and mode of transport clustering analysis, it resulted that most measures presented address all alternative fuels for road transport vehicles. Measures with a focus on a particular fuel (electricity, hydrogen) are oriented to the deployment of the correspondent recharging/refuelling infrastructure, especially along the TEN-T Corridor. The measures in the Spanish NPF emphasize the role of LNG in maritime transport. This contrasts with few measures for promoting the deployment of shore-side electricity supply.

In addition, a number of measures are established at regional and local levels to promote electro-mobility in Andalucia, Islas Baleares, Canarias, Castilla y Leon, Castilla la Mancha, Catauña, Comunidad Valenciana, Extremadura, Comunidad de Madrid, Pais Vasco and Ceuta and for the deployment of hydrogen vehicles and infrastructure in particular in Aragon, and Comunidad Valenciana.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Spanish NPF contains 3 specific measures in this category; two of them adopted, aim at facilitating permits for AFV in public transport services and a third one, under consideration, aims at mandating environmental aspects as one criterion in the tendering procedures for public transport services.

In addition measures are taken at regional and local levels in Andalucia (electric buses in Malaga, natural gas buses in Sevilla, alternative fuels taxis, electric vehicles at Andalucia's government offices), in Castilla y Leon (electric buses in Valladolid) in Cataluña (incentives for low emission taxis) and in Madrid (procurement of CNG buses).

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Spanish NPF contains four regulatory measures in this category; three are adopted. They are assessed as having a high score since they address important barriers to the deployment of private recharging points. In particular, Spain has made mandatory the provision of appropriate electrical installations (for possible later addition of private recharging infrastructure) in all new buildings, both one-family houses with private parking place and residential buildings with common private garage. Moreover all new collective parking areas (e.g. in offices and companies buildings and in public garages) must have a recharging point per 40 parking places.

5.10.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Spanish NPF has been established respecting the interests of regional and local authorities, as well as those of the stakeholders concerned, in particular taking into account the needs from SMEs. The NPF explicitly mentions stakeholder participation in its drafting. It also refers to the workgroup with the Spanish Autonomous Communities and Regions to co-ordinate the measures proposed in the NPF with those plans and measures of the different Autonomous Communities and Regions. Local authorities' interests have been brought in through both the Spanish Association of Municipalities and Provinces and the Smart Cities' Network. In addition, the national government has set up an online inquiry to receive from the 8,114 Spanish municipalities information about intended measures and plans relevant for the NPF.

5.10.7 Assessment of MS cooperation and coordination with other Member States

Spain has cooperated with other Member States through different fora. The NPF mentions the signature in November 2015 of the Spanish, Portuguese and French governments of the common "Spanish-Portuguese-French Initiative for the promotion of electric vehicles". The initiative contains 10 actions for EVs deployment and the establishment of a work-group to improve co-ordination and set up a project for public recharging infrastructure at the Iberian Peninsula.

Co-operation with neighbouring Member States to ensure adequate coverage of the TEN-T Core Network has, in particular, been established between Spain and Portugal for deployment of alternative fuels infrastructure for electricity, natural gas and LPG and between Spain, Andorra and France in a common project for development of a transnational corridor of hydrogen refuelling points.

5.10.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attainment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	12,883	38,000-150,000	0.14-0.54	33.9-8.6	1,754 (EAFO)			7.34		M	c
CNG / vehicles / 2020	2,929 (EAFO) 4,366 (NPF)	17,200	0.06	17.0	45	76	59.2	65.09	226.32	M	c
LNG / heavy duty vehicles / 2025	306 (EAFO) 250 (NPF)	800*	0.09	38.3	19 (EAFO) 15 (NPF)	44	43.2		OK	M	c
LNG / seagoing ships / 2025		3				13			OK	M	c
LNG / inland waterway vessels / 2030						1			(OK)	X	-
H2 / vehicles / 2025	11	500*	<0.01	2.2	4	20	20.0		OK	M	c
LPG / vehicles	50,000 (NPF) 58,038 (EAFO)	200,000-250,000*	0.72-0.90	25-20	468	800	58.5		OK	M	c

*2020 estimate

The Spanish NPF addresses most of the requirements of Article 3. It contains an extensive discussion of the current state and future scenarios for alternative fuels in the transport sector. For most fuels and modes, it establishes targets as required by Article 3 of the Directive. The Spanish NPF does not contain a 2020 target for recharging points. This violates a basic requirement of the Directive. It can pose a serious risk to cross-border continuity and a functioning internal market for electric vehicles.

The Spanish NPF estimates a comparably low share of roughly 0.5% electric vehicles on the road in 2020. While the spatial distribution of recharging points seems to cover the needs of electric vehicles in terms of distance requirements in Spain, the absence of targets for publicly accessible recharging points for 2020 is a risk to the further market deployment of electric vehicles. This could also lead to market fragmentation within the EU, especially in the context of the rather low estimated EV shares in the Spanish NPF. It will be important to establish appropriate infrastructure targets in line with the market developments. The Spanish NPF contains modest targets and measures for increasing shore-side electricity in its ports. Coverage of electricity supply for stationary airplanes at the major airports is already good and no increase is foreseen.

The Spanish NPF focusses on LPG and natural gas, for which substantial infrastructure is already in place. It considers strong growth of CNG and LPG vehicles and establishes appropriate refuelling infrastructure targets consistent with the vehicle projections.

The Spanish NPF strongly emphasizes LNG. There are already 15 publicly accessible LNG refuelling points for heavy-duty vehicles present in the Spanish territory and it is foreseen to have 44 by 2020. Altogether, the planned LNG refuelling points could guarantee that the maximum distance requirement for LNG refuelling points along the road TEN-T Core Network would be fulfilled on the Spanish territory.

LNG refuelling is available for all maritime ports in the TEN-T Core Network and in several ports of the comprehensive network, and additional bunkering terminals and ship-to-ship refuelling are planned.

Spain has considered hydrogen in its NPF. The deployment of 20 publicly accessible hydrogen refuelling points and 500 hydrogen fuel cell vehicles by 2020 is foreseen.

The Spanish NPF contains an extensive list of measures, most already in place. Most of them can be considered having a low to medium impact on market actor's decisions. Regulatory measures have been put in place to facilitate infrastructure deployment. Longer durations for the validity of financial support measures could provide certainty for market actors and hence increase the likelihood that the national targets and objectives of the NPF can be reached. The NPF also contains several support measures to promote the deployment of alternative fuels infrastructure in public transport services.

The consideration of the interests of regional and local authorities, as well as stakeholders during the drafting of the Spanish NPF can be viewed as exemplary. Further co-operation will continue in the follow up phase of the NPF.

Spain is actively involved in coordinating its plans on alternative fuels infrastructure with other Member States as well as collaborating with them in this field, in particular for the deployment of alternative fuels infrastructure for electricity, natural gas and LPG. Spain and France collaborate for the establishment of a hydrogen refuelling point corridor connecting the two countries.

5.11 Finland

5.11.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Finland is 1,070 km and the length of motorways is 810 km. The length of the total road network in Finland is 26,892 km.

The length of the TEN-T Road Corridors present in Finland is 5% (348 km) of the Scandinavian - Mediterranean Corridor.

Through the TEN-T Core Network, Finland is connected with Sweden.

Number of registered road vehicles

In 2016, Finland had 3,346,005 registered passenger cars in traffic use. In 2016, it had 6,316,531 registered vehicles of all type (motorcycles, passenger cars, microbuses and buses, goods vehicles, tractor

units, trailers and semi-trailers and special vehicles). Presently only a few (1%) AFV are driving on Finnish roads, 0.11% of passenger cars are electric.

Number of main agglomerations

- 21 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- no inland ports in the TEN-T Core Network/ TEN-T Comprehensive Network
- 4 maritime ports in the TEN-T Core Network
- 12 maritime ports in the TEN-T Comprehensive Network

Through the TEN-T maritime ports network, Finland is connected with Sweden through the Scandinavian - Mediterranean Corridor and Estonia through North Sea - Baltic Corridor.

Number of airports in the TEN-T Core Network

- 2 airports in the TEN-T Core Network
- 18 airports in the TEN-T Comprehensive Network

5.11.2 Summary of the National Policy Framework submitted

Short description of the measures

The majority of measures in the Finnish NPF already exist, and, for most, the future extension is foreseen. They cover various types, addressing many deployment barriers. Some measure descriptions lack important information needed for an assessment. Many measures focus on the biofuels and their increased share in the fuel mix in road and waterways transport. Electro-mobility is promoted mostly with financial measures, taxation schemes and public procurement incentives. The Finnish set of measures cover many alternative fuels and seem to set Finland on a good track to reach the targets laid down by the Directive.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.11-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	3,436	971	22,000	2,000	106,000		263,000	25,000
Electricity for stationary airplanes		3						
SSE for maritime ports	1	4						
CNG for vehicles	1,344	24	5,800	55	17,000	55	53,000	
LNG for road	8	2		9		11		
LNG inland								1
LNG for	12	2		4		6		6

maritime ports								
Ethanol (E85) for road	36,000	100						250
H_2 for road	1	2						21

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that all the requirements of the Directive are covered.

Table 5.11-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x				Chapter 2
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x				Chapter 2
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				22, 37
4(1)	within networks determined by the MS	Road	Electricity	x		N.M.		44
4(1)	at public transport stations	Road	Electricity	x		N.M.	The public charging network refers not only to charging points located in public places, but stations generally available to all cars	44
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	x				20
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	x				22
5(1)	cross-border links	Road	Hydrogen		x			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2025 at maritime ports	Maritime ports	LNG	x				22
6(2)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2030 at inland ports	Inland ports	LNG	x			for the needs of vessels navigating through Saimaa, a mobile bunkering point will be in Mustola, Lappeenranta, no later than 2030.	22,40
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				22
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x				4
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG		x		International cooperation regarding SSE: cooperation with Sweden and Estonia to promote SSE in Baltic Sea	12
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x			In all TEN-T Core Network ports(Hamina-Kotka, Helsinki, Naantal and Turku), each covering 300 to 500 km radius.	15
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	x			For liquid natural gas and biogas, target is that Finland would have a network of LNG for the needs of HDV by 2030. LNG for shipping needs will serve also HDV needs.	14,22
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x			A map and a table of urban agglomerations and TEN-T network unitl 2020	45,57
	within networks determined by the MS	Road	CNG	x			A map and a table of urban agglomerations and TEN-T network unitl 2021	45,57
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				37
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x				22
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x				22
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x			need for LNG ships, such as ESL shipping, icebrakers and containerships	15
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x				22, 37
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x				22, 37
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				26, 27, 28, 30, 33, 34, 35, 36
			CNG	x				26, 27, 28, 30, 33, 34, 35, 36
			LNG	x				26, 27, 28, 30, 33, 34, 35, 36
			Hydrogen		x			26, 27, 28, 30, 33, 34, 35, 36
		Maritime	Shore Side Electricity		x			33, 35
			LNG	x				32
		Inland Waterway	Shore Side Electricity		x			
			LNG		x			4
		Airports	Electricity for stationary airplane		x			33, 35
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				29
			CNG	x				29
			LNG	x				29
			Hydrogen	x				29
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		x			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x				32
3(4)	Assessment of MS cooperation and coordination	All	All		x	N.M.		

5.11.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.11.-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	3.54	11.00		10.5
CNG for vehicles	56.00	105.45	309	

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.11.-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points.

The current sufficiency index for EVs is 3.54 meeting the assessment threshold by a large margin. In 2020, it does not satisfy the assessment threshold of 10 AFV. In 2030, the sufficiency could be met with additional effort, even though it is slightly above the threshold of 10 vehicles per recharging point.

Appropriate locations of recharging points to be put in place in 2020 on the TEN-T Core and Comprehensive Network are provided on a map. The total target for recharging points and the distribution visualized on the map gives confidence that the minimum coverage target of one recharging point at least every 60 km of TEN-T network will be achieved in 2020.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Finnish NPF considers urban agglomerations as cities with more than 50,000 inhabitants. The NPF provides a map showing recharging points distributed along TEN-T Corridor, Core and Comprehensive Network and densely populated areas by 2020 with depicted recharging point locations. The NPF further provides a table where existing and 2020 target recharging points are counted for every city, urban agglomeration and villages stating a detailed plan for the recharging point's distribution.

Electricity supply at airports for use by stationary airplanes

Finland has 3 TEN-T Core Network and 18 Comprehensive Network airports, already providing comprehensive range of ground power, with both sockets and mobile equipment when needed. Only the smallest airports do not facilitate ground power systems since it is not economically viable, according to the NPF.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

Currently there are 3 Finnish ports offering shore-side electricity supply: the port of Helsinki, Oulu and Kemi. A cooperation agreement was signed in 2016 between the port of Helsinki, Turku, Stockholm and Tallinn to further promote use of shore-side electricity in the port Turku and Helsinki, and the agreement is currently being finalized. It would ensure the SSE availability in the main maritime ports.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.11.-3 shows that the currently available number of CNG refuelling points is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. The targets will also be sufficient in 2020,

while there are no infrastructure targets for 2025. However, if the target of 55 CNG refuelling points is met in 2020 and the number remains constant until 2025, this will also fulfil the sufficiency target in 2025, with 309 vehicles per one refuelling point.

According to the visual assessment of spatial distribution of CNG refuelling points up to 2020, and checking the TEN-T Core Network routes, it seems that the distance requirement of one CNG at least every 150 km will be fulfilled by 2020, except on the E75 route between Oulu and Jyväskylä. No further information is provided for CNG infrastructure after 2020, and it may need a revision.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Finnish NPF contains a table listing 55 CNG refuelling points available in 31 agglomerations, towns and villages in 2020. The NPF also contains a map that depicts existing and planned CNG refuelling points throughout urban agglomerations and Core/Comprehensive road Network that sets Finland on a good track to ensure sufficient infrastructure in urban and suburban areas.

Road LNG refuelling points along the TEN-T Core Network (2025)

Currently there are 2 road LNG refuelling points in Finland. The NPF targets 9 LNG refuelling points for road vehicles in the 2020 and depicts them on the map provided. If the target will be achieved in 2020, Finland will meet the minimum coverage target of one refuelling point every 400 km on the TEN-T Core Network. Moreover, LNG terminals built for shipping needs will also serve heavy-duty vehicles, and it will ensure coverage for needs of heavy-duty vehicles in 2030.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

There are currently 2 maritime ports with LNG refuelling points. Target for 2025 is to build 4 more LNG refuelling points, which will also serve heavy-duty trucks, totalling to 6 LNG refuelling points in maritime ports, which according to the NPF will be enough to fulfil the market needs in Finland.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Currently there are no inland waterways LNG refuelling points in Finland. The NPF states one mobile bunkering point will be available for LNG vessels navigating in the Saimaa channel until 2030.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Currently there are 2 hydrogen refuelling points in Finland. An ambitious target of 21 hydrogen-refuelling points is established for 2030, ensuring the maximum distance target of 300 km, each serving a radius of 150 km.

5.11.4 Deployment of alternative fuels vehicles and vessels

The Finnish NPF contains ambitious estimates for the deployment of several alternative fuels vehicle options. The focus is on vehicles compatible with high blends of biofuels and on electric vehicles, both in private and public road transport. Moreover, the NPF targets that every refuelling point would offer high-blend biofuel as a part of the product range. In 2050, Finland targets near zero-emission transport, aiming at 50% of all new vehicles to be powered by an alternative fuel already in 2025. The target in shipping and aviation is 40% GHG reduction, planned to be achieved mainly by switching to LNG and biofuels.

Finland estimates a share of roughly 0.6% electric vehicles on the road in 2020, and around 7.4% in 2030. For CNG road vehicles, the estimate share for 2020 is around 0.16%, while in 2030 it is 1.5%.

5.11.5 Assessment of the measures to implement Article 3

The Finnish NPF contains a large portfolio of measures. Most of the measures are already in effect and prolongation is considered for most of them. According to the assessment methodology, a medium overall assessment score is derived for electricity, biofuels, CNG and LNG vehicles and infrastructure measures. However, measures considering biofuels and electricity display the highest commitment for the road transport and set confidence of reaching the target of near-zero emission transport in Finland. The NPF promotes LNG through the measures to be the main shipping and long haul transport fuel in the future. Road transport is a main NPF focus, with some waterborne and airborne shipping. For some measures, the Finnish NPF provides ambiguous and limited information concerning the promotion of various fuels, which makes the assessment difficult at times.

Assessment of the measures that can ensure national targets and objectives

The measures of this category cover: AFI and AFV, major alternative fuels types, modes of transport, financial and nonfinancial support. The totality of these measures can address many deployment barriers for electricity, biofuels and LNG. The portfolio of all measures can be considered comprehensive for electricity, biofuels, CNG and public electric road transport. One main focus of the NPF is on biofuels, and measures further address the deployment of biofuels to increase their share, even though the national target of 10% according to the Directive 2009/28/EC on renewable energy has already been surpassed. These measures set Finland on a good track to meet the national target for biofuel share in transport of 30% by 2030.

For electricity and CNG, the overall measure assessment grade is medium and most of the measures back up the vehicle estimates and infrastructure targets. Some measures address electricity for shore-side supply and for stationary airplanes, and it appears that Finland will meet the national target for these alternatives. The overall LNG measure assessment is medium, covering road, maritime and inland waterways infrastructure. The most promising LNG measure is an energy grant to support the building of 4 LNG/LBG terminals for shipping and HDVs needs, which represents 57% of the planned LNG waterways infrastructure until 2030.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The NPF measures imply that electricity will play a leading role in public transport. Four demonstration projects yielded the procurement of 22 electric buses and 34 recharging points in different cities. Moreover, increasing share of drop-in biofuels will also be promoted in the public transport.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

In the respective section, the Finnish NPF lists some general measures. Although the information is scarce vis-à-vis these measures, Finland recognises company cars as a natural way of promoting new costly technologies, such as electricity, and it will target the taxation system for low emission company cars to support the corresponding infrastructure.

5.11.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Finnish NPF mentions local initiatives. It also mentions that the LNG action plan was prepared by a number of different authorities and together with companies and associations relevant to the sector.

5.11.7 Assessment of MS cooperation and coordination with other Member States

The Finnish NPF states that a cooperation agreement was signed between Finland, Sweden and Estonia on promoting the usage of shore-side electricity on the Baltic Sea.

5.11.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	3,436	22,000	0.63	15.6	971	2,000	48.6	3.54	11.00	M	c
CNG / vehicles / 2020	1,344	5,800	0.17	23.2	24	55	43.6	56.00	105.45	M	c
LNG / heavy duty vehicles / 2025	8 (NPF) 1 (EAFO)				2 (NPF) 0 (EAFO)	11	18.2		OK	M	n
LNG / seagoing ships / 2025	12				2	6	33.3		OK	H	n
LNG / inland waterway vessels / 2030						1			(OK)	L	c
H2 / vehicles / 2025	1				2	21*	9.5		(OK)	X	-
Ethanol (E85)/2030	36,000				100	250	40.0		X	X	-

*2030

The Finnish NPF fully addresses the requirements of Article 3. It contains an extensive discussion of the current state and future scenarios for alternative fuels in the transport sector. For all fuels and modes, it establishes targets as required by Article 3 of the Directive. The Finnish NPF focuses on biofuels to meet the near-zero emission transport target by 2050, and states ambitious measures to achieve them. Low and high blends are planned to be used in different modes of transports, ensuring less fossil oil dependency and less GHG emissions.

The NPF states high recharging point targets and vehicle estimates, and contains some measures to deploy electricity in transport, such as tax reductions and direct investments for private and public electro-mobility. The given recharging points target and its spatial distribution seems to cover the needs of electric vehicles in terms of number of publicly accessible recharging points as well as distance requirements in Finland. The ratio of recharging points per estimated number of electric vehicles is on the borderline to sufficiency until 2030, and close monitoring may be needed to ensure sufficiency. In Finland, 22 electric buses have been procured for public transport for demonstration projects in 4 cities. The Finnish NPF contains targets to further promote and increase shore-side electricity in ports and ground power for stationary airplanes is already offered in the major airports.

Finland currently has a sufficient CNG infrastructure in terms of vehicles per refuelling point and will continue to have in 2025. The NPF provides a map of spatial CNG distribution where minimum coverage criteria does not hold on the TEN-T Core Network in 2020, and no information about CNG infrastructure until 2025 is provided. Thus, additional revision could be necessary to secure the minimum coverage criteria until 2025.

LNG with gradual increase of renewable share is foreseen as the main shipping and long-haul transport fuel. Six LNG refuelling points in maritime ports and one mobile inland waterway bunker are planned until 2030. Nine road LNG refuelling points on the TEN-T Core Network will ensure the minimum coverage criteria of one LNG refuelling point at least every 400 km for heavy-duty motor vehicles, already by 2020.

Furthermore, the Finnish NPF displays a strong commitment towards hydrogen. The deployment of 19 publicly accessible hydrogen refuelling points in addition to two existing is planned, ensuring the distance of 300 km between two points.

The Finnish NPF contains a comprehensive list of measures, with most already in place and foreseen to stay. Most of them could have a medium impact on electricity, CNG and LNG in the road transport, and high impact on LNG in shipping. However, some measures could not be assessed due to the limited information contained in the NPF. The NPF contains a comprehensive list of support measures that can promote the deployment of alternative fuels infrastructure in public transport services.

Finland considered regional and local authorities, stakeholders' interests and cooperation with other Member States in some instances.

5.12 France

5.12.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in France is 5,283 km and the length of motorways is 11,552 km. The length of the total road network in France is 398,533 km (including motorways, main/national roads, and secondary/regional roads).

The following lengths of the TEN-T Road Corridors are present in France: 13% (767 km) of the Mediterranean Corridor, 36% (1,583 km) of the Atlantic Corridor, 38% (1,611 km) of the North Sea – Mediterranean Corridor, 0.4% (18 km) of the Rhine - Danube Corridor.

Through the TEN-T Road Corridors, France is connected with the following Member States:
- Germany (through the Rhine - Danube Corridor)
- England (through the North Sea -Mediterranean Corridor)
- Belgium (through the North Sea - Mediterranean Corridor)
- Luxembourg (through the North Sea - Mediterranean Corridor)
- Spain (through the Mediterranean and the Atlantic Corridor)
- Italy (through the Mediterranean Corridor)

Number of registered road vehicles

At the beginning of 2016, France had about 32,300,000 registered passenger cars (M1) and about 38,500,000 registered road vehicles of all types. The French NPF considers the present situation of about 0.2% of AFV on French roads as insufficient, and in need of improvement.

Number of main agglomerations

- 25 urban agglomerations with more than 250,000 inhabitants for which measures to promote air quality are implemented (source: Decree of 28 June 2016 pursuant to Article R.221-2 of the French Environment Code)
- 61 urban agglomerations with more than 100,000 inhabitants for which measures to promote air quality are implemented (source: Decree of 28 June 2016 pursuant to Article R.221-2 of the French Environment Code)
- 114 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 11 inland ports in the TEN-T Core Network and 10 ports in the TEN-T Comprehensive Network
- 8 maritime ports in the TEN-T Core Network and 19 in the TEN-T Comprehensive Network

Through the TEN-T inland waterways network, France is connected with Belgium and Luxembourg through the North Sea - Mediterranean Corridor and with Germany through the Rhine - Alpine Corridor. France plans to expand the existing inland waterways network by 27% along the North Sea - Mediterranean Corridor.

Number of airports in the TEN-T Core Network

- 8 airports in the TEN-T Core Network
- 19 airports in the TEN-T Comprehensive Network

5.12.2 Summary of the National Policy Framework submitted

Short description of the measures

The majority of measures in the French NPF is already existing. They cover a wide variety of types, addressing many deployment barriers. The number of proposed measures is high, covering almost all areas, and the measures are presented in a well-structured and logical manner. The French NPF presents all the measures existing or being developed, diverse in nature (legislative and regulatory, incentive, informative, calls for projects, research and development, cross-border coordination and projects financed by European programs) and promoting, directly or indirectly, the deployment of alternative fuels and corresponding infrastructure. The French NPF puts a lot of emphasis on electric vehicles offering substantial direct incentives for purchase.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.12-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	118,663	16,081	960,000	35,000	(2,400,000 in 2023)			7,000,000*

CNG for vehicles	7,606	43		79 / 210**		116 / 260**		
LNG for road	40	1				25 / 40**		
LNG for inland ports		0						3
LNG for maritime ports		1				7		
H_2 for road	30 (NPF) 16 (EAFO)	11 (NPF) 9 (EAFO)		30				

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Public Alternative Fuels Recharging/Refuelling Points, * - includes some private and semi-public recharging points, ** - sector actors estimations.

Unfortunately, not enough data are provided concerning AFV estimations. The French NPF states that a review of the level of development of alternative fuels and infrastructure will be made by 2019 and the objectives of this framework and the actions required to achieve them will be updated as appropriate.

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that all the requirements of the Directive are covered.

Table 5.12-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			Clarification on EV estimates and recharging point targets received by French authorities (Ares(2017)3258180)	6, 39
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x				
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x			•criteria of population level and density •Inside a dense zone, there are acting the criteria of physical accessibility to the charging points and of inter kilometric distance •recommended ratio of 3,000 inhabitants / ERP	27-28
4(1)	within networks determined by the MS	Road	Electricity			N.M.		
4(1)	at public transport stations	Road	Electricity			N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	x				18
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	x				18
5(1)	cross-border links	Road	Hydrogen	x			Accelerate the development and deployment of fuel cells and hydrogen technology; Germany, Scandinavia, France and United Kingdom.	88
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	x			focused initially on the axes and the major of the French road network nodes, there where the potential in natural gas demand is estimated to be the most important, namely a base consisting of the TEN - T core network and the nine French largest urban areas.	15, 32
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG	x			the river ports considered in 2030 horizon are Rouen, Le Havre and Strasbourg. As possible prospects are Paris, and on each axis River: Seine, Rhine, Northeast, Northern France, Rhône-Saône).	15, 32
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				15, 32,43
6(3)	consideration of market needs	Maritime and Inland ports	LNG					
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	x			In the frame of programmes TENT-T and MIE-T	90
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x			The number of LNG refuelling points will assure a normal circulation at least in TEN-T core network and will cover all of the settlements subject to an obligation to develop and implement a plan for the protection of the atmosphere (projects "respirable cities")	28
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	x			Station interdistance = 400 km urban station at least at 10 km from TEN-T	28, 44
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x			on TEN - T core network and the nine French largest urban areas.	28, 43
	within networks determined by the MS	Road	CNG			N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x			Station interdistance = 30 km in urban agglomerations Station interdistance = 200 km in TEN-T core network Towns >100,000 inhabitants near TEN-T, at 10 km from it In TEN-T ports, stations for vehicles	28, 43
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x			Maritime - Marseille-Fos; inland: Andelys, Lyon, North dept. and Pas-de Calais. 2025: Paris, Strasbourg, Le Havre, Rouen, Lille et Lyon for river transport and Marseille for river	33-35
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x			Paris-Charles de Gaulle, Paris-Orly, Lyon, Nice, Lille, Toulouse and Marseille	10
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x				15,32
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x			criteria of population level and density; 968 towns >5,000 inhabitants, 89% of population	7, 26
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x				28
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				55-63, 66-68, 73-75, 77-85, 90, 93
			CNG	x				58, 60-62, 68,73, 77-82, 85, 90,92
			LNG	x				60-62, 64-66, 70-74, 76-82, 85, 90-93
			Hydrogen	x				58, 60-64, 67,69, 77-81, 85, 88, 90, 91
		Maritime	Shore Side Electricity	x				60, 74, 77, 90
			LNG	x				60, 65, 71, 72, 74, 90,93
		Inland Waterway	Shore Side Electricity	x				60, 74, 77, 90
			LNG	x				60, 65, 71, 72, 74, 90,93
		Airports	Electricity for stationary airplane	x				59, 90
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				60-62
			CNG	x				60-62
			LNG	x				60-62
			Hydrogen	x				60-62
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	x				55, 56, 75, 76
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x			A dedicated body bringing together external stakeholders (list pg 95) was created: the Follow-up Committee.	57, 67, 68, 94, 95
3(4)	Assessment of MS cooperation and coordination with other member states	All	All	x		N.M.		85-94

5.12.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.12-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	7.38	27.43	-	-
CNG for vehicles	176.88	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points. In italic index of sufficiency resulted after power extrapolation for AFI and AFV (see table 5.12.1)

Table 5.12-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AFI Recharging/Refuelling points. Regarding electric vehicles, for the current situation, with a value of 7.38, the index passes the assessment threshold of 10 EV per recharging point. For 2020, the value 27.43 of the index suggests that the targeted number of recharging points in the French NPF may be insufficient. The French NPF objectives for 2020 contain a network of 35,000 recharging points (4 points/station) or 21,000 recharging points (2 points/station) accessible to the public. The NPF states that this network would be sufficient for EVs to circulate in 2020 from the physical accessibility point of view (access time on foot in urban areas denser than 450 inhabitants/km^2, access time by car in the rest of the areas).

According to the visual assessment of spatial distribution of recharging points in the provided map and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one recharging point at least every 60 km is fulfilled, and the entire French metropolitan territory is well covered.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

All the departments of metropolitan France are equipped with recharging points open to the public. At the end of 2015, the average equipment of a French department is around one recharging point open to the public for 10,000 inhabitants. The designation of the urban/suburban agglomerations selected to be equipped with recharging points takes into account the criteria of population level and density. The zones with more than 5,000 inhabitants and 450 inhabitants/km^2 are called dense zones (968 living areas corresponding to 89% of the population) and the target is defined as one recharging point per 3,000 inhabitants. The remaining populated zones are called rural zones and are grouped in 676 living areas. For the rural zones, one recharging point per living area is considered sufficient by the French NPF. This approach leads to obtaining 21,300 recharging points (2 points/station) or 35,000 recharging points (4 points/station), values considered appropriate and fulfilling the requested spatial distribution for 2020.

Electricity supply at airports for use by stationary airplanes

For many airports, which belong to the TEN-T Core network, there are regulations or recommendations for maximum periods of use of auxiliary power units (APUs) with the purpose to encourage the airport operators to equip themselves with alternatives means to the use of APUs. The main French airports are already equipped with fixed or mobile ground power units. The majority (7 out of 8) of the TEN-T Core Network airports are equipped with Sockets of 400 Hz for parking positions at the terminals: Paris-Charles de Gaulle, Paris-Orly, Lyon, Nice, Lille, Toulouse and Marseille. Also the addition of mobile ground power units is investigated.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

According to the French NPF, the current demand of shore-side electricity is considered low with a high uncertainty about the potential of the market. Currently, one French maritime port (Marseille-Fos) offers an electrical connection, delivering high power (above 1MVA), designed for commercial ships. In addition, several maritime ports (Marseille, Nantes, Bordeaux...) already offer, or will offer in the very short term, a service of shore-side electricity for ships with longer mooring time (wintering and ship repair). Almost all French maritime commercial ports, belonging to the TEN-T Core Network, performed studies on this issue, and included the development of shore-side electricity supply in their development strategy towards greener environment activities.

Concerning inland ports which have lower energy needs, the shore-side electricity terminals for riverboats are installed in the town of Andelys (Normandy), in the port Lyon Gennevilliers and on the river basin of the North and Pas-de-Calais departments (60 electricity terminals). Several projects are also being investigated on sites managed by the port of Paris. In the coming months, the installation of a harmonised shore-side electricity supply service will be completed along the Seine for inland waterway freight vessels. Given the results of a national level, socio-economic cost-benefit assessment and considering the development strategies of the ports, by 2025 the following ports are likely to offer shore-side electricity supply: the maritime port of Marseille and the inland ports of Paris, Strasbourg, Le Havre, Rouen, Lille and Lyon. Other possible ports were identified: Nantes, Bordeaux, Havre (in the case of a demand increase); la Rochelle, Rouen (in the case of traffic growth and the emergence of a demand via regular routes); Marseille (for cruise ships depending on market needs and technological constraints).

Prospects for the development are therefore potentially significant, but the business case remains a challenge. The NPF considers that the regulatory developments regarding restrictions on pollutant emissions from ships, the use of alternative fuels for ship propulsion and the connection technologies will determine the future development of shore-side electricity.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

For the vehicle stock, the French NPF only communicates one number for natural gas vehicles (NGV) that includes both CNG and LNG. Currently, the consumption of natural gas in the French transport sector remains low: it represented in 2014 less than 0.02% of the final energy consumption of the transport sector. The park of NGV in France counted 12,199 vehicles at the end of 2015, primarily captive fleet vehicles with dedicated fuelling points. Table 5.12-3 shows that the current situation for CNG refuelling points passes the sufficiency threshold value of one CNG refuelling point per 600 vehicles (under the assumption that most NGV are indeed CNG vehicles).

The actors of the sector envisage 210 CNG refuelling points in 2020 and a minimum of 260 CNG refuelling points in 2025. The CNG refuelling points map presented for 2025, with the localisations also along the axes of the TEN-T Core Network accessible to heavy-duty vehicles, allows the visual assessment of a uniform geographical coverage without important gaps and indicates the fulfilment of the distance requirement of at least one refuelling point every 150 km (even though the maximum distance value chosen in the French NPF is 200 km).

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The French NPF considers CNG an appropriate solution also for heavy-duty vehicles. The target consists in developing CNG refuelling points mainly for heavy-duty vehicles for medium and short-range distances, these points remaining accessible also to light vehicles.

Planned distribution of CNG refuelling points, open to the public, is based on population densities of French urban areas as main criterion dimensioning the network and on physical accessibility to the refuelling points. The appropriate number of CNG refuelling points open to the public is estimated at approximately 80 points by the end of 2020, and 115 points by the end of 2025, including about 70 along the axes or within urban areas of the TEN-T Core Network.

Road LNG refuelling points along the TEN-T Core Network (2025)

By the end of 2020, according to the French NPF, the network envisaged by the actors of the sector would contain 40 LNG refuelling points. Using the same criteria as for the CNG refuelling points estimation, it results that, along the TEN-T Core Network, by the end of 2025, the appropriate number of LNG refuelling points, strictly necessary in the sense of the Directive, is 25. This number of LNG refuelling points will assure a normal circulation at least on the TEN-T Core Network. By 2025, the number of LNG refuelling points is estimated to be with 40 well above this threshold. The LNG localisation map presented confirms the uniform geographical coverage without important gaps and the fulfilment of the distance requirement of at least one refuelling point every 400 km.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

The marine LNG refuelling of a ship is a reality in France since the first operation took place in May 2016 at the port of Le Havre, but all the ports show a collective ambition to develop marine LNG refuelling capacities. To do this, they can rely on four methane terminals available on the three coastal areas of the country: Channel - North Sea, Atlantic and Mediterranean. The TEN-T Core Network maritime ports include the ports of Marseille - Fos, Bordeaux, Nantes Saint-Nazaire, Le Havre, Rouen, Dunkirk and Calais. The maritime port of La Rochelle, belonging to the TEN-T Comprehensive network, is fully integrated in this approach.

Two scenarios for the evolution of LNG demand, one base and another more optimistic, were developed by the actors in the field and the state services within a prospective exercise. The French NPF commits to the base scenario which involves the provision of LNG bunkering by 2025, at least, on one port of each coastal area. The Mediterranean coast is designed as a major area to develop a substantial marine LNG refuelling offer. The North Channel-North Sea coast is also a market with high potential for marine LNG bunkering, owing to its strategic geographical position and its inclusion in the SECA zone. The Atlantic coast already offers a service for LNG tankers from the Montoir methane terminal and its capacity should increase soon. The fixed objectives for 2025 include the ports of Nantes St- Nazaire, La Rochelle, Bordeaux for the Atlantic coast; the ports of Havre, Rouen, Dunkerque for the English Channel - North Sea coast and the port of Marseille-Fos for the Mediterranean Sea coast. Within the optimistic scenario, the ports of Calais, Dieppe, Nice, Brest, Roscoff, Toulon, Caen Ouistreham, and Cherbourg were identified as possible candidates for the further extension of the LNG refuelling point network.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Regarding inland ports, the French NPF mentions that the uncertainty over future demand remains too important to set a goal on the horizon of 2030. Nevertheless, according to the projections of the economic actors, truck to ship mobile bunkering offers or small fixed points could emerge by 2030 in several inland ports of the TEN-T Core Network and at least on each main inland waterway system. The inland ports considered for the 2030 horizon are Rouen, Le Havre and Strasbourg. Possible additions could be Paris and LNG on each main French inland waterway system: Seine, Rhine, Northeast, Northern France, and Rhône-Saône.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

France has taken steps to promote the deployment of a network of refuelling infrastructure dedicated to hydrogen, a sector still emerging. This deployment is based on a bottom-up approach within specific networks and it involves an ongoing first step of establishing captive fleet clusters. Various projects are being developed and local administrations show a strong interest for hydrogen. France fixed as a goal that these projects can be implemented by 2025, which would lead to a number of points in the order of 30 refuelling points accessible to the public. This goal could reach 50 within an optimistic scenario. These targets could be revised upwards in the event of a strong increase in the offer of available vehicles and related market conditions.

5.12.4 Deployment of alternative fuels vehicles and vessels

The focus of the French NPF is mainly on electric vehicles, but it also features substantial coverage of CNG, LNG and hydrogen. The volume, thematic distribution and comprehensiveness of the taken measures reflect these priorities. Only two estimations regarding future AFV are given in the French NPF: 2.4 million EVs in 2023 and 7 million of recharging points (includes besides public also semi-public and some private points) in 2030.

Even if the number of EV (battery electric or plug-in hybrids) on French roads is still low compared to the total stock of road vehicles (0.2% from total fleet), the EV market is continuously growing since several years.

The development of NGV in France focussed so far on public transport and many communities now have a fleet of buses running on CNG. It then expanded to cleaning vehicles, garbage trucks, and captive fleets of light-duty vehicles. Currently, the consumption of natural gas in transport remains low: it represented in 2014 less than 0.02% of the final energy consumption of the transport sector in France. The use of LNG as maritime fuel is today one of the main technological solutions to cope with current and future environmental requirements in ports and coastal areas, and its development is today in France considered a priority.

5.12.5 Assessment of the measures to implement Article 3

The French NPF has a big portfolio of measures, the great majority already in effect. These measures are structured in: legislative and regulatory (20), informative (11), incentive (15), call for projects (6), RTD&D (3) and measures for cross-border coordinated actions and projects funded by European programmes (11). The measures defined in the French NPF can be considered comprehensive for the following fuels in road transport: electricity, CNG, LNG, and hydrogen.

Assessment of the measures that can ensure national targets and objectives

As mentioned before, electricity for road modes is a main interest in the French NPF. This cluster achieves a high overall assessment score. The development of the market for EVs in France is supported by incentivising clean mobility. EVs can benefit, for example, from direct incentives for the purchase or lease of low emission vehicles (up to € 10 000 per vehicle) and from the requirement to renew public fleets with more environmentally friendly vehicles. 75% of the EVs, registered in France in 2016, were BEVs.

Other alternative fuels, CNG, LNG and hydrogen receive also considerable attention within the NPF, benefitting from several measures of calls for projects, incentives for building the infrastructure, and tax incentives.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The French NPF proposes three regulatory measures in this category, covering all fuel types, two modes of transport (road and rail) with the aim to foster AFI and AFV in public transport.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The French NPF proposes three measures in this category, two financial and one regulatory. They concern (i) programmes to facilitate the installation and partial financing of private recharging points by energy companies via certificates of energy saving, (ii) the deduction of up to 30% of expenditures from the income tax for energy performance improvements like building recharging points, and (iii) regulations imposing the provision of ducts and the dimensioning of the electrical installations for potential later installation of recharging points in new residential buildings with covered parking lots. These measures can have a high impact on the deployment of private electro-mobility infrastructure.

5.12.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The definition of the NPF was based on a consultation process involving, on one hand, the state services and the public institutions concerned within a steering committee and, on the other hand, all concerned stakeholders (transporters, manufacturers, distributors, environmental protection associations, local communities), within a monitoring committee during the various stages of the document's development. Stakeholder consultation is enshrined in a law regarding the deployment of recharging points in public spaces. It specifies that the conditions of this deployment must be subject to a consultation between different stakeholders and local communities. Another law stipulates that urban agglomerations can exercise the right to construct and maintain recharging points. A guide helps local and regional authorities, as well as private actors, wishing to coordinate, operate or build infrastructures in areas open to the public.

5.12.7 Assessment of MS cooperation and coordination with other Member States

The measures chapter of the French NPF contains a section on cooperation with neighbouring Member States for interoperability and alternative fuels deployment. This section includes all the projects, measures and initiatives with European character in which France participates with other MS in order to develop cross-border continuity of different alternative fuels solutions. In addition, projects funded by the Connecting Europe Facility involving several Member States as partners are listed.

5.12.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	118,663	960,000	2.19	12.4	16,081	35,000	45.9	7.38	27.43	H	c
CNG / vehicles / 2020	7,606				43	79/210*	29.8	176.88		M	c
LNG / heavy duty vehicles / 2025	40				4 (EAFO) 1 (NPF)	25/40*	12.3		OK	M	c
LNG / seagoing ships / 2025					1	7	14.3		OK	L	n
LNG / inland waterway vessels / 2030					0	3	0.0		OK	L	n
H2 / vehicles / 2025	30 (NPF) 16 (EAFO)				11 (NPF) 9 (EAFO)	30	36.7		OK	M	c
Other fuels (LPG / vehicles)	206,846				1,750				(OK)	M	c

* sector actors estimation

The French NPF fully addresses the requirements of Article 3. It contains an extensive discussion of the current state and future development of alternative fuels and corresponding infrastructure in the transport sector. For the different fuels and modes, it discusses targets as required by Article 3 of the Directive. However, for some fuels/modes the target commitment is ambiguous, which, at times, makes it difficult to understand the ambition of the French NPF.

The focus of the French NPF is mainly on electric vehicles with estimates of roughly 1.6% EV on the road in 2020. Based on the targets provided, it can be concluded that the aims for recharging infrastructure accessible to the public seem insufficient in comparison with the future estimated EVs. Each department of metropolitan France is already today equipped with at least one recharging point. It seems that the distance requirement on the TEN-T Core Network of one recharging point at least every 60 km is fulfilled. The French NPF also highlights the role that electricity can play in airports for use by stationary airplanes, shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports.

The current and targeted number of CNG refuelling points can be considered sufficient, although the NPF does not provide future estimates for CNG vehicles. The NPF focus for CNG is on the TEN-T Core Network and nine French large urban areas. The French NPF emphasizes the role that natural gas vehicles can play for the public transport sector, cleaning vehicles, garbage trucks, and captive fleets of light-duty vehicles. The provided information indicates the fulfilment of the distance requirement of at least one CNG refuelling point every 150 km.

For heavy-duty trucks, the committed target provides the appropriate number of LNG refuelling points, which is strictly necessary in the sense of the Directive and this number is assumed to assure a normal circulation at least within the road TEN-T Core Network. The localisation map confirms the uniform geographical coverage without important gaps and the fulfilment of the distance requirement of at least one refuelling point every 400 km.

The French NPF commits to the provision of LNG bunkering by 2025, at least, on one maritime port of each coastal area of the country: Channel - North Sea, Atlantic and Mediterranean. According to evolving market demand, truck to ship mobile bunkering offers or small fixed points could emerge by 2030 in

several inland ports of the TEN-T Core Network. France targets to equip at least three ports with LNG refuelling on its inland waterways.

France has taken steps to promote the deployment of a hydrogen refuelling infrastructure and funds several ongoing projects in this field. This deployment is based on a bottom-up approach within specific networks and it involves establishing captive fleet clusters. The targets could be revised upwards in the event of a strong increase in the offer of available vehicles and related market conditions.

The French NPF has a big portfolio of measures, the great majority already in effect. These measures are structured in: legislative and regulatory (20), informative (11), incentive (15), call for projects (6), RTD&D (3) and measures for cross-border coordinated actions and projects funded by European programmes (11). The measures defined in the French NPF are comprehensive for the following fuels in road transport: electricity, CNG, LNG, and hydrogen. They can be considered exemplary for electric vehicles and the associated infrastructure.

France cooperates with neighbouring countries and other Member States to support EU-wide circulation for AFV and cross-border continuity for AFI. An important enabler for this cooperation is, according to the French NPF the Connecting Europe Facility.

5.13 Croatia

5.13.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Croatia is 1,107 km and the length of motorways is 1,295 km. The length of the total road network in Croatia is 17,726 km.

The length of the TEN-T Road Corridors present in Croatia is 6% (315 km) of the Mediterranean Corridor, which connects Croatia with Hungary and Slovenia.

Number of registered road vehicles

In 2016, Croatia had 1,474,000 registered passenger cars and 1,775,700 registered vehicles of all types (motorcycles, passenger cars, microbuses and buses, goods vehicles, tractor units, trailers and semi-trailers and special vehicles). Presently a few (4.02 %) AFV, mainly LPG cars, are driving on Croatian roads, while 0.06% of passenger cars are electric.

Number of main agglomerations

- 29 cities > 20,000 inhabitants (source – NPF)
- 5 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 2 inland ports in the TEN-T Core Network
- 2 inland ports in the TEN-T Comprehensive Network
- 1 maritime port in the TEN-T Core Network

- 6 maritime ports in the TEN-T Comprehensive Network

Through the TEN-T inland waterways network, Croatia is connected with Hungary through the Rhine - Danube Corridor.

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network (Zagreb, Pleso Airport)
- 6 airports in the TEN-T Comprehensive Network

5.13.2 Summary of the National Policy Framework submitted

Short description of the measures

The Croatian NPF offers a low number of measures on alternative fuels infrastructure and vehicle deployment. Many measures contain limited information and could not be assessed. The overall score for electricity is medium, while for CNG and LNG is low, and only measures regarding electric recharging points and vehicles are comprehensive. Measures mostly address road transport. Prolongation of some existing measures is foreseen until 2020. Although the NPF lists several measures under consideration with little information, the overall low number of adopted or existing measures could hamper the NPF target achievement.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.13-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	496 (EAFO) 856 (NPF)	126		296*		602**		806***
Electricity for stationary airplanes		9[a]		9[a]		9[a]		9[a]
SSE for inland ports		2[b]		4[b]				
SSE for maritime ports						3[b]		
CNG for vehicles	211 (EAFO) 427 (NPF)	2		13		19		
LNG for road						2		7(+)****
LNG for maritime ports						1		7
LNG for inland ports								2(+2)*****
LPG for road	87,000 (EAFO) 57,911 (NPF)	334						
H_2 for road		0						1 or 2

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points, * 222 normal and 74 high power, **434 normal and 168 high power, ***554 normal and 252 high power, **** in case of additional demand, mobile facilities can be supplied, ***** in case of additional need, 2 more inland ports could supply LNG, [a] number of international airports, [b] number of ports

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that almost all the requirements of the Directive are covered.

Table 5.13-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x				3, 4, 5
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x				2, 3
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				5
4(1)	within networks determined by the MS	Road	Electricity			N.M.		
4(1)	at public transport stations	Road	Electricity			N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen		x			4
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	(x)			Definition states there will be no need, but it could be revised in the future	6
5(1)	cross-border links	Road	Hydrogen		x			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2025 at maritime ports	Maritime ports	LNG	x				6, 7
6(2)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2030 at inland ports	Inland ports	LNG	x				6, 7
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				6, 7
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x				6, 7
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	x				18
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x				6, 7
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	x				6, 7
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x				7
	within networks determined by the MS	Road	CNG		x	N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				7
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x				5
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x				6, 7
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x				6, 7
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x				5
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x				7
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				8,9, 10
			CNG	x				8,9, 10
			LNG	x				8,9, 10
			Hydrogen		x			
		Maritime	Shore Side Electricity		x			
			LNG		x			
		Inland Waterway	Shore Side Electricity		x			
			LNG		x			
		Airports	Electricity for stationary airplane		x			
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				8,9, 10
			CNG	x				8,9, 10
			LNG		x			
			Hydrogen		x			
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		x			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x				11, Annex 3 and Annex 4
3(4)	Assessment of MS cooperation and coordination	All	All	x		N.M.		11

5.13.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.13.-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	2.19	-	-	-
CNG for vehicles	105.50	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.13.-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points.

The current sufficiency index for EVs of 2.19 meets the assessment threshold by a large margin. The sufficiency index could not be determined for the future since the Croatian NPF does not provide any future vehicle estimates. The NPF states that the recharging points target could be adjusted to the market needs in the future, and states that until 2020, recharging points will be available every 50 km of the highway and in every urban agglomeration. The target stated gives the impression that the distance requirement will be met. Some locations of the recharging points in urban agglomerations are described in the table at the end of the NPF. However, no map or spatial distribution is provided by the NPF.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Croatian NPF considers urban agglomerations as 29 cities/towns with more than 20.000 inhabitants. Recharging points are indicated in a table for 14 urban agglomerations. Nevertheless, the NPF states that by 2020, all of the 29 agglomerations will facilitate recharging points.

Electricity supply at airports for use by stationary airplanes

Croatia has one TEN-T Core Network airport, six comprehensive network airports and all together nine international airports. According to the NPF, all nine airports already offer ground power. It does not provide explicit information on GPU coverage.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The NPF states that currently 2 inland waterways ports offer shore-side electricity supply points. The 2025 target is to build another 2 shore-side electricity supply points in the TEN-T Core Network inland waterways ports, and 3 shore-side electricity supply points in the TEN-T Core Network maritime network ports. Thus in 2025 Croatia plans to have 7 shore-side electricity supply points in TEN-T Core Network ports.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.13.-3 shows that the currently available number of CNG refuelling points is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. Since no vehicle estimates are provided for the future period, the future sufficiency index cannot be calculated. Targets for 2025 are 19 CNG

refuelling points, which will satisfy the minimum coverage criteria of 150 km, according to the NPF. The NPF does not provide visual distribution information, rather states that these 19 locations are planned with having in mind a minimum coverage criteria of 150 km, proximity to the CNG pipeline network and profitability of existing locations, i.e. fuel distributors, both on the highways and in agglomerations.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Croatian NPF states a minimum of 12 urban agglomerations will feature CNG refuelling points until 2020. These agglomerations have been designated according to economic viability considerations, according to the NPF. Until 2025, the NPF states a total of 19 refuelling points, distributed in urban agglomerations highways and local roads. The target of 19 refuelling points sets Croatia on a good track to meet a minimum coverage target. However, no spatial distribution is presented by the NPF to assess if the minimum coverage criteria will be met.

Road LNG refuelling points along the TEN-T Core Network (2025)

Currently there are no road LNG refuelling points in Croatia. At country level, the 2025 target is 2 road LNG refuelling points, located in Zagreb and Rijeka. The target for 2030 is set to 7 LNG refuelling points allocated at the peripheries of larger agglomerations. The NPF also mentions that additional mobile LNG refuelling points could be made available on highways if there is additional demand in 2030. With 2 LNG refuelling points, Croatia will not meet the minimum distance criteria of at least one refuelling point every 400 km in 2025 on the TEN-T Core Network, as it would not provide sufficient coverage for the south of Croatia. However, the NPF does not state if the inland waterway or maritime LNG refuelling points will also be available to use for heavy-duty road vehicles.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

Currently there are no LNG refuelling points in the maritime ports in Croatia. The NPF targets 1 LNG refuelling point in the TEN-T Core Network port of Rijeka by 2025, and a total of 7 maritime LNG refuelling points, located in the main ports in 2030.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Currently there are no inland waterway LNG refuelling points in Croatia. The NPF states that 2 LNG refuelling points will be installed in the TEN-T Core Network, in 2030, with an option of additional refuelling points in two other ports if more demand emerges.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Currently there is no hydrogen refuelling point in Croatia. The NPF predicts no demand for hydrogen infrastructure by 2030, but a pilot project on the Mediterranean Corridor is possible if demand arises. In that case, one or two hydrogen refuelling points would be available, in Zagreb and/or in Rijeka.

5.13.4 Deployment of alternative fuels vehicles and vessels

The Croatian NPF contains estimates for the deployment of several alternative fuels vehicle options. It estimates a share of roughly 0.06% electric vehicles currently on the road. There are no estimates for the future share of electric vehicles. However, electric vehicles are gradually introduced in the municipalities, such as for tourism in the national parks and reserves, replacing conventional vehicles and vessel. The NPF estimates the current share of CNG vehicles of 0.03% on the road. CNG buses are gradually

introduced as an alternative in public transport in some urban agglomerations, but there is no information about future CNG vehicle estimates in the Croatian NPF. Currently, there is a substantial number of LPG vehicles, which amounts to 4% of the total registered vehicles, but no future estimates are provided.

5.13.5 Assessment of the measures to implement Article 3

The Croatian NPF contains a portfolio of different measures. Most of the measures are already in effect. According to the assessment methodology, a low overall assessment score is derived for electric, CNG and LNG vehicles. The assessed measures mostly address electricity for road transport. The total number of measures provided is very low and the information presented is very limited. This makes the assessment difficult at times.

Assessment of the measures that can ensure national targets and objectives

The measures of this category cover: AFI and AFV, several fuel types, modes of transport, financial and nonfinancial support. The totality of these measures can address some of the deployment barriers for electricity, CNG, and LNG. The portfolio of electric vehicles and infrastructure deployment can be considered comprehensive, with a medium overall score. Most of the measures are financial, and along one solid measure to co-finance the electric vehicle purchase likely with a medium impact, the rest of the measures will likely have low impact on electric vehicles deployment.

For CNG, the defined measures are not comprehensive. Measures focus mostly on CNG in public transport vehicles. For LNG the overall measures receive a low and non-comprehensive score. Even though Croatia participates in the EU joint programmes regarding LNG infrastructure deployment in the port of Rijeka, no other measures have been stated to further address the deployment of infrastructure or vehicles/ vessels to reach the 2030 targets in inland, maritime or road transport.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Croatian NPF states two measures on promoting alternative fuels in public transport. Their focus is on co-financing of 20 CNG buses in Rijeka and upgrading the CNG refuelling point for public transport buses in Zagreb.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

In the respective section, the Croatian NPF lists some general measures. The scope of these measures vis-à-vis the deployment of private electro-mobility infrastructure is not clear.

5.13.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Croatian NPF states that in the drafting process of the NPF, local authorities had an important role in assessing the future targets for recharging and CNG infrastructure. Moreover, for LNG refuelling points in ports, port authorities were involved in assessing the potential profitability and targets.

5.13.7 Assessment of MS cooperation and coordination with other Member States

The Croatian NPF does not explicitly mentions international cooperation with other Member States. However, the NPF states international cooperation in three occasions. One is the LNG infrastructure deployment in maritime transport, as a part of COSTA II, an LNG bunkering project. The cooperation was made with Italy, Slovenia, Greece and Cyprus. Another international cooperation was made through Civitas DYD@AMO project, to promote electro-mobility in city transport. The cooperation was made

with Germany, Poland and Spain. Third international cooperation was PRO-E-BIKE between Spain, Italy, Netherlands, Portugal, Slovenia, and Sweden, and the project was on electric bicycles deployment in cities.

5.13.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attainment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	496 (EAFO) 856 (NPF)				226	296	76.4	2.19		M	c
CNG / vehicles / 2020	211 (EAFO) 427 (NPF)				2	13	15.4	105.50		L	n
LNG / heavy duty vehicles / 2025					0	2	0.0		i	L	n
LNG / seagoing ships / 2025					0	1	0.0		(OK)	X	-
LNG / inland waterway vessels / 2030					0	2(+2)	0.0		OK	X	-
H2 / vehicles / 2025					0				i	X	-
LPG / vehicles	57,911 (NPF) 87,000 (EAFO)				334				OK	X	-

The Croatian NPF addresses most of the requirements of Article 3. It contains a comprehensive discussion of the current state, but a somewhat limited discussion of future scenarios for most alternative fuels in the transport sector. For all fuels and some modes, it establishes targets as required by Article 3 of the Directive. The NPF does not contain concrete measures to encourage and facilitate the deployment of recharging points not accessible to the public.

The NPF does not contain vehicle estimates for the future deployment of EVs. The given recharging points target and especially fast recharging infrastructure seems to cover the needs of electric vehicles in terms of number of publicly accessible recharging points as well as minimum coverage requirements in Croatia in 2020. The NPF does neither consider shore-side electricity nor electricity supply for stationary airplanes.

The NPF does not contain vehicle estimates for the future deployment of CNG vehicles. Croatia currently has a sufficient network of CNG refuelling points when compared to CNG vehicles, but it does not meet the minimum coverage requirements. Regarding the 2025 minimum coverage target in terms of distance requirements, the existing measure for the deployment of CNG refuelling points seems sufficient. Croatia already counts a high number of CNG buses and future promotion of CNG vehicles for public transport is foreseen.

The Croatian NPF plans two LNG refuelling points for heavy-duty vehicles in road transport until 2025 and seven until 2030. Moreover, the NPF plans one LNG refuelling point in maritime transport in 2025 and seven until 2030. Furthermore, two LNG refuelling points for inland waterways are planned until 2030. It is not specifically stated in the NPF whether the inland waterways and maritime LNG refuelling points will be accessible for LNG heavy-duty vehicles. In case they are accessible, Croatia would meet the minimum distance requirement of one LNG refuelling point every 400 km on the road TEN-T Core Network in 2025.

The NPF does not consider hydrogen for transport.

The Croatian NPF contains a list of measures with a low impact score on overcoming deployment barriers in electro-mobility, CNG and LNG vehicles and infrastructure deployment. Only measures concerning electro-mobility are considered comprehensive. Most of the existing or planned measures end in 2018 or earlier, with no prolongation explicitly stated. The majority of measures stated in the NPF could not be assessed due to the limited information provided.

Croatia considered local authorities and stakeholders' interest, and coordinated the NPF with the local authorities. Moreover, Croatia cooperated with many Member States in projects concerning electro-mobility and LNG infrastructure deployment.

5.14 Hungary

5.14.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Hungary is 1,090 km and the length of motorways is 1,767 km. The length of the total road network in Hungary is 31,760 km.

The following parts of the TEN-T Road Corridors are present in Hungary: 11% (604 km) of the Mediterranean Corridor, 9% (469 km) of the Orient/ East - Mediterranean Corridor and 10% (469 km) of the Rhine - Danube Corridor.

Through the TEN-T Road Corridors, Hungary is connected with the following Member States:
- Austria (through the Orient / East Mediterranean and the Rhine - Danube Corridor)
- Slovakia (through the Orient / East Mediterranean and the Rhine - Danube Corridor)
- Romania (through the Orient / East Mediterranean and the Rhine - Danube Corridor)
- Croatia (through the Mediterranean Corridor)
- Slovenia (through the Mediterranean Corridor)

Number of registered road vehicles

In 2014, Hungary had 3,107,695 registered passenger cars. In 2014, it had 4,968,408 registered vehicles of all type (motorcycles, passenger cars, microbuses and buses, goods vehicles, tractor units, trailers and semi-trailers and special vehicles). Presently only a few (0.56%) AFV are driving on Hungarian roads, 0.01% of passenger cars are electric.

Number of main agglomerations

- 22 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 2 inland ports in the TEN-T Core Network
- 7 inland ports in the TEN-T Comprehensive Network
- No maritime ports

Through the TEN-T inland waterways network, Hungary is connected with Croatia and Slovakia through Rhine - Danube Corridor.

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network (Liszt Ferenc International Airport)
- 4 airports in the TEN-T Comprehensive Network

5.14.2 Summary of the National Policy Framework submitted

Short description of the measures

The majority of measures in the Hungarian NPF already exists. The NPF contains a low overall number of proposed measures. They cover a variety of types, addressing several deployment barriers. For some, information is limited. The Hungarian NPF focuses most measures on electric vehicles under the "Jedlik Anyos Plan", with a couple of solid CNG and LNG measures. The measures are presented in a well-structured and logical manner, mostly addressing road transport. They are often very limited in time and budget, mostly not mentioning development after 2018, which may hamper the NPF target achievement.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.14-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	790 (EAFO) 395 (NPF)	205	21,200	2,250	81,600	8,100	181,900	18,100
Electricity for stationary airplanes		9						
SSE for inland ports		28		36				
CNG for vehicles	5,512 (EAFO) 2,385 (NPF)	8	40,000	62	213,750	145	326,800	286
LNG for road	0	0	2,550	23	6,300	83	14,200	224
LNG for inland ports				1		6		8
LPG for road	24,872 (NPF) 85,000 (EAFO)	611	22,000	630	35,000	650	45,000	700
H_2 for road			35	2	75	5	150	14

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points, all estimates and targets correspond to the realistic scenario

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that almost all the requirements of the Directive are covered.

Table 5.14-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			Chapter 1	from page 2
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Chapter 1	from page 2
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				15
4(1)	within networks determined by the MS	Road	Electricity		x	N.M.		
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	x				6
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	x				7
5(1)	cross-border links	Road	Hydrogen		x			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2025 at maritime ports	Maritime ports	LNG			N.A.		
6(2)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2030 at inland ports	Inland ports	LNG	x				7
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				22
6(3)	consideration of market needs	Maritime and Inland ports	LNG		x			
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG		x			
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x			Table containing distance between neghbouring LNG stations throughout MS territory	7
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x			
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x			Table containing distance between neghbouring LNG stations throughout MS territory.	7, 15
	within networks determined by the MS	Road	CNG	x		N.M.		21
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				18
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x				23
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x				23
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x				23
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x				15, 16, 17
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x				15, 16, 17
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				8;9;10
			CNG	x				10;11
			LNG	x				10
			Hydrogen		x			
		Maritime	Shore Side Electricity			N.A.		
			LNG			N.A.		
		Inland Waterway	Shore Side Electricity	x			There are 17 designated for 2020 both for TEN-T and outside Ten-T	23
			LNG	x				10;11
		Airports	Electricity for stationary airplane	x			Ground power unit available at 9 stands close to terminal 2, Liszt Ferenc Int. Airport	23
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x			National Action Plan for bus manufacturing, priority to deployment of alt. fuel buses	12
			CNG	x				12
			LNG	x				10;11;12
			Hydrogen	x				12
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	x				11
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All		x			
3(4)	Assessment of MS cooperation and coordination	All	All		x	N.M.		

5.14.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.14.-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	3.85	9.42	10.07	10.05
CNG for vehicles	689	645	1474	1142

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.14.-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. The current sufficiency index for EVs is 3.85 meeting the assessment threshold by a large margin. Also for 2020, it passes the assessment threshold of 10 AFV per recharging point for the realistic scenario. Moreover, the index is close to the assessment threshold for 2025 and 2030.

Appropriate locations of recharging points to be put in place in 2025 on the TEN-T Core Network is still to be determined, but planning activities have begun. The total target for recharging points even in the low penetration scenario gives confidence that the minimum coverage target of one recharging point at least every 60 km of TEN-T Core Network from the Directive will be achieved.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Hungarian NPF considers urban agglomerations as cities with more than 50.000 inhabitants. The NPF provides a table with the target for recharging/refuelling points distributed along urban/suburban agglomerations and other densely populated areas by 2020, where a detailed target for each of the 22 agglomerations for recharging points counts in total 328 recharging points. This corresponds to only around 30% of the total defined target for the low penetration scenario. The table also reveals rather low EV infrastructure targets in all agglomerations except Budapest, with respect to the number of inhabitants.

Electricity supply at airports for use by stationary airplanes

Hungary has one TEN-T Core Network airport Liszt Ferenc International Airport, which according to NPF, contains ground power units at only 9 gates/positions (out of 57 on two terminals). However, the NPF also states that several new constructed gates will feature ground power units. No quantitative targets are given.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The NPF states that in 2015, Hungary had 28 shore-side electricity supply points The 2020 target is to build another 4 shore-side electricity supply points in the TEN-T Core Network and additional 4 shore-side electricity supply points outside the TEN-T network. Thus in 2020 Hungary plans to have 36 shore-side electricity supply points in inland ports.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.14.-3 shows that the currently available number of CNG refuelling points is not sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. In addition, due to very high estimates for CNG vehicles and non-proportional expansion of refuelling points, the number of publicly accessible

CNG refuelling points in the future will also likely be insufficient. The NPF contains three possible scenarios for CNG refuelling point expansion, and, depending on the scenario, the sufficiency index also varies. It seems insufficient in all scenarios. The NPF provides a visual tool and depicts locations of the operating and planned CNG points. Furthermore, the NPF states that on TEN-T Corridors passing through Hungary, the minimum distance requirement will be covered in 2020 with 38 CNG refuelling points. It also foresees that the minimum distance requirement of 150 km will be met on the TEN-T Comprehensive Network.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Hungarian NPF contains a table listing 56 CNG refuelling points available in the 22 agglomerations in 2020. The chosen quantitative threshold will assure proximity access to the CNG infrastructure of a 53% share of the Hungarian population, which is an ambitious target and sets Hungary on a good track to meet a minimum coverage target.

Road LNG refuelling points along the TEN-T Core Network (2025)

Currently there are no road LNG refuelling points in Hungary. At country level, a 2025 target depending on the scenario is from 36 to 182 LNG refuelling points for road transport. The NPF states that already in 2020, with 15 refuelling points, the maximum distance between two neighbouring LNG refuelling points is 156 km on the TEN-T Corridors, which will fulfil the distance criteria of at least one refuelling point every 400 km. Moreover, the distance criteria of at least one refuelling point every 400 km will also be met on the TEN-T Comprehensive Network in 2020 when the maximum distance between two neighbouring LNG refuelling points on this network will be 137 km.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

Not applicable since Hungary has no maritime ports.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Currently there are no inland waterways LNG refuelling points in Hungary. The NPF states that within TEN-T network, in 2025, 6 LNG refuelling points will be built and in 2030, 1 LNG refuelling point will be built. Moreover, 3 LNG refuelling points will be built outside TEN-T network in 2025.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Currently there is no hydrogen refuelling point in Hungary. A target of 5 hydrogen refuelling points is established for 2025. The NPF aims at reaching 14 hydrogen refuelling points by 2030.

5.14.4 Deployment of alternative fuels vehicles and vessels

The Hungarian NPF contains ambitious estimates for the deployment of several alternative fuels vehicle options. It estimates a share of roughly 0.4% - 1.62% electric vehicles on the road in 2020. Until 2030, this share is estimated to increase to levels between 1.8% and 13.5%. The Hungarian NPF also states a high number of CNG and LNG vehicles in three scenarios for 2025, in case of CNG passenger cars even exceeding the electric passenger cars estimates, but the high estimates are not supported with measures. Hungarian NPF facilitates a measure to develop LNG bunkering vessel, with addition of financial measure to aid LNG bus development, where the content of the measure is not clear thus cannot be

assessed. Moreover, NPF states a substantial target for LPG refuelling points, exceeding the CNG targets, and a high estimate of LPG vehicle estimates.

5.14.5 Assessment of the measures to implement Article 3

The Hungarian NPF contains a portfolio of different measures. Most of the measures are already in effect. According to the assessment methodology, a medium overall assessment score is derived for electric vehicles and one LNG infrastructure measure. CNG infrastructure deployment is supported with a high impact measure. For some measures the, Hungarian NPF provides only vague and ambiguous information regarding, which limits the overall assessment for a certain alternative fuel. This makes the assessment difficult at times. In addition, the NPF contains mostly measures for road transport.

Assessment of the measures that can ensure national targets and objectives

The measures of this category cover: AFI and AFV, several fuel types, modes of transport, financial and nonfinancial support. The totality of these measures can address some of the deployment barriers for electricity, CNG, and LNG. The portfolio of all measures can be considered comprehensive for electricity for cars. Measures that address electric infrastructure and vehicles deployment score an overall medium score. Financial measures after 2018 for electric vehicles are not discussed in the NPF.

For CNG the overall measure assessment is high but not comprehensive as only one measure on the deployment of infrastructure could be assessed. This measure will ensure that Hungary meets the 2020 CNG infrastructure target. For LNG the overall measure assessment is medium, covering both water and road transport infrastructure. The most promising LNG measure is to deliver 5 LNG/L-CNG refuelling points for HDVs, which represents around 30% of the 2020 LNG target. However, the lack of other measures for LNG could lead to the situation that the targets will be difficult to achieve.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Hungarian NPF states two measures on promoting alternative fuels in public transport out of which only one is tangible, and it is mostly limited to electric buses in Budapest and not addressing any other mode or fuel.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

In the respective section, the Hungarian NPF lists some general measures. The scope of these measures vis-à-vis the deployment of private electro-mobility infrastructure is not clear.

5.14.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Hungarian NPF mentions local initiatives. However, it does not describe explicitly, whether the interests of regional and local authorities, as well as those of the stakeholders concerned have been considered.

5.14.7 Assessment of MS cooperation and coordination with other Member States

The Hungarian NPF does not mention any cooperation with other Member States.

5.14.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	790 (EAFO) 395 (NPF)	21,200	0.56	3.7	205	2,250	9.1	3.85	9.42	M	c
CNG / vehicles / 2020	5512 (EAFO) 2385 (NPF)	40,000	1.06	13.8	8	62	12.9	689.00	645.16	H	n
LNG / heavy duty vehicles / 2025	0	6300	4.38	0	0	83	0.0		OK	M	n
LNG / seagoing ships / 2025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LNG / inland waterway vessels / 2030					0	8	0.0		OK	M	c
H2 / vehicles / 2025	0	75	<0.01	0	0	5	0		(OK)	X	-
LPG / vehicles / 2020	24,872 (NPF) 85,000 (EAFO)	22,000	0.58	113.1	611	630	97.0		(OK)	X	-

- all estimates and targets correspond to the realistic scenario

The Hungarian NPF addresses most of the requirements of Article 3. It contains a comprehensive discussion of the current state and future scenarios for most alternative fuels in the transport sector. For all fuels and some modes, it establishes targets as required by Article 3 of the Directive.

It contains a large bandwidth of estimates for the future deployment of EV ranging for the 2 extreme EV penetration scenarios from 0.3% to 1.4% electric vehicles on the road in 2020. The given recharging points target and especially fast recharging infrastructure seems to cover the needs of electric vehicles in terms of number of publicly accessible recharging points as well as distance requirements in Hungary. The NPF mentions that new gates at the Liszt Ferenc International Airport will feature ground power units, No quantitative targets are provided. For shore-side electricity it targets a modest growth at its ports.

For CNG cars, the estimated shares are slightly higher than for EV. Hungary currently does not meet the threshold of at least one CNG refuelling point per 600 CNG vehicles on the road. The NPF states very high estimates for CNG vehicles that would also for the future lead to a sufficiency index of less than one refuelling point per 600 CNG vehicles. Regarding the 2020 minimum coverage target in terms of distance requirements the existing measure for the deployment of CNG refuelling points, seems sufficient. Hungary already counts a high number of CNG trucks and buses and the NPF contains very ambitious estimates for 2020.

The Hungarian NPF has firm plans for building 5 LNG road refuelling points for 2020. Beyond, for 2025 it targets, between 36 and 182 LNG refuelling points for heavy-duty vehicles in road transport and plans a pilot liquefaction plant for vessels and heavy-duty trucks. It also describes a project for an LNG ship-to-ship bunkering vessel. Moreover, the NPF states that Hungary should already in 2020 appropriately cover LNG infrastructure, both on TEN-T Corridors and the Comprehensive Network, for road and inland waterways.

Hungary, in its NPF, has established targets for the deployment of a hydrogen refuelling infrastructure, accessible to the public.

The Hungarian NPF contains a comprehensive list of measures that could have a medium impact on overcoming deployment barriers, especially in electro-mobility. Most of the existing or planned measures end in 2018 or earlier, with no prolongation foreseen. It may be challenging to achieve NPF targets and

corresponding vehicle deployment estimates for electricity until 2020 even in the low penetration scenario. For CNG, the described measures may create a too low impact vis-à-vis the high estimates. The NPF does not list any measures in support of LNG refuelling point deployment.

Cooperation with neighbouring Member States is not mentioned in the NPF. It may be advisable for Hungary to coordinate its NPF with neighbouring Member States.

5.15 Ireland

5.15.1 Description of the MS

Length of the road TEN-T Core Network

The total road length of Ireland (including motorways, main/national roads and secondary/regional roads) is 17,059 km from which 897 km is motorways. Ireland has one Network Corridor (the North Sea – Mediterranean) crossing its country and covering rail, road, airports and ports. It stretches from Northern Ireland (Belfast) to the Irish ports of Cork and Dublin with a total length of 478 km.

Number of registered road vehicles

Ireland, with a population of 4,757,976 (according to the 2016 census given by the Irish NPF) had 2,026,977 registered passenger cars (M1) and a total of 2,725,538 registered road vehicles of all types. The present situation of less than 0.1% of the total vehicles being electric (2,374 in total), around 0.1% running on LPG (3,000 vehicles) and only 10 vehicles running on compressed natural gas is insufficient and considered in need of improvement. Ireland has an ambitious goal that by 2030 all new cars and vans sold in Ireland should be zero-emission capable.

Number of main agglomerations

- 5 cities > 50,000 inhabitants: Dublin, Cork, Limerick, Galway and Waterford (source – Eurostat)

Number of ports in the TEN-T Core Network

- 3 ports in the TEN-T Core Network: Dublin, Cork and Shannon Foynes (near Limerick).
- 2 ports on the TEN-T Comprehensive Network: Rosslare and Waterford.
- No TEN-T inland ports.

Number of airports in the TEN-T Core Network

- 2 airports in the TEN-T Core Network: Dublin and Cork.
- 6 airports in the TEN-T Comprehensive Network: Donegal, Inishmore, Kerry, Knock (Connaught), Shannon (Limerick) and Waterford.

5.15.2 Summary of the National Policy Framework submitted

Short description of the measures

The Irish NPF contains an extensive and detailed description of measures. They cover a wide variety of types and various fuels and modes. Some already existing financial measures particularly for electric

vehicles (and LPG vehicles) have resulted in a slight shift towards the purchase of more alternative fuels vehicles in Ireland.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030.

Table 5.15-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	2,176	2,732 (832 public)	25,005	18,970 (950 public)	262,600	201,200 (1,100 public)	823,455	701,450 (1,250 public)
CNG for vehicles	10	3 (1 public)	4,200	19 (13 public)	31,050	70 (27 public)	45,550	102 (49 public)
LNG for road								
LNG for ports								
LPG for vehicles	3,000	578 (78 public)	3,600					
H_2 for road	0	0	0	0	0	0		

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points.

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that several of the Directive's requirements have not been covered. For electro-mobility the Irish NPF largely relies on private recharging infrastructure. It did not consider electricity recharging points at public transport stations or within other networks. Ireland also has not considered LNG as alternative fuel in their country. Electricity for stationary airplanes and shore-side electricity have not been considered in the Irish NPF. Synthetic and Paraffinic Fuels, Biofuels and LPG are also included in the Irish NPF.

Table 5.15-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	X				20, 44-52
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	X				
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	X				16, 38
4(1)	within networks determined by the MS	Road	Electricity	X				16, 38
4(1)	at public transport stations	Road	Electricity		X			
	Hydrogen supply for transport							
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen			N.M.		59
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen			N.M.		
5(1)	cross-border links	Road	Hydrogen			N.M.		
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2025 at maritime ports	Maritime ports	LNG		X			
6(2)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2030 at inland ports	Inland ports	LNG			N.A.		
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG.	Maritime and Inland ports	LNG	X			3 core TEN-T ports: Dublin, Cork, Shannon Foynes	79
6(3)	consideration of market needs	Maritime and Inland ports	LNG		X		vague statement: "further market analysis will be required". There is no customer demand at this stage	51
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network.	Maritime and Inland ports	LNG		X		only a vague statement of collaboration with Northern Ireland and the UK	51, 62
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG		X		cost and benefits (also environmental) considered?	
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		X			
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	X				28, 50, 64-66
	within networks determined by the MS	Road	CNG	X				64-66
6(8)	Definition of an appropriate number of refuelling points for CNG accessible to the public to be put in place by 31 December 2025 along the existing TEN-T Core Network.	Road	CNG	X				66
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need of install shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation to ports of the TEN-T Core Network by 31 December 2025.	Inland and maritime ports	Electricity	X			cost and benefits (also environmental) considered? Vaguely	48
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes.	Airports	Electricity	X				48, 49
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		X			
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	X			5 agglomerations: Dublin, Cork, Limerick, Galway, Waterford	64-66
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	X			5 agglomerations: Dublin, Cork, Limerick, Galway, Waterford	64-66
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	X			existing or adopted	54-57
			CNG	X			existing or adopted	58
			LNG		X		Under consideration. Market analysis will be undertaken in relation to demand for LNG	58
			Hydrogen		X		under consideration. Measures to be considered by 2020	59
		Maritime	Shore Side Electricity		X		Under consideration: (1) Feasibility study of shore-side electricity supply for seagoing ships in TEN-T ports to stablish targets and (2) Investigate tax reduction for shore-side electricity supply	56, 57
			LNG		X		Under consideration. Market analysis for demand of LNG along the TEN-T corridor and ports by 2018	58
		Inland Waterway	Shore Side Electricity		X	N.A.	Ireland does not have any inland ports in the TEN-T core network	51
			LNG		X	N.A.		51
		Airports	Electricity for stationary airplane		X		Under consideration by 2018. Undertake a life-cycle cost analysis of rolling out Fixed Electrical Grownd Power units at airports	56
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	X			Green Bus Fund considered	56, 57
			CNG	X			Green Bus Fund considered	58
			LNG	X				58
			Hydrogen		X		opt out	52
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public	Road	Electricity	X				54-57
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been	All	All	X				
3(4)	Assessment of MS cooperation and coordination with other member states	All	All		X	N.M.		

5.15.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.15-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	2.8 (0.9*)	26.6 (1.3*)	239.6 (1.3*)	662.8 (1.2*)
CNG for vehicles	10 (3.3*)	323 (221*)	1150 (443.6*)	929.6 (446.6*)

*Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF public Recharging/Refuelling points, * = for total number of AFI (including private)*

Table 5.15-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding electric vehicles, for the current situation, the index passes the assessment threshold of 10 AFV per recharging point. For 2020, 2025 and 2030, the threshold is passed if the private recharging points are considered. However, the targeted number of public recharging points in the Irish NPF may be insufficient.

According to the Irish NPF, fast chargers are available approximately every 60 km on Ireland's main intercity roads, including the TEN-T Core Network. In the map of electric recharging points in Ireland (provided by the ESB, Electricity Supply Board), this statement can be corroborated.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

Initially, two areas are designated to be equipped with publicly accessible recharging points and CNG refuelling points under this framework: the cities and counties of Dublin and Cork. The population of these two areas account for approximately 40% of the total population of Ireland. The long-term objective (post-2025) of this framework is to equip all key urban areas in Ireland with the required level of recharging and refuelling infrastructure necessary to support a continuing uptake of alternative fuels usage. By 2030, most of the recharging points are planned to be installed in the areas of Dublin, Cork, Limerick, Galway and Waterford.

Electricity supply at airports for use by stationary airplanes

The Dublin Airport in the TEN-T Core Network is currently using mobile ground power units for use by stationary airplanes. Pier 4 has already 27 fixed electrical ground power units. The airport is currently undertaking a study to assess the feasibility of installing these units on Pier 100. Pier 4 and Pier 100 serve the majority of airplanes at the Dublin airport. The Dublin Airport Authority (DAA) also installed 2 new units in Pier 3 in late 2016.

The NPF states that for old and smaller airports a life-cycle cost assessment would be required before investment in electricity supply for stationary airplanes could be justified.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The Irish NPF does not include estimates or targets for shore-side electricity supply for the Irish ports. However, among the measures to be considered by the end of 2018, the development of a feasibility study of shore-side electricity supply for seagoing ships in TEN-T Core Network ports (Dublin, Cork and Shannon Foynes) is included. Based on the results of the study, targets for shore-side electricity supply should be established. The study on shore-side electricity supply should also investigate the possibility for reducing the tax rate for shore-side electricity in the short term to stimulate demand.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

The two available CNG refuelling points in Ireland are private and are still in demonstration phase. They are operated by Gas Networks Ireland (GNI); one point on their premises in Cork and another temporary point operating in Dublin. These two points are insufficient to cover the whole surface of Ireland, not fulfilling the requirement of refuelling points every 150 km as required by the Directive. Table 5.15-3 shows that these two private CNG points and the ones planned for 2020, 2025 and 2030 are sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles, but for 2025 and 2030 only if the private refuelling points are considered.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Irish government plan is to install four CNG refuelling points in the Dublin area and two in the Cork area respectively by 2020. The plan is that by 2030, there would be 17 public CNG points in the Dublin area, 7 in the Cork area, 4 in Limerick, 2 in Galway and another 2 points in Waterford.

Road LNG refuelling points along the TEN-T Core Network (2025)

The Irish NPF does not propose targets for LNG infrastructure and justifies this by the small size of the Irish TEN-T Core Network. The total distance between the cities of Belfast and Cork (the TEN-T road Corridor connecting Northern Ireland with Ireland) is just over 400 km. While the distance of the Corridor in the Republic of Ireland is approximately 360 km it also connects the road to the TEN-T Core Network port of Shannon Foynes. The NPF mentions a lack of demand from domestic or international transporters to provide LNG for heavy-duty vehicles in Ireland.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

At the moment, there are no LNG projects planned at the TEN-T Core and Comprehensive Network ports in Ireland. The NPF mentions lack of demand at this stage. Further market analysis will be required. Supply by carrier from the UK is considered feasible. The ports have advised that a common set of regulations and safety procedures would also need to be developed. Ireland has committed to setting targets for the LNG facilities at the three TEN-T maritime ports in 2019.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Ireland does not have any inland port the TEN-T Network.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Ireland has no immediate plans to establish a hydrogen refuelling network as, according to the NPF, the cost of the infrastructure is massively disproportionate to current demand. The NPF proposes some measures to be considered by the year 2020.

5.15.4 Deployment of alternative fuels vehicles and vessels

A main focus of the Irish NPF is on electric vehicles. It foresees that all the vehicles sold from 2030 in Ireland will be zero emissions or zero emission capable. As stated in the Irish NPF, all other category of vehicles will continue on a positive trajectory towards greater penetration of low emission vehicles in line with development in technologies. The ambitious plan of achieving a penetration of 800.000 EVs in the national vehicle fleet by 2030 could result in a cumulative reduction in CO_2 emissions from the transport sector of approximately 7 megatons (Mt) between 2017 and 2030. Policies relating to the provision of energy, particularly electricity and gas, from renewable sources would need to be fully aligned to the forecasts.

5.15.5 Assessment of the measures to implement Article 3

Assessment of the measures that can ensure national targets and objectives

The Irish NPF contains a detailed list of measures for electricity, natural gas and biomethane, hydrogen, biofuels, LPG and synthetic and paraffinic fuels. The list contains existing support, measures to be implemented and measures to be considered in the coming years.

Within the measures already in effect for electricity, aside from grants for research, technological development and demonstration projects, the following financial measures are in place: tax incentives and direct incentives for purchase of electric vehicles, which exist since 2008 (company tax incentives) and since 2011 (for vehicle purchase and registration). These measures can be rated as medium/ high, however, it seems that so far these measures have not had a significant impact in Ireland because at the moment, the amount of electric vehicles is less than 0.1% of the total amount of vehicles. The registration tax relief of up to 5000 euros for battery electric vehicle exists for 10 years whereas for plug in hybrid electric vehicles it is in place since 7 years.

Similarly, for natural gas (compressed and liquefied) and biomethane, aside from funds for innovation projects by GNI (Gas Networks Ireland) and supported by the Gas Innovation Group existing from 2015, some tax incentives like lower fuel excise duties are existing since 2015 to increase the number of natural gas vehicles in Ireland (which in 2015 were only 10). The budget of 2017 restarted this measure for a period of eight years. However, details of the exact budget involved are not given. Another measure existing from 2010 is the biofuel obligation scheme which is related to renewable energy targets in transport (10% by 2020), more than to the development of the alternative fuels infrastructure but which would result in an increase on the usage of biomethane.

The lower fuel excise duty also exists for LPG vehicles since 2013 and is extended for another ten years. This together with the LPG infrastructure on the Irish roads (78 refuelling points including the TEN-T Corridors), has resulted in 3000 LPG vehicles on the road, having in 2015 the highest share of all alternative fuels vehicles in Ireland.

The measures already adopted and to be implemented in the coming years have been rated as having a medium impact. For example, one important measure is the direct incentives for the installation of 5 publicly accessible CNG points at strategic locations by 2017. One point in Dublin port has already been inaugurated in February 2017. This measure will help reach the targets of one CNG refuelling point per 600 vehicles. However, more of these points would be necessary in the future to meet this ratio with the

big amount of CNG vehicles that have been estimated for the years 2025 and 2030. In this context, company tax incentives are provided from 2017, specifically to encourage private investment in refuelling infrastructure and equipment for natural gas.

Among other important measures proposed in the Irish NPF is the establishment of a low emissions vehicles taskforce by 2017. This taskforce will revise/propose future measures and policies for Ireland. It will focus on: (1) market growth, stimuli and visibility (low emission zones, public parking recharging...), (2) recharging infrastructure, energy regulation and pricing, (3) planning legislation, building regulation and public leadership. Ireland, by 2018, will start implementing new measures on the basis of the recommendations by the mentioned taskforce.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

In the Irish NPF, different measures have been taken into account for the promotion of alternative fuels infrastructure in public transport services. The establishment of the green bus fund in 2017, the support of the use of biomethane in the public transport and freight sector (also to be implemented in 2017) and a scrappage scheme for taxis (from 2018 on taxis aged 7 years or older could be replaced by an electric vehicle) have been considered measures having a medium impact. The measures for the coming years 2018 and 2020 like a feasibility study of electrifying elements of the rail system, the facilitation of trials of synthetic and paraffinic fuels in buses and rails or the establishment of a partnership to facilitate trials of electric vehicles in the public sector and public transport fleets are only under consideration and have been rated as having a low impact.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Irish NPF includes a group of measures for the promotion of the deployment of private electro-mobility infrastructure. As measures with high/medium impact, company tax incentives (companies allowed to write off 100% of purchase value against profit of same year) have been given since 2008 and 2000 free home recharging points have been installed. The importance of these measures is reflected in the high amount of private recharging points actually in Ireland where in 2015, 70% of the recharging points were private. The future of these infrastructural assets is unclear and it would be preferable if future recharging systems were independent from state subsidies (capable of operating on commercial basis).

Other regulatory measures for electric recharging points (building regulations and addressing the misuse of recharging point spaces) and to be implemented in 2018 have been rated as having a medium impact.

5.15.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Irish NPF was drawn up alongside a Strategic Environmental Assessment under the SEA Directive (2001/42/EC) and an AA, Appropriate Assessment (under the Habitats Directive 92/42/EEC) which were carried out by the Irish Department of Transport, Tourism and Sport (DTTAS). The SEA/AA teams were involved in both DTTAS and stakeholder meetings on the development of this framework. Likely significant impacts were identified and mitigation measures included in the AA. Following public consultation, updates to the Framework were screened by the SEA/AA team and amendments were made. A commitment has been given to liaise with the Irish Department of Communications, Climate Action and Environment on the roll-out and implementation of the Renewable Electricity Plan and the Steering Group monitors current research and development of emerging technologies.

5.15.7 Assessment of MS cooperation and coordination with other Member States

No specific cooperation activities have been listed in the Irish NPF. However, it is stated that the development of alternative fuels use in Ireland has already benefited from close cooperation with neighbours, specifically Northern Ireland.

Facilitated by support from EU funding programmes, the interoperability of infrastructure has been central to developments across the island of Ireland. As referred to previously, an EU-funded cross border project in 2013 helped to extend the EV fast-recharging network in the Republic of Ireland and Northern Ireland. The investment involved the roll-out of new fast (rapid) recharging points, which were installed at service stations and other prime locations along key interurban routes, including a section of the TEN-T Core Network corridor between Belfast and Dublin.

It is hoped that this level of cooperation will continue to grow in the future, ensuring that all future infrastructure will be interoperable and that the range and availability of alternative fuels will continue to increase its penetration across the island.

In the absence of a LNG terminal, the alternative is to supply LNG to Ireland by truck or shuttle carrier from a full-scale terminal in a neighbouring Member State. The nearest LNG terminal to Ireland is located in Milford Haven in the United Kingdom (UK).

5.15.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Public AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	2,176	25,005	1.00	8.7	832	950	87.6	2.80	26.32	M	c
CNG / vehicles / 2020	10	4,200	0.17	0.2	1	13	7.7	10.00	323.00	M	c
LNG / heavy duty vehicles / 2025									X	L	n
LNG / seagoing ships / 2025									X	L	n
LNG / inland waterway vessels / 2030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H2 / vehicles / 2025									X	L	c
Other fuels (LPG)	3,000	3,600	0.14	83.3	78				X	L	n

The Irish NPF addresses partly the requirements of Article 3. It contains a discussion of the current state and future scenarios for alternative fuels in the transport sector. For all the mandatory fuels and modes except for LNG it establishes targets as required by Article 3 of the Directive.

The spatial distribution of the available recharging points fulfils the requirement of having chargers available every 60 km on Ireland's main intercity roads, including the TEN-T Core Network. The actual number of public recharging points is also sufficient to cover the requirement of one recharging point every 10 electric vehicles. However, the number of electric recharging points foreseen for 2020, 2025 and 2030 seem to be insufficient for the foreseen number of electric vehicles in Ireland if only the public recharging points are taken into account. Ireland supports the deployment of private electro-mobility

infrastructure. To increase the number of electric vehicles in Ireland, vehicle purchase and registration tax incentives exist since 2011. Company tax incentives exist since 2008. The registration tax relief for battery electric vehicles will be extended until 2021 and for plug in hybrid vehicles until 2018.

The Irish NPF does not include concrete plans for shore-side electricity supply for maritime ports. The development of a feasibility study of shore-side electricity supply for seagoing ships in TEN-T ports (Dublin, Cork and Shannon Foynes) is considered for 2018. Based on the results of the study, targets for shore-side electricity supply should be established.

The Dublin Airport in the TEN-T Core Network is currently using mobile ground power units for use by stationary airplanes. However, the Irish NPF does not include targets for electricity supply for stationary airplanes only a life-cycle cost analysis of rolling out Fixed Electrical Grown Power units at airports is considered for 2018.

Regarding CNG, the current number of vehicles in Ireland is insignificant. The number of refuelling points is also insufficient to cover the Irish territory, not fulfilling the requirement of refuelling points every 150 km. In order to improve this situation, the Ireland has established direct incentives for the installation of 5 public CNG points in 2017. For 2020, the targeted number of public refuelling points would be sufficient to have one for every 600 vehicles. The number of public points seems to be insufficient to cover all the foreseen CNG vehicles in Ireland. The inclusion of biomethane as transport fuel in the biofuel obligation scheme since 2010 assists the promotion of the vehicles running with natural gas.

The Irish NPF does not consider any LNG refuelling points in Ireland (neither for road nor for maritime ports). Ireland has committed to setting targets for the LNG facilities at the three TEN-T maritime ports in 2019.

The Irish NPF does not include hydrogen. It has already identified measures to be considered by 2020 and plans to analyse opportunities to further the advancement of hydrogen infrastructure.

In Ireland, since 2013 tax incentives like lower fuel excise duty for LPG vehicles exist. They are foreseen to be active at least until 2023. These measures together with the already existing infrastructure for LPG have led to substantial LPG vehicle shares in Ireland.

The Irish NPF contains a comprehensive list of financial support measures already in place for the support of electricity, CNG (biofuels included) and LPG vehicles and infrastructure. They can be considered having a medium impact on market actor's decisions. Longer periods for their validity could provide certainty for market actors and hence increase the likelihood that the national targets and objectives of the NPF can be reached. For other modes and fuels the measures in the Irish NPF seem to have a rather low impact because they are only in planning phase. The Irish NPF has included a group of measures to be implemented in the coming years 2017 and 2018 (e.g. establishment of the green bus fund and scrappage scheme for taxis) which have been considered to have a medium impact on the promotion of alternative fuels in public services. Finally, the tax incentives for the installation of free home recharging points have had an important impact on the deployment of private electro-mobility infrastructure in Ireland.

The NPF states that the development of alternative fuels use has benefitted from close cooperation between the Republic of Ireland and Northern Ireland.

5.16 Italy

5.16.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Italy is at present 3,300 km and it will increase to 4,145 km in 2025. The total road extension is 181,619, while the length of motorways is 6,751.

Number of registered road vehicles

The number of registered vehicles in Italy was 49.2 million in 2014, out of which 37.1 million were cars, 6.5 million powered two-wheelers, 3.9 million duty vehicles and 97,914 buses.

In term of fuels, the majority is represented by gasoline vehicles with 51%, followed by diesel with a 41%. LPG/gasoline dual fuel vehicles have a share of 6%, and CNG/gasoline dual fuel vehicles 2%. The presence of vehicles with more advanced alternative fuels such as PHEV, BEV and FCEV is negligible (around 0.01%).

Number of main agglomerations

- 76 cities cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 4 inland ports in the TEN-T Core Network (6 inland ports in the TEN-T Comprehensive Network)
- 14 maritime ports on the TEN-T Core Network (25 maritime ports in the TEN-T Comprehensive Network)

Number of airports in the TEN-T Core Network

- 11 airports in the TEN-T Core Network
- 22 airports in the TEN-T Comprehensive Network

5.16.2 Summary of the National Policy Framework submitted

Short description of the measures

The Italian NPF is embedded in a law: Decreto Legislativo no. 257 of the 16th December 2016[2]. It covers the transposition of the AFID in the Italian law, followed by annexes dedicated to individual alternative fuels: electricity, hydrogen, LNG and CNG, and LPG. The annex on electricity for transport is in fact part of another law of 2014, the Infrastructural National Plan for the recharging of electrical vehicles, updated on the 26th September 2014[3].

The Italian NPF is very comprehensive, but clearly relies on already existing infrastructure for compressed natural gas and vehicles deployment realistic measures.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

[2] It has been published in the Gazzetta Ufficiale della Repubblica Italiana the 13th January 2017.

[3] Piano Nazionale Infrastrutturale per la ricarica dei veicoli alimentati ad energia elettrica (PNire), published in the Gazzetta Ufficiale the 30 June 2016.

Table 5.16-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	11,663	2,205	45,000 – 130,000	6,500 – 19,000				
Electricity for stationary airplanes								
CNG for vehicles	1,057,461	1,101	1,350,000	1,350	1,800,000 – 2,300,000	1,600 - 1,900		
LNG for road		8 L-CNG & 3 LNG		16		80	30,000 – 35,000	800
LNG for inland and maritime ports		0	7	10	40	12	60	20
H_2 cars			1,000	10	27,000	140	2,900,000	350
H_2 buses			100	10	1,100	56	3,700	96
LPG for road	2,137,078	3,767		-	2,400,000	-	2,500,000	

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that all the requirements of the Directive are covered.

Table 5.16-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	X				Annex III
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	X				Annex III
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	X			Annex III section A - Piano Nazionale Infrastrutturale per la ricarica dei veicoli alimentati ad energia elettrica (PNire), di cui all'articolo 17 septies della legge n. 134 del 7 agosto 2012. - rules and criteria for the installation	art 4 - page 8, art 18 page 16, art 15 page 14, page 26-28, 30 PNIRE
4(1)	within networks determined by the MS	Road	Electricity	X		N.M.		26-28 PNIRE
4(1)	at public transport stations	Road	Electricity	X		N.M.		26-28 PNIRE
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	X				15
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	X			Maps with possible locations for refueling stations	59, 60
5(1)	cross-border links	Road	Hydrogen	X				67
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2025 at maritime ports	Maritime ports	LNG	X			At least all TEN-T ports	92 and 105
6(2)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2030 at inland ports	Inland ports	LNG	X			At least all TEN-T ports	92 and 105
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	X			At least all TEN-T ports	92 and 105
6(3)	consideration of market needs	Maritime and Inland ports	LNG	X			Cost Benefit Analysis will be performed	105
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	X				117
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	X				87, 105
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	X				86
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	X				130
	within networks determined by the MS	Road	CNG			N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	X				10
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity		X		Cost Benefit Analysis will be performed	9 (art. 4); 27
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity		X		Cost Benefit Analysis will be performed	33
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		X		Cost Benefit Analysis will be performed	92, 93
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	X				6; 8
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	X				10
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	X				15, 16, 17, 12, 63
			CNG	X				135, 136, 138, 156
			LNG	X				12, 156
			Hydrogen	X				12; 63
		Maritime	Shore Side Electricity		X			29
			LNG	X				12, 113
		Inland Waterway	Shore Side Electricity		X			29
			LNG	X				12, 113
		Airports	Electricity for stationary airplane		X			
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	X			art. 18 (indent 10) pag 16	art. 18 (indent 10) pag 16
			CNG	X				16, 137
			LNG	X				16
			Hydrogen	X				16, 63
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	X			Art. 15 and Art. 17	14, 15
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	X				2, 30 - PNIRE
3(4)	Assessment of MS cooperation and coordination	All	All	X		N.M.		67, 117

5.16.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.16-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, Is			
	Current	2020	2025	2030
Electricity for vehicles	5.29	6.88	-	-
CNG for vehicles	960	1,000	1,171	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.16-3 shows the values of the sufficiency index IS = Number of AFV / Number of AF Recharging/Refuelling points.

Regarding the electric vehicles, for the current situation, with 5.29, the index passes the assessment threshold of 10 AFV per recharging point. For 2020, for both scenarios, the value obtained for the index is close to 7, suggesting that the targeted number of recharging points in the Italian NPF is sufficient. The NPF objectives for 2020 contain a network of 2,000-6,000 fast recharging points and 4,500-13,000 normal recharging points.

For the case of fast recharging points, the NPF gives details about their deployment locations and chronology. By 2020, 500 fast recharging points (>40kW) will be constructed at already existing service areas on the motorways (giving priority to the TEN-T Core Network), 1,750 fast recharging points at already existing fuel points on normal roads and 1,750 at points of interest (giving priority to railway stations, parking near metro lines, airports and ports). As distance conditions between 2 locations the NPF mentions a maximum threshold of 50 km and a minimum one of 20 km. The Italian NPF assumes that there will be 2-4 normal recharging points corresponding to one fast recharging point.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The NPF gives priority in the short term to the deployment of recharging points within urban areas and commuting zones related to them, broadening the focus in the medium long term to suburban and motorway service areas even with the provision of fast recharging points, both at public areas and, especially, at current fuel stations. The type of recharging points to be deployed depends on the duration of the vehicle stop. Three different scenarios are identified. They depend on how many vehicles can be charged per day. Corresponding public or semi-public locations are proposed.

All garages and private/public car parks should contain an adequate number (consistent with the size of the parking lot) of recharging points. In the case of new construction, the NPF stipulates that at least 5% of the total number of places available shall be dedicated to electric vehicles.

The municipality will be taken as reference regarding the geographical distribution of targets, the number of normal/fast recharging points will be identified according to the following criteria: number of inhabitants, number of circulating electric vehicles, number of vehicles per inhabitant; and ratio private/total parking spaces.

Electricity supply at airports for use by stationary airplanes

The main Italian airports open to commercial traffic have ground power supply units (GPU) (400 Hz) located at the aprons. These facilities are available at over 80% of the existing aprons at the three

intercontinental airports Roma Fiumicino, Milano Malpensa and Venice (part of the TEN-T Core Network). GPUs are also available to varying degrees in nearly all airports with annual passenger traffic of over 1.5 million persons (corresponding to the TEN-T Core and Comprehensive Network).

The Italian NPF notes that the action plan for reduction of CO_2 levels drawn up by Italy in order to respond to specific ICAO decisions promotes an increase of the number of aprons with GPUs and further expansion of this type of facilities will be planned after a cost-benefit analysis.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The Italian NPF states that many Italian ports have already prepared or are developing various economic and environmental impact studies of the electrification of the docks. It is mentioned that they all agree on the decisive contribution of the ports electrification to the effective reduction of air pollutant emissions, and that many take into account the costs-benefits balance or analyse the advantages of an integrated energy approach for the port area. Studies for the ports of Trieste and Genova are referred. No clear target is provided at this moment. The NPF indicates that decisions are needed case-by-case following in-depth examinations of questions relating to local environmental issues, maritime traffic, power generation and grid access.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

The current AFI sufficiency index for CNG in Italy (Table 5.16-3 above) is 1 to 960 and does not meet the criterion of at least 1 CNG refuelling point per 600 CNG vehicles. Nevertheless, the Italian NPF considers this value as sufficient. The NPF plan strives to increase the ratio for NG in 2025 to a value above 1,000 for reasons of economic viability. These values are characterised by a high level of uncertainty, due to the fact that in general the NG refuelling stations have only one NG dispenser, while the gasoline/diesel ones have in average more than one. The NPF concludes that an AFV/AFI station number similar to that of conventional vehicles can cause long waiting times at the station, especially in combination with the longer refuelling time required for NG tanks. In conclusion, considering the uncertainties, it is doubtful that an index of 1,000 already expected in 2020 in major cities will be enough to guarantee drivers comfort and avoid bottlenecks.

According to the Italian NPF, the minimal coverage condition along the TEN-T Core Network is already met today, with an average of 80 km between two points. However, due to the geographical inhomogeneous distribution mentioned above, certain areas in south Italy respect only marginally the minimal condition of 150 km distance (assessment based on approximated distance measurements between points in Calabria and Sicily). Sardinia is not served by the Italian NG distribution system, and it does not make either part of the road TEN-T Core Network.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The distribution of NG vehicles and dispensers is geographically inhomogeneous, with 7 provinces representing 81% of the total NG vehicles park. In average for the whole of Italy, the NPF projects shares in the trend scenario at 3.6% and 4.8% of the vehicle stock respectively for 2020 and 2025. The targets identify a desirable level of 6% CNG cars on the road by 2025. Specific targets are provided for the five cities Roma, Milano, Napoli, Catania, and Palermo.

The Italian NPF assesses technical/legal needs for improving the situation in the least developed areas, considering the possibility to make use of biomethane plants and also the synergy resulting from the LNG plan to guarantee favourable conditions for points in off-grid areas.

Road LNG refuelling points along the TEN-T Core Network (2025)

The Italian NPF has developed a detailed scenario for the development of the LNG distribution infrastructure, based on primary and secondary LNG storage points and various LNG transportation systems.

At the moment, 3 LNG refuelling points are in function in Italy, while 8 CNG dispensers make use of LNG storage. Assuming a minimum requirement of one LNG point each 400 km on the TEN-T Core Network, the target of 5 LNG refuelling points would not be enough to cover the whole length of the Italian TEN-T Core Network length in 2025. The same is true for 2030 with planned 7 LNG refuelling points on the Italian TEN-T Core Network. The NPF acknowledges this and mentions that for a supply distribution fine enough to guarantee a reasonable minimal LNG availability at least 20 LNG refuelling points along the Italian TEN-T Core Network would be needed.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

Italy has 14 maritime ports along the TEN-T Core Network. For all of them a figure for the LNG demands for maritime navigation has been evaluated for 2025, based on a study performed by the TEN-T project COSTA. For 2025, 12 TEN-T ports will have a LNG distribution point, and for 2030, 20 ports will be covered, considering also additional interested ports beyond the TEN-T Core Network.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Considered the limited extension of the Italian inland navigation system (2 purely inland ports in the TEN-T Core Network plus 2 additional mixed maritime-inland), it is not surprising that the NPF focuses mainly on maritime ports. Nevertheless, a total of 20 LNG supply points is foreseen for 2030, which also includes inland ports. The inland ports are characterised by a difficult supply infrastructure, which is assumed to rely on ISO containers.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

The Italian NPF considers the deployment of hydrogen vehicles and strategically focuses on a gradual development of vehicles and related refuelling points. It considers also in a comprehensive way the aspect of hydrogen production both from methane reforming as well as from renewable energy sources via electrolysis, including the concept of power-to-fuel. The strategy focuses at first (2025 horizon) on captive fleets, because their refuelling and mobility can be easily planned and optimised. From 2026 onwards, according to the Italian NPF, the technology is expected to be fully fledged, with also public refuelling points and private cars. For the captive fleets foreseen during the early development, the refuelling points capacity is designed to address the needs of each of the fleets. The location of the planned refuelling points, and their geographical distribution and timeline development is given tentatively in a map, respecting the TEN-T Core Network priorities. The majority of the points is foreseen in north of Italy. In the south, the distance between refuelling points will come below 400 km in 2025, which could be marginally acceptable for bus, but does not respect that criterion of maximal 300 km between points. However, till 2025 the Italian NFP focuses more on the development of bus fleets in urban environments, so that long distance hydrogen based transport will develop only on a 2050 horizon.

The evolution of the market and of the technology has been modelled up to 2050, when it is expected that the minimal criteria for distance and sufficiency index will be respected.

Road and waterborne LPG refuelling points on networks determined by Member States having decided to include LPG in their National Policy Framework

The main reason for the development of LPG in Italy since 2000 has been the needs for reduction of pollution in big urban centres. As primary indicator of the geographic distribution of LPG availability, the Italian NPF gives a figure based on surface density of LPG refuelling points (number/100 km^2) per region. As in the case of CNG, the northern regions show a density higher than the national average, while southern Italy shows the minimum. In term of index of AFI sufficiency, the national average results 542, in a range from 757 in Liguria to 274 in Marche. The plan aims at a slow growth of LPG bi-fuel vehicles, which is supposed to grow by 11% until 2030 by maintaining the same measures adopted so far.

The NPF shows interest in the use of LPG also for waterborne applications. At present, only some pilot projects have put a very limited number of vessels in circulation. Despite the availability of technical regulations since several years, no progress has been registered in the development of plans for using LPG in waterborne transport.

5.16.4 Deployment of alternative fuels vehicles and vessels

A major focus of the Italian NPF is on natural gas vehicles (CNG) and vessels (LNG). This is based on the historical infrastructure investments of Italy for this fuel, and consequently the availability of a well-developed transmission and distribution network.

For electric vehicles, Italy adopts a very conservative approach. The NPF estimates for 2020 a share of new sales of 1% - 3% and only 0.1% - 0.4% electric vehicles on the road and does not contain any estimates beyond 2020.

Regarding CNG vehicles, Italy experiences at present a growth of 85,000 cars/year. On this basis the trends for 2020 and 2025 have been calculated (in italics in the table 5.16-1). This would represent the current trend extrapolation expected simply based on the present situation and development. Considering however the environmental benefits and related costs, a higher annual growth is considered in the so-called 'reasonable targets' scenario, aiming at 6% of NG cars and 1,900 distribution points in 2025. Specific targets for the already more developed provinces are also given.

A critical role is attributed to LNG, in particular for seagoing ships, considering the importance of the Italian coastal areas and the need to reduce emissions from conventional fuels. At present, only one LNG vessel has been commissioned in Italy, by the Italian marine. Considering the need to adapt available infrastructure and the typical fleet turnover time of ships, it is not expected that before 2025 Italy will see a considerable number of LNG vessels. The NPF gives expected targets up to 2030, differentiating between new vessels and converted ones, with a total of 60 vessels in total for that year. The main focus of the first phase of development (up to 2020) is on public transport, especially of the point -to-point kind, and also ships for harbour service (towage service). The following line of development (2020 onwards) is expected to focus on passengers and containers vessels on fixed routes. For heavy-duty vehicles on the road, a model has been used to study the LNG market evolution and its environmental impact, according to different scenarios which make use of a detailed description of the present travel patterns. A range of heavy-duty vehicles with LNG propulsion (both dual- as well as monofuel) is expected for 2030, from 30,000 to 35,000 units, while nothing is expected by 2025. This assumes a very rapid growth in only 5 years.

Regarding hydrogen, the Italian NPF strategy foresees first the development of captive fleets, and only in a second phase, beyond 2025, the significant growth of private car fleets. The development is modelled up to 2050, when almost 20% of the total car stock could be represented by hydrogen vehicles. According to the Italian NPF, after 2025 costs for fuels, vehicles and infrastructure will start to become comparable to those of the incumbent technologies, with a fully-fledged market in 2050.

Regarding LPG, at present, LPG/gasoline bi-fuel vehicles represent 5.5% of all road vehicles. The growth of LPG vehicles accelerated in the last 10-15 years as consequence of policies aiming at reducing the environmental impact of cars. The increase of the market share and competition have contributed to increase the attractiveness for this type of vehicles (improvement of efficiency, reduction of costs), both for conversions (retrofitting) as well as for new registrations. The current trend scenario foresees the continuation of the present measures, which will induce a slow increase of the LPG car stock from 2.2 million today to 2.5 million in 2030.

5.16.5 Assessment of the measures to implement Article 3

The Italian NPF is a law which tackles almost all alternative fuels envisaged by the AFID. It contains also a considerable amount of measures of the regulatory, administrative, financial (fiscal) and technical types.

According to the assessment methodology, a medium overall assessment score is derived for electricity for road vehicles. In some cases, the lack of concrete information (many exceptions are mentioned for the nonfinancial measures) makes it difficult to assess the coverage according to the same methodology.

The adopted measures for natural gas seem effective because of the already developed infrastructure and of the fact that the measures already in place have demonstrated their market impact. Traditionally, the introduction of CNG (and of LPG, which is also considered in the Italian NPF) has been triggered by the need of abatement of emissions from transport. One of the critical aspects of the already existing measures relies on the economic benefit in term of fuel costs. This is obtained thanks to a favourable excise regime which more than compensates the higher CNG vehicle price (versus conventional alternatives). The new law maintains and consolidates the existing measures for natural gas. Additional measures are foreseen to eliminate some bottlenecks, especially related to the geographical inhomogeneity of the infrastructure and to consider biomethane. Based on the Italian historical background related to NG technologies, the NPF presents a plan for a quick introduction of LNG: both in tandem with CNG for road vehicles, as well as specifically for maritime navigation. Also here, according to the Italian NPF, the most effective measure facilitating the introduction of LNG in maritime transport would be the adoption of very strict criteria on emissions in most of the coastal areas and seas.

Assessment of the measures that can ensure national targets and objectives

The electricity for road cluster achieves a medium overall assessment score having the majority of the measures already adopted. The cluster was considered comprehensive since it contains measures targeting both vehicle and infrastructure deployment and it addresses various deployment barriers through a combination of financial and nonfinancial measures. However, it is important to note the unambitious estimated share of electric vehicles for 2020 and the cessation of the incentives for the purchase of reduced CO_2 emissions vehicles from 2015.

Articles 9 to 14 of the Italian NPF are dedicated to measures aiming at simplifying the administrative procedures related to LNG infrastructure, in terms of general authorisation for storage and transport, and for both direct use of cryogenic NG, as well as distribution for gaseous NG. These measures are law and have been assessed as high. The same is valid also for the measures prescribed by Articles 18-19, aiming

at the increase of the utilisation of alternative fuels on the road (EV, CNG, LNG). It requires, among others, refuelling points for alternative fuels for every new station, facilitating the installation of the infrastructure and imposing to the local administrations the commitment to procure a fixed minimal fraction of alternative fuels vehicles for new fleets. This however is valid only for the municipalities where the concentration of particulates has trespassed the limits for a long period of time. For this reasons this bundle of measures can be assessed as medium-high.

In the case of CNG, the NPF lists all technical bottlenecks, for which additional measures are under consideration. These bottlenecks relate to the need of an update of the existing safety regulations, the introduction of self-service refuelling, the revision of CNG pipelines capacity prescriptions and of constraints related to the connection of the refuelling point to the pipelines. This additional bundle of nonfinancial measures has been assessed as low because of their implementation status (only under consideration).

The costs of LPG at the refuelling point is lower than the cost of conventional fuels because of a lower fuel excise duty on LPG. According to the NPF, this has been the principal factor driving a constant growth of LPG vehicles in the past years. Therefore, the measures already in place will be maintained to guarantee the present rate of growth.

Article 16 is dedicated to the case of hydrogen, which lists this fuel among all the other fuels for transport. However, this is the only legal measure adopted. The NPF annex on hydrogen calculates the financial measures necessary to the deployment of the technology, but states also that the financial coverage does not exist at present. In this case, the measure has been assessed overall as low, for this optional fuel.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

In the case of CNG, many captive fleets are already in place in the main urban centres. One measure already in place to support development of public transport is the adoption of green public procurement criteria in public tenders. CNG vehicles are classified as ‘green’ vehicles, making them eligible for bonus points in tender procedures. This mechanism has allowed in the last 3 years for an expansion of the CNG bus fleet for local transport up to 9% of the total in Italy. There has also been financial support to regions promoting tender procedures for CNG buses, particularly in urban areas. It is not clear if this financial incentive is still in place and the measure cannot be assessed for now.

The strategy for the nucleation of a maritime LNG-fuelled fleet is that the Italian NPF relies on conversions or replacement of vessels for public transport services.

Regarding hydrogen, the first phase, up to 2020, focuses exclusively on captive fleets for public transport and the related captive refuelling points. Technical measures are partially already in place, while others are planned. The NPF recognises the need of a considerable public investment contribution to support the introduction of this technology, for both the vehicles as well as the infrastructure (production/distribution). Up to 47 M€ are estimated necessary up to 2020, and additional 420 M€ in the 2020-25 period. The Italian NPF aims at a sharing of 60% from European funds and 40% national and local governments. The general assessment of these measures is low, due to the fact that financial coverage is only under consideration.

The NPF includes also a measure imposing a minimum share of 25% of alternative fuels vehicles purchase in the case of renewal of the public fleets stating that for local public transport fleets the target refers only to urban services.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The NPF imposes the provision of ducts for the possible installation of electrical infrastructure for charging of electric vehicles in covered or uncovered parking lots in the case of newly built or renovated residential buildings with at least 10 housing units. This is required for at least 20% of the total number of parking spaces.

5.16.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Italian NPF has been established respecting the interests of regional and local authorities, as well as other stakeholders. For example, specifically for the LNG case, a National Strategy for the LNG was prepared by a working group consisting of all stakeholders. Another example is the hydrogen part of the NFP, which has been managed by the H2Mobility Italy with the participations of all public research, governmental and industrial stakeholders. The first Infrastructural National Plan for the recharging of electric vehicles was elaborated through a shared process with the main stakeholders in the sector that the Ministry of Infrastructure and Transport has coordinated. Currently an inter-ministerial technical committee is in charge of monitoring the implementation of the plan.

5.16.7 Assessment of MS cooperation and coordination with other Member States

The level of inter-MS cooperation and coordination is in the Italian NPF fuel-specific.

For the CNG case, this dimension does not exist: this is not surprising considering the fact that this fuel is much more deployed in Italy than in the neighbouring countries. The support of LNG for heavy-duty road vehicles in some countries is considered a motivation for its gradual introduction also in Italy. The NPF plans to dedicate particular attention to the refuelling points along the cross border corridors and to consider the results of the related TEN-T projects. In the case of LNG for maritime applications, the project COSTA has already studied integrated solutions for the Mediterranean area. Similar is the case of Hydrogen, which relies on related European projects, among which those of the TEN-T family (especially the most recent European project for fuel cells buses, MEHRLIN, is supposed to present the nucleation, near the border with Austria, of an Italian corridor for long distance hydrogen buses to reach the Adriatic coast). However, the NPF does not give evidence of structured collaboration with other MS, beyond these EU initiatives.

5.16.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	11,663	45,000-130,000	0.11-0.32	9.0 -25.9	2,205	6,500-19,000	11.6-33.9	5.29	6.92-6.84	M	c
CNG / vehicles / 2020	1,057,461	1,350,000	3.27	78.3	1,101	1,350	81.6	960.46	1,000.00	M	c
LNG / heavy duty vehicles / 2025	56				8 L-CNG & 3 LNG (NPF) 2 (EAFO)	80	13.8		i	M	c
LNG / seagoing ships / 2025					0	12 (2025) 20 (2030)	0.0		OK	X	-
LNG / inland waterway vessels / 2030									OK	X	-
H2 / vehicles / 2025	11	27,000	0.06	<0.1	4	140	7.9		OK	M	c
LPG / vehicles	2,137,078	2,400,000	5.82	89.0	3,767				OK	M	n

The Italian NPF fully addresses the requirements of Article 3. It contains an extensive discussion of the current state and future scenarios for alternative fuels in the transport sector. However, not for all fuels and modes it establishes hard targets, because the NPF uses scenario dependent projections relying on 'expected trends' or 'evolution' rather than real quantitative targets.

For electric vehicles, the Italian NPF adopts a very conservative approach. For 2020, low shares of new sales (1% - 3%) and of electric vehicles on the road (0.1% - 0.3%) are estimated, and the NPF does not contain any estimates beyond 2020. The Italian NPF has established sufficient 2020 targets for recharging points accessible to the public consistent with the rather low estimates for EV for the same year. The NPF ensures appropriate coverage of the TEN-T Core Network with fast recharging points. Regarding electricity supply for stationary airplanes the Italian NPF refers to ongoing cost-benefit analyses. No concrete targets are established. For shore-side electricity the situation is similar, although there seems to be a general consensus on its decisive role to reduce air pollution.

The Italian NPF puts a lot of emphasis on CNG, for which Italy has already today a dense network of public refuelling points, especially in the northern regions. Nevertheless, on a country level, Italy does not currently nor will it in the future meet a level of at least one CNG refuelling point per 600 CNG vehicles on the road. According to the Italian NPF, CNG vehicles can contribute a lot to reduce CO_2 emissions in transport. The aim is to increase the share of the CNG vehicle park on the road from 2% to 3.3% in 2020 and 6% in 2025. Considering the leading position of Italy in relation to CNG vehicles, it could be explored if more ambitious targets could be set for its development beyond 2025.

A number of 5 dual-use LNG refuelling points for heavy-duty trucks are proposed in the NPF along the TEN-T Core Network by 2025. This would not guarantee that the maximum distance requirement for LNG refuelling points along the road TEN-T Core Network would be fulfilled on Italian territory.

The Italian NPF considers the development of a LNG infrastructure for maritime applications as strategic and critical in the context of the implementation of the Directive. Plan for its development, including designing of storage quantities in all 14 maritime TEN-T Core Network ports and beyond is part of the NPF and can be considered exemplary.

A very comprehensive plan has been developed for the deployment of hydrogen technologies (hydrogen production, distribution and fuel cell vehicles). Targets have been set up to 2050 and the amount of public funding needed to achieve the targets has been calculated. However, the Italian NPF states that the financial coverage for this hydrogen roll-out could not be provided, so that the plan has to be considered

a 'potential scenario'. In essence, the targets for hydrogen technologies appear too ambitious vis-à-vis the lack of financial coverage considered essential for their achievement. It is therefore expected that the only evolution, which will take place in the near term, will be local, and related to the inter-MS corridor linking Italy with Austria.

The Italian NPF contains a comprehensive list of measures, partially already in place in the case of CNG. Most of them can be considered as having a medium impact on market actor's decisions. Since the Italian NPF is a law, it guarantees long periods of validity which could provide certainty for market actors and hence increase the likelihood that the national targets and objectives of the NPF can be reached. The NPF report identifies additional technical and administrative bottlenecks which need to be eliminated to enable the expected developments. However in some cases it is not clear if and which practical measures have been / will be taken to achieve the goal (for example, the facilitations of the present requirement for CNG refuelling point to be at not more than 1,000 meters from the CNG distribution grid, or the mentioned still existing difficulties related to the permitting procedures for LNG in ports).

Regional and local interests have been considered in the evaluation of the measures, as well as industrial and public R&D stakeholders. In fact, regional authorities and municipalities play a critical role in ensuring the implementation of the actions, having jurisdiction on infrastructure for highways, respectively for local infrastructure. A particular attention in the Italian NPF has been dedicated to the island Sardinia, which at the moment is the only region of Italy deprived of a NG distribution infrastructure.

Evidence of collaboration of Italy with other Member States has been found mainly in the frame of European projects, especially of the TEN-T family.

5.17 Lithuania

5.17.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Lithuania is 665 km and the length of motorways is 309 km. The length of the total road network in Lithuania is 21,254 km.

The length of the TEN-T Road Corridors present in Lithuania represents 20% of the North Sea - Baltic Core Network Corridor. Lithuania does not form part of any other TEN-T Corridors.

Through the TEN- T North Sea - Baltic Core Road Network Corridor, Lithuania is directly connected with Latvia and Poland.

Number of registered road vehicles

At the end of the 2015, Lithuania had 1,244,063 registered passenger cars. In 2015, it had 1,443,046 registered road vehicles of all types (mopeds, motorcycles, passenger cars, buses, trolleybuses, lorries, road tractors, semi-trailers, special-purpose road vehicles, trailers). Currently, only a few AFV are present on Lithuanian roads, for example 0.1% of EV.

Number of main agglomerations

- 6 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 1 maritime port in the TEN-T Core Network

The Namunas river represents the Lithuanian TEN-T Core inland waterways Network and its length is 265 km. It connects the Klaipėda maritime port with the city of Kaunas. The Lithuanian inland waterways network does not enable international connections.

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network (Vilnius)
- 2 airports in the TEN-T Comprehensive Network (Palanga, Kaunas)

5.17.2 Summary of the National Policy Framework submitted

Short description of the measures

The prevailing number of measures in the Lithuanian NPF is still under consideration or in process of adoption. Existing or adopted measures aim at biofuels production and use as well as fleet renewal in public transport.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.17-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	155	26	1,200	100		100		
CNG for vehicles	80	3		10		10		
LNG for road		0		0		1		
LNG for inland ports		0		0		1		
LNG for maritime ports		1		1		1		
LPG for road	112,000	690						

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points.

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that most of the requirements of the Directive are covered. The NPF does not contain support measures for a number of fuels and modes.

Table 5.17-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	(x)			The strongest commitment is given to the deployment of electric vehicles, based at assessment of the current state of the deployment of alternative fuels (the beginning stage), whilst no concrete results coming from measures boosting synergic effects were visible in the report (Klaipėda port is considered to be a merger between sea, road, rail and inland transport, capable of interoperability with other modes of transport, however, relevant measures are only at the beginning, e.g. reconstruction works). The cross-border continuity was considered in case of rail transport (Rail Baltica project). Detailed market analysis (e.g. cost-benefit analyses, development of pricing mechanisms, etc.) was not conducted, whilst command-and-control mechanisms are in favor of alternative fuels support (EC reports 2014,2016 --> Lithuania has the lowest natural gas prices charged to medium-level industrial consumers; lowest relative amount of tax contribution in EU).	22fr, 4,5,6fr
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Deployment needs and preconditions for their fulfillment were described. There is not a plan to jump-in into the promotion of alternative fuel, which is not already existing/partially disseminated in Lithuania (hydrogen supply).	
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				22fr
4(1)	within networks determined by the MS	Road	Electricity		x	N.M.		
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen		x			
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen		x			
5(1)	cross-border links	Road	Hydrogen		x			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	x				37-38fr
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG		x		Klaipėda seaport is being considered as a maritime port mostly, despite the fact it is linked to an inland waterway, which is not heavily used. A foreseen change in this regard is expected to come with construction works (e.g. new quays, access roads) affecting Kaunas-Klaipeda inland waterways, mostly in terms of vessel movements and goods storage.	31fr
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				
6(3)	consideration of market needs	Maritime and Inland ports	LNG		x		No results of empirical analyses were presented in the report (e.g. demand identification, results of market trends extrapolation, etc.)	
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG		x			
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG		x			
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x			
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x				
	within networks determined by the MS	Road	CNG			N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x			Klaipėda State Seaport and inland ports in the country are equipped with shore-side electricity supply facilities, which may be used by operators in accordance with individual agreements with users of quays, therefore no additional need for its deployment.	23fr
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x			Lithuania's international airports (Vilnius, Kaunas, Palanga, Siauliai) have already been equipped with all the necessary facilities for standing for electricity supply. In this context, Lithuania does not further the need to install electricity supply at airports for use in aircraft standing areas.	23fr
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x			Lithuania does not need to install LNG refuelling points in ports outside the TEN-T core network	23fr
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity		x			
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x			The Lithuanian NPF states that publicly accessible CNG refuelling points plans are designed for 7 NUTS level 3 counties - Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys, Telšia, Marijampolė, (agglomerations with more than 50, 000 inhabitants) and two suburban agglomerations with less than 50, 000 inhabitants - Ukmergė, Elektrėnai.	38fr
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				10, 11, 15fr
			CNG	x				10, 11, 15fr
			LNG	x				10, 11, 15fr
			Hydrogen		x			
		Maritime	Shore Side Electricity	x				23fr
			LNG	x				37fr
		Inland Waterway	Shore Side Electricity	x				23fr
			LNG		x		Not explicitly mentioned, but Klaipeda has access also to inland waterways	37fr
		Airports	Electricity for stationary airplane	x				23fr
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				11, 17fr
			CNG	x				11, 17fr
			LNG	x				11, 17, 23fr
			Hydrogen	x				11, 17fr
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		x			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x			Separation of local traffic from TEN-T network; Engineering solutions derived from strategic noise maps in order to deal with excessive noise pollution where applicable	19, 24fr
3(4)	Assessment of MS cooperation and coordination with other member states	All	All	x		N.M.	Rail Baltica project	30, 42-43, 4-5fr

5.17.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.17-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	5.96	12.00	-	-
CNG for vehicles	26.67	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.17-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding electric vehicles, for the current situation, with 5.96, the index passes the assessment threshold of 10 AFV per recharging point, which is not the case for the 2020 target, when, according to the estimations, the country will only have an index of one recharging point per 12 electric vehicles.

The visual assessment of the spatial distribution of recharging points presented and checking the routes of the TEN-T Core Network shows that the distance requirement regarding one electricity recharging point at least every 60 km is not fulfilled today. The NPF does not mention explicitly that coverage of the road TEN-T Core Network would be ensured in the future for Lithuania.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

Publicly accessible recharging points are targeted for urban and suburban agglomerations of more than 25 000 inhabitants and the NPF contains specific targets per agglomeration.

Electricity supply at airports for use by stationary airplanes

Lithuania's airports in the TEN-T Core and Comprehensive Network, Vilnius, Kaunas, Palanga, are, according to the NPF, already equipped with ground power units (this is valid also for Siauliai airport). The Lithuanian NPF does neither contain any information on how many aprons are equipped with GPU's nor does it present any plans for their further increase.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The Klaipėda maritime port and inland ports in the country are equipped with shore-side electricity supply facilities. The NPF does not see additional needs for further development of SSE in Lithuanian ports.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.17-3 shows that the currently available number of CNG refuelling points is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. Targets for an increase of the number of CNG refuelling points by 2020 and 2025 are foreseen. However, as the NPF does not provide estimates for the future deployment of CNG vehicles, their CNG infrastructure sufficiency for 2020 cannot be assessed.

According to the visual assessment of spatial distribution of CNG refuelling points presented in the provided map, it seems that the distance requirement of one CNG refuelling point at least every 150 km is currently not fulfilled, but with the targeted increase of refuelling points appropriate coverage could be ensured.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Lithuanian NPF states that publicly accessible CNG refuelling points plans are being designed for seven bigger agglomerations - Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys, Telšia, Marijampolė, (agglomerations with more than 50,000 inhabitants) and two suburban agglomerations with less than 50,000 inhabitants - Ukmergė, Elektrėnai. The deployment of CNG refuelling points is currently being pursued according to this logic whilst respecting infrastructure sufficiency requirements.

Road LNG refuelling points along the TEN-T Core Network (2025)

Despite existing fleet of 161 public transport buses with engines fuelled by LNG, no publicly accessible road LNG refuelling points are mentioned in the Lithuanian NPF. One LNG refuelling point for heavy-duty vehicles is targeted for 2025.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

According to the Lithuanian NPF, there are no further plans for an extension of LNG refuelling points in ports, besides the already existing LNG refuelling point in Klaipėda, Lithuania's only maritime port in the TEN-T Core Network.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

A 2025 target of 1 inland port LNG refuelling point is foreseen at country level.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

The Lithuanian NPF opted not to cover the deployment of hydrogen refuelling points.

5.17.4 Deployment of alternative fuels vehicles and vessels

Great attention in the Lithuanian NPF is paid to the deployment of electric vehicles. At the beginning of 2015, Lithuania had 65 electric cars on the road. The Lithuanian NPF estimates 1,200 electric vehicles by 2020. 2025 estimations were not available in the Lithuanian NPF. For LNG and CNG, the NPF contains infrastructure targets for 2020 and 2025. For any of the other alternative fuels or transport modes the Lithuanian NPF does not specify any future estimates for alternative fuels and vessels. Altogether, it can be concluded that the Lithuanian NPF is based on the assumption that electric vehicles will gain in importance while other alternative fuels and vessels remain niche products until the 2020/2025 time-frame.

5.17.5 Assessment of the measures to implement Article 3

The Lithuanian NPF contains several measures, most of them under consideration or in the process of adoption. According to the assessment methodology, a low overall assessment score is derived for electric and CNG vehicles and a medium score for biofuels and alternative fuels in public transport services. Bicycle deployment is being supported by administrative measures permitting to carry bicycles

in public transport means. For the presented measures, the lack of concrete information (for example budget ceiling) made it difficult to assess the scope.

Assessment of the measures that can ensure national targets and objectives

From the alternative fuel and mode of transport clustering analysis, it resulted that despite mentioning electric vehicles as one of the core priorities, most measures presented do not explicitly address this topic. The measures of this category cover mainly biofuels. The lack of support measures for electricity in road transport could lead to the situation that the deployment of electric vehicles will fall short of the estimates.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Lithuanian NPF contains several measures in this category, covering mainly LNG and electric buses, as well as further electrification of rail. The measures for public road and rail transport are already existing or in the process of adoption. They were assessed as having a medium score.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Lithuanian NPF does not contain measures relevant for this category.

5.17.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The contents of the Lithuanian NPF have been subject to consultation with various stakeholders like the Ministry of Energy, Ministry of Agriculture, Ministry of Transport, a private sector company Smart Continent LT, or municipal authorities. Urban mobility plans and several budgets have been established respecting the interests of regional and local authorities. The NPF, however, does not explicitly mention concrete stakeholder consultation steps.

5.17.7 Assessment of MS cooperation and coordination with other Member States

Lithuania is cooperating with other Member States through the Rail Baltica project. It aims amongst others at improving the electrification rate of rail in the Baltic States. Another important inter-governmental initiative is the one between Baltic States improving the accessibility of Lithuania and interoperability between Baltic Sea region states. Beyond that, the NPF does not mention any cooperation or coordination in the field of alternative fuels.

5.17.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly available AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	155	1,200	0.07	12.9	26	100	26.0	5.96	12.00	L	n
CNG / vehicles / 2020	80				3	10	30.0	26.67		L	n
LNG / heavy duty vehicles / 2025					0	1	0.0		(OK)	X	-
LNG / seagoing ships / 2025					1	1	100.0		(OK)	X	-
LNG / inland waterway vessels / 2030					0	1*	0.0		(OK)	X	-
H2 / vehicles / 2025					0				X	X	-
Other fuels (LPG / vehicles)	112,000				690				(OK)	X	-

* = target for 2025

The Lithuanian NPF does not fully address the requirements of Article 3. A short discussion on the current state and future scenarios for alternative fuels in the transport sector in Lithuania is presented in the NPF. Targets as required by Article 3 of the Directive were established for CNG, LNG, and electricity for vehicles.

The Lithuanian NPF places attention on electric vehicles without possessing currently a dense network of publicly accessible recharging points. The spatial distribution of recharging points does not currently cover the needs of vehicles in terms of distance requirements; the ratio of only one public recharging point per 12 electric vehicles estimated for 2020 may be seen as a risk to the further market deployment of electric vehicles. It may be important to closely monitor this development and correct infrastructure targets in line with the market developments. Lithuania, today, has 10 hybrid buses (electricity + CNG). Bicycles as well as their infrastructure also receive support. The NPF neither contains any targets for increasing the availability of electricity supply for stationary airplanes nor for shore-side electricity.

Lithuania currently has a sufficient network of CNG refuelling points. Targets for an increase of the number of CNG refuelling points by 2020 and 2025 are foreseen. However, as the NPF does not provide estimates for the future deployment of CNG vehicles, their CNG infrastructure sufficiency for 2020 cannot be assessed.

Despite existing fleet of 161 public transport buses with engines fuelled by LNG, no publicly accessible road LNG refuelling points are mentioned in the Lithuanian NPF. One LNG refuelling point for heavy-duty vehicles is targeted for 2025.

According to the Lithuanian NPF, there are no further plans for an extension of LNG refuelling points in ports, besides the already existing LNG refuelling point in Klaipėda, Lithuania's only maritime port in the TEN-T Core Network.

The NPF does not cover hydrogen for transport.

The Lithuanian NPF contains a list of measures, most of them, however, still under consideration with little details revealed in the NPF. Most of them can be considered having a low or medium impact on

market actor's decisions. Their low implementation status could create uncertainty for market actors and hence decrease the likelihood that the national targets and objectives of the NPF could be reached.

The interests of regional and local authorities, as well as stakeholders have been considered during the drafting of the Lithuanian NPF. Further coordination is planned in order to ensure follow-up of the implementation actions, collaboration among authorities and advice from stakeholders.

Lithuania is actively involved in coordinating its plans on rail infrastructure with other Member States as well as collaborating with them in this field. Beyond that, the NPF does not mention any cooperation or coordination in the field of alternative fuels.

5.18 Luxembourg

5.18.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Luxembourg is 69 km and the length of motorways is 152 km. The length of the total road network (including motorways, main/national roads and secondary/regional roads) in Luxembourg is 2,880 km.

The length of the TEN-T Road Corridors present in Luxembourg is 1% (32 km) of the North Sea - Mediterranean Corridor.

Through the TEN-T Road Corridors, Luxembourg is connected with Belgium and France, through the North Sea - Mediterranean Corridor.

Number of registered road vehicles

At the end of 2015, according to the Luxembourg NPF, the Member State had 427,103 registered vehicles. At the end of 2014, Luxembourg had 373,000 registered passenger cars. The present situation of few AFV on Luxembourg roads, with less than 0.3% AFV in the vehicle fleet, is regarded by Luxembourg as insufficient and in need of improvement.

Number of main agglomerations

- 1 city (main urban agglomeration) > 50,000 inhabitants (source – Eurostat) – Luxembourg

Number of ports in the TEN-T Core Network

- 1 inland port in the TEN-T Core Network (Port of Mertert)
- no inland ports in the TEN-T Comprehensive Network
- no maritime ports

Through the TEN-T inland waterways network, Luxembourg is connected with Germany through the Rhine - Alpine and the North Sea - Mediterranean Corridor, and with France through the North Sea - Mediterranean Corridor.

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network (Luxembourg Airport)
- no airports in the TEN-T Comprehensive Network

5.18.2 Summary of the National Policy Framework submitted

Short description of the measures

The majority of measures in the Luxembourgish NPF already exist and are foreseen to stay in place. The number of measures is not so high but they are presented in a well-structured and logical manner in the NPF. They cover a wide variety of types, addressing many deployment barriers. The Luxembourgish NPF puts a lot of emphasis on electric vehicles. The first subsection contains five legal measures regarding the electricity market, the public infrastructure, taxi services, environmental policy and tax

reform. These legal measures contain also financial and nonfinancial aspects, which are treated in the second subsection dealing with incentive and funding measures related to the construction of infrastructure and to the investment programmes for RTD&D. The subsection on "Other measures" presents instruments for implementing alternative infrastructure and for purchasing alternatively fuelled cars. Other subsections treat the measures for private recharging points and for public transport.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.18-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	1,535	155	40,000	1,758	44,000	1,962	48,000	2,170
Electricity for stationary airplanes		24		28				
CNG for vehicles	234	7	200	2	100	2	100	
LNG for road	0	0	30/150	1		1		
LNG for inland ports								
H_2 for road	2	0						

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that the majority of the requirements of the Directive are covered.

Table 5.18-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant,	All	All	x			In accordance with the Directive 2014/94/EU and their needs and characteristics, the Member States estimates the number of AFV and AFI expected by 2020, 2025 and 2030	17,18,34,22-24
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available				x			
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x			In 2015 the ERP number is in accordance with EU regulation. In 2020, the value is ajusted in accordance with specific considerations but not with EU figures	35-40
4(1)	within networks determined by the MS	Road	Electricity	x		N.M.	Core and comprehensive TEN-T and other road network	41-44
4(1)	at public transport stations	Road	Electricity	x		N.M.	4 main operators. The Ministry of Sustainable Development and of Infrastructures (MDDI) provides support in order for all public transport operators to operate a modern fleet	33-34
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen		x		Hydrogen is not part of the national policy framework	24, 34
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen		x		"	24
5(1)	cross-border links	Road	Hydrogen		x		"	
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN T Core Network	Maritime ports	LNG			N.A.		45
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG		x		LNG-powered vessels have high autonomy, therefore an LNG refuelling infrastructure is not deemed viable in the port of Mertert due to closeness to the ports of Rotterdam and Bale	45
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG.	Maritime and Inland ports	LNG	x			"	45
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x			"	45
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network.	Maritime and Inland ports	LNG	x			"	45-46
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where	Road	LNG	x			The installation of an LNG refuelling ipoint for road transport is envisaged by 2020.	42
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way	Road	LNG	x			"	42
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x			1 Public	22
	within networks determined by the MS	Road	CNG		x	N.M.		22
6(8)	Definition of an appropriate number of refuelling points for CNG accessible to the public to be put in place by 31 December 2025 along the existing TEN-T Core Network.	Road	CNG	x				22
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31	Inland and maritime ports	Electricity	x			limited demand for a shore-side power supply for inland waterway vessels and the installation costs would be disproportionate to the benefits.	21, 45-46
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x				47
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG			N.A.	No maritime or inland port from Comprehensive TEN-T Network is situated in Luxembourg	23
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in	Road	Electricity	x				35-40
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article	Road	CNG		x			
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				21
			CNG	x				22
			LNG	x				23
			Hydrogen		x			24
		Maritime	Shore Side Electricity			N.A.		23
			LNG			N.A.		23
		Inland Waterway	Shore Side Electricity		x			21
			LNG		x			
		Airports	Electricity for stationary airplane	x				21
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				33-34
			CNG	x				34
			LNG		x			34
			Hydrogen		x			34
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)				x		only a regulatory measure , no measure to facilitate or promote	32
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered						800 recharging points to be installed in the proximity of facilities of communal interest. The final location of the recharging stations allocated to the communes is to be established by the communal authorities and to be implemented according to a general site plan established by the ministerial regulation of 5 February 2016	25, 35-40, 41-45
3(4)	Assessment of MS cooperation and coordination with other member states			x		N.M.	Benelux M(2015)10 Recommendation on the cooperation concerning the deployment of alternative fuels infrastructures (pg 30) R&D project - LPG system for downsized engines (Eurostars- Eureka project) - cooperation with the Netherlands (pg29)	29, 30-31

5.18.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.18-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current (end 2015)	2020	2025	2030
Electricity for vehicles	9.90	22.75	22.43	22.12
CNG for vehicles	33.43	100	50	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.18-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding the electric vehicles, for the current situation, with a value of 9.90, the index passes the assessment threshold of 10 AFV per recharging point. For 2020, the value 22.75 of the index suggests that the targeted number of recharging points in the Luxembourgish NPF may be insufficient. The Luxembourgish NPF objectives for 2020 contain a network of 1,754 recharging points accessible to the public. The NPF states that this network would be sufficient to recharge at least 40,000 electric vehicles based on a technical and economic study conducted by the Government and the Luxembourg Regulation Institute in 2011. According to this study in Luxembourg 95% of primary recharging would be made at private recharging points (in particular home recharging points) and approximately 5% of total recharging would be made using the public recharging infrastructure.

According to the visual assessment of spatial distribution of recharging points presented in the provided map and considering the lengths of the TEN-T Core Network and of the total road network, it results that the distance requirement of one recharging point at least every 60 km is fulfilled, already today. The NPF provides as well the detailed number of normal power and high power to be installed in specific park-and-ride areas along the TEN-T Core Network (on the Corridor "North Sea – Mediterranean Sea" (A3 and A6 motorways) and on the connection Luxembourg - Coblence (A1 motorway)) and a future adequate coverage of the TEN-T Core Network is assured.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Luxembourg NPF contains the envisaged exact number of recharging points to be built in 2020, 2025 and 2030 in 24 communes with more than 3000 inhabitants. According to this information, it can be assumed that the urban/suburban agglomerations in Luxembourg will be well covered with publicly accessible recharging points, although the ratio between estimated EV and targeted recharging points may give rise to concerns (see previous sub-section). The NPF delivers also the exact number of recharging points planned outside the TEN-T Network and the urban/suburban agglomerations in park-and-ride facilities and on other roads of rural communes.

Electricity supply at airports for use by stationary airplanes

According to the NPF, the Luxembourg airport, the only one in the TEN-T Core Network, currently has 24 ground power units for stationary airplanes and their specific locations are provided. A plan is foreseen to increase this number by adding 4 extra points in 2017-2018.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

In the Mertert inland port, the only inland port on the Luxembourg TEN-T Core Network, there is currently no shore-side power supply infrastructure for inland waterway vessels. The NPF mentions it

was observed that there would be limited demand for a shore-side power supply for inland waterway vessels and that the installation costs would be disproportionate to the benefits. Consequently, no shore-side power supply is envisaged in the NPF until 2025.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.18-3 shows that the currently available number of CNG refuelling points is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. Even if the NPF foresees a decrease of the number of CNG refuelling points, the CNG infrastructure target clearly passes the sufficiency threshold value for the estimated CNG vehicles on Luxembourg roads for the years 2020 and 2025. The number of CNG refuelling points will be decreased because these points are considered of poor economic viability in the medium term and the target number is considered sufficient in terms of the demand from national and international users.

Considering the length of the TEN-T Core Network, it seems that the distance requirement of one CNG refuelling point at least every 150 km is and will remain fulfilled.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

Since the CNG refuelling points target for 2020 is reduced compared to the current situation, no new urban/suburban agglomerations are designated to be equipped with CNG refuelling points.

Road LNG refuelling points along the TEN-T Core Network (2025)

With regard to LNG, Luxembourg does not have currently any road-refuelling infrastructure. The installation of one refuelling infrastructure for road transport is envisaged for 2020 and 2025 in a service area on a highway of the TEN-T Core Network, the Corridor North Sea – Mediterranean Sea. In the beginning, the LNG refuelling may be provided by a mobile point installed on a truck.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

Not applicable since Luxembourg has no maritime ports.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Currently Luxembourg does not have any LNG refuelling infrastructure for inland waterway transport. Due to the high autonomy of LNG-powered vessels, (according to the assumptions of the NPF of Luxembourg a round trip between the ports of Rotterdam and Bale without the need to refuel on the way is possible), an LNG refuelling infrastructure in the port of Mertert (only inland TEN-T Core Network port) is not deemed as viable and the implementation of an LNG infrastructure in Luxembourg for vessels circulating on the Moselle river has not been considered. However, a “ship to ship” refuelling vessel operating in neighbouring waters or a “truck to ship” refuelling truck is mentioned as a solution on a case by case basis in the port of Mertert.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Hydrogen is not part of current the NPF and no target is set. Even though the Luxembourgish NPF considers that significant technological progress is still necessary in order to turn this industrial sector competitive, the evolution of hydrogen as an alternative fuel will be monitored closely.

5.18.4 Deployment of alternative fuels vehicles and vessels

The main focus of the Luxembourgish NPF is on electric vehicles. It estimates a share of more than 9% electric vehicles on the road in 2020. For CNG vehicles, the ambition level is much lower (only 0.05% CNG vehicles estimated for 2020) and decreases compared to the current situation. For the heavy-duty vehicles fleet the Luxembourgish NPF estimates a share of approximately 2.5% LNG heavy-duty vehicles by 2025. The Luxembourgish NPF does not contain any estimates for LNG vehicles. Altogether, it can be concluded that the Luxembourgish NPF is based on the assumption that electric vehicles will gain in importance while other alternative fuels and vessels remain niche products until the 2020 time frame.

5.18.5 Assessment of the measures to implement Article 3

The NPF of Luxembourg contains a portfolio of measures. According to the assessment methodology, a High overall assessment score is derived for electric vehicles, a Medium overall score for Hydrogen vehicles and a Low overall score for CNG vehicles. This is a consequence of Government estimation that the CNG will only play a marginal part and consequently the focus is placed on the promotion of electric mobility, which is considered the most suited for the decarbonisation of the transport sector. 14 measures from a total of 17 concern electricity as alternative fuel. Bicycle and electric bicycle deployment are also supported. For the other fuels and transport modes, the assessment score is low as well as for the measures concerning the promoting of the deployment of alternative fuels infrastructure in public transport services.

Assessment of the measures that can ensure national targets and objectives

The measures of this category are the most numerous (11 from 17) and cover AFI and AFV, several fuel types, modes of transport, financial and nonfinancial support. The totality of these measures can indeed address many of the deployment barriers and consequently the portfolio of all measures can be considered quite comprehensive.

From the alternative fuel and mode of transport clustering analysis, it resulted that most measures presented address electric vehicles (8 from 11) and this cluster is a comprehensive one, revealing the focus of the Luxembourgish NPF. Since many of the measures already exist and receive a high score at least for electric vehicles, it can be derived that the Luxembourgish NPF seems to have defined appropriate measures in order to attain the defined targets and objectives.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Luxembourgish NPF contains three measures in this category, covering only AFV, with only electric and Hydrogen fuel types and road as mode of transport. Two of them are financial or nonfinancial type and they were assessed as having a Low score since they only address the taxi services.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Luxembourgish NPF contains only one measure in this category, which is of regulatory type. The measure stipulates only that the distribution system operators should cooperate on a non-discriminatory basis with all public or private persons willing to set up or operate recharging points on sites accessible to the public in order to integrate them into the joint central management system. However, there is no measure or regulation planned to facilitate the deployment of recharging points not accessible to the public.

5.18.6 *Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered*

The Luxembourgish NPF has been established respecting the interests of regional and local authorities, as well as those of the stakeholders concerned. There are two regulations (one Grand Ducal and another Ministerial) that provide evidence that the interests of local authorities and stakeholders have been considered. 800 recharging points will be installed at communal level until 2020, and their locations are to be determined by the communal authorities in close collaboration with the distribution system operators and shall fulfil the criteria of proximity to communal interest facilities.

5.18.7 *Assessment of MS cooperation and coordination with other Member States*

With regard to the need for regional cooperation, the Grand Duchy of Luxembourg focuses on cooperation with the Benelux countries. A cooperation recommendation signed by the three Benelux countries in October 2015 aims to strengthen the exchange of knowledge and best practices with regard to the deployment of an alternative fuels infrastructure in the respective countries by ensuring a minimum coverage by the end of 2020, 2025 and 2030. The Benelux recommendation pays specific attention to the cross-border matters, involved by the deployment of the infrastructure. Another cooperation with The Netherlands is mentioned and regards an RTD&D program dealing with LPG for downsized engines. Other neighbouring Member States, such as France or Germany are not explicitly mentioned.

5.18.8 *Conclusions and possible recommendations*

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	1,535	40,000	9.22	3.8	155	1,758	8.8	9.90	22.75	H	c
CNG / vehicles / 2020	234	200	0.05	117.0	7	2	350.0	33.43	100	L	n
LNG / heavy duty vehicles / 2025		30 / 150*	0.14 / 0.71		0	1	0.0		OK	X	-
LNG / seagoing ships / 2025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LNG / inland waterway vessels / 2030									(OK)	X	-
H2 / vehicles / 2025	2				0				X	M	n
LPG / vehicles	151								X	X	-

*2020 estimate

The Luxembourgish NPF broadly addresses the requirements of Article 3. It contains tables of the current state and future estimates for alternative fuels vehicles in the transport sector. For most fuels and modes, it establishes targets as required by Article 3 of the Directive. It does not provide a target for its inland port in the TEN-T Core Network.

The Luxembourgish NPF puts the accent on electric vehicles deployment with ambitious plans in terms of recharging infrastructure and share of electric vehicles on the road in 2020 (more than 9% from the total vehicle fleet). Bicycles and electric bikes also receive support. To be highlighted is the fact that Luxembourg has legislated a very detailed action plan for the implementation of the public recharging

infrastructure for electric vehicles (including the exact number of recharging points per commune and TEN-T Core Network segments). The NPF foresees a small increase of available ground power units for stationary airplanes. The Mertert inland port does not have shore-side electricity and no targets are foreseen in the NPF.

While the spatial distribution of recharging points seems to cover appropriately the needs of electric vehicles in terms of distance requirements in Luxembourg, the ratio of more than 22 electric vehicles per one recharging point for 2020 could evolve to become a barrier for the further market deployment of electric vehicles. This could also lead to market fragmentation within the EU. It will be important to closely monitor this development and correct the infrastructure targets in line with the market developments.

In the case of CNG, the Luxembourgish government is pessimistic regarding the economic viability for this fuel. Therefore, it plans the decrease of the number of refuelling points to two CNG refuelling points considering this quantity to be sufficient in the medium term, estimating also a reduction of the CNG fleet.

Concerning LNG, the installation of a refuelling infrastructure for road transport is envisaged for 2020. Such an infrastructure will be intended to refuel apart from the LNG vehicles registered in Luxembourg the heavy-duty vehicles transiting the country. LNG-powered vessels having a high autonomy, an LNG refuelling infrastructure in the port of Mertert is not deemed as viable.

For the moment, the Luxembourgish government decided not to include in the current stage refuelling points for hydrogen accessible to the public in its NPF.

The Luxembourgish NPF contains a comprehensive list of measures, most already in place. According to the assessment methodology, a High overall assessment score is derived for electricity for vehicles, a Medium overall score for hydrogen for vehicles and a Low overall score for CNG for vehicles. This is a consequence of the government estimation that CNG will only play a marginal part in the future, the focus being placed on the promotion of electric mobility which is considered to be the most suited for the decarbonisation of the transport sector in the NPF.

Two regulations (one Grand Ducal and another Ministerial) provide evidence that the interests of local authorities and stakeholders have been considered.

Luxembourg is actively involved in coordinating its plans on alternative fuels infrastructure with the Benelux countries and has signed a collaboration agreement with them in this field. It may be advisable to extend this cooperation effort also towards other neighbouring countries such as France and Germany.

5.19 Latvia

5.19.1 Description of the MS

Length of the road TEN-T Core Network

The road TEN-T Core Network in Latvia has a length of 835 km. In 2014, the length of the total road network was 7,062 km. There are no motorways in Latvia.

The length of the TEN-T Road Corridors present in Latvia is 9% (378 km) of the North Sea - Baltic Corridor, which connects Latvia with Estonia and Lithuania.

Number of registered road vehicles

According to the NPF, there are 752,940 vehicles in Latvia, of which 664,177 are cars. In Latvia, the main alternative fuel currently used in road transport is LPG, with LPG vehicles accounting for about 7% of the vehicle stock. The Latvian government aims at increasing its EV stock from 279 to 747 by 2023.

Number of main agglomerations

- 4 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- no inland ports in the TEN-T Core Network
- no inland ports in the TEN-T Comprehensive Network
- 2 maritime ports in the TEN-T Core Network (Riga, Ventspils)
- 1 maritime port in the TEN-T Comprehensive Network (Liepāja)

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network (Riga)
- 3 airports in the TEN-T Comprehensive Network

5.19.2 Summary of the National Policy Framework submitted

Short description of the measures

The government of Latvia highlights the policy measures of the Electro-mobility Development Plan 2014-2016 and also lists four strategic objectives to be pursued under the Plan for the Development of Alternative Fuels 2017-2020, or NPF. For each strategic objective, the NPF defines corresponding measures to be introduced in the next years. A comprehensive study of scenarios will inform many of these measures. It is unclear whether this study shall be completed in 2017 or 2018.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Despite an estimated CNG stock of 93 vehicles, the NPF indicates that there is currently no publicly accessible CNG refuelling point in Latvia. The NPF does not provide future estimates of CNG vehicles.

Table 5.19-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	303	72	747*	150				
Electricity for stationary airplanes								
CNG for vehicles	29	2		5				

LNG for road		0						
LNG for inland ports	0	0						
LNG for maritime ports	0	0						
H_2 for road	0							
LPG for vehicles	54,197	210 (EAFO) >30 (NPF)						
Biofuel for vehicles		40**						

Legend: AFV = Alternative Fuels Vehicle, AFI = Alternative Fuels Infrastructure, *By 31 December 2023, **4 E85 stations and 36 stations with biodiesel

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that the Latvian NPF fails to meet the requirements of the Directive related to natural gas supply for transport. The definition of measures is also insufficient. Note that the checklist has been filled out taking into account only financial measures. Nonfinancial measures mentioned in the NPF include conducting studies, amending legislation and raising awareness about alternative fuels. The latter two address other transposition requirements of the Directive.

Table 5.19-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			See sections 1.5 and 2 of the NPF.	32-63
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Rail electrification also considered (see section 1.6.4 and measure number 3.6).	57-58; 63
3(1)-second indent	**Fixing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x			See Figure 12.	65
4(1)	within networks determined by the MS	Road	Electricity	x		N.M.	See Figure 12.	65
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen			N.A.	Hydrogen is mentioned in the NPF. However, it seems it is not formally part of the NPF (neither targets nor estimates are communicated).	
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen			N.A.	Hydrogen is mentioned in the NPF. However, it seems it is not formally part of the NPF (neither targets nor estimates are communicated).	
5(1)	cross-border links	Road	Hydrogen			N.A.	Hydrogen is mentioned in the NPF. However, it seems it is not formally part of the NPF (neither targets nor estimates are communicated).	
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG		x		No LNG refuelling points defined, apparently because a study found that it cannot be economically justified.	55
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG		x			
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG.	Maritime and Inland ports	LNG		x			
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x				41; 55-56; 61
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network.	Maritime and Inland ports	LNG		x			
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG		x			
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x			
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x				63
	within networks determined by the MS	Road	CNG	x		N.M.	See Figure 13 for potential locations under examination.	66
6(8)	Definition of an appropriate number of refuelling points for CNG accessible to the public to be put in place by 31 December 2025 along the existing TEN-T Core Network.	Road	CNG		x		The final decision will depend on the results of study that is still pending.	63
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x			Two studies were carried out, concluding that it is expensive.	56
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes.	Airports	Electricity	x				56-57
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		x			
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x			See Figure 12.	65
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG		x		The final decision will depend on the results of study that is still pending.	63
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				60-63
			CNG	x				60-63
			LNG	x			However, it is unclear whether the assessment related to the reduction of the excise duty for natural gas would also be applicable to LNG.	61
			Hydrogen			N.A.		
		Maritime	Shore Side Electricity		x		Only a study is mentioned.	61
			LNG		x		Only a study is mentioned.	61
		Inland Waterway	Shore Side Electricity			N.A.		
			LNG			N.A.		
		Airports	Electricity for stationary airplane		x			
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				52; 63
			CNG	x				52; 63
			LNG		x			52
			Hydrogen			N.A.		
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	x				60
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x				64
3(4)	Assessment of MS cooperation and coordination with other member states	All	All		x	N.M.		

5.19.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.19-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030

Electricity for vehicles	4.21	4.98	-	-
CNG for vehicles	14.50	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Based on EAFO data, an I_S of 4.21 is calculated for EVs for the current situation. This exceeds the threshold of at least one recharging point for every 10 electric vehicles. Whereas the EV stock estimate is for the year 2023, the EV recharging infrastructure target is for 2020. Despite this mismatch, the 2020 sufficiency index is pragmatically derived, obtaining a value of 4.98. This would represent a move towards the right direction in the objective of meeting the aforementioned threshold requirement.

The NPF, informed by the Research of the EV Recharging Network, states that "the EV recharging infrastructure should be established using fast recharging points". In this context, fast charging can be considered high power (DC up to 50 kW). As a result of a cost and efficiency comparison between a full DC recharging network with 150 points and the 235 points (168 normal power and 67 high power) previously proposed by the Electro-mobility Development Plan 2014-2016, the NPF embraces the target of 150 high power recharging points by 2020, adding to the 5 DC points (of which 3 in Riga) installed to date.

Thus it is important to note that Latvia's strategy is to develop publicly accessible recharging infrastructure with only high power points. The NPF foresees the deployment of 55 recharging points along the TEN-T Road Corridor and 95 points on regional roads connected to the TEN-T Core Network as well as in agglomerations. The Latvian NPF confirms that a study on DC recharging infrastructure deployment along the TEN-T Core Network was recently conducted and a new one examining the location of recharging points along regional roads linked to the TEN-T is planned.

The Latvian NPF contains maps of refuelling infrastructure for LPG, CNG, hydrogen and biofuels as well as EV recharging infrastructure. Based on the visual assessment of planned spatial distribution of recharging points shown in the map contained in the NPF, it can be concluded that the distance requirement of one recharging point at least every 60 km would be met.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Latvian NPF describes a two-stage process to meet the objective of a national EV recharging infrastructure network. The first stage, mentioned above, centres on a prioritisation along TEN-T routes. The second stage focuses on agglomerations of over 5,000 inhabitants. The deployment of 12 recharging points in various districts is mentioned as well as the distance requirement for regional centres and populated areas.

Electricity supply at airports for use by stationary airplanes

Thanks to EU funding, the airport of Riga already has fixed power units that supply electricity to stationary airplanes. The intention to add more units as gates and aprons get renovated in the future is stated in the NPF. However, no numerical information is provided.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

Backed by two studies, one for the port of Riga and the other for Ventspils, the Latvian NPF concludes that for shore-side electricity supply for inland waterways vessels and seagoing ships the costs outweigh the benefits. No targets are communicated in the NPF.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

According to EAFO, there are 2 CNG refuelling points in operation in Latvia. That would result in an I_S of 14.5, thus meeting the requirement of one CNG refuelling point per estimated 600 CNG vehicles.

The Latvian NPF admits that compliance with the minimum requirements of the Directive related to CNG refuelling points would require the deployment of at least 5 CNG refuelling points. The NPF cites a study that concluded that 19 points are suitable for CNG dispenser installation (shown in one of the maps of the NPF). According to that map, no CNG points can be expected on the two routes of the TEN-T Road Corridor that link Riga with Ventspils and with the Estonian border along the coast. In fact, the Latvian NPF mentions that the northern Kurzeme Region would not be covered by CNG refuelling infrastructure, hinting at the lack of a natural gas system.

Research on the optimal location of CNG refuelling points is underway. It remains to be seen which locations are eventually selected for the deployment of the 5 points planned by 2020. Based on a visual assessment of the TEN-T Core Network and spatial distribution of potential refuelling infrastructure location, one CNG point should in principle be deployed in Riga, Jekabpils, Rēzekne and Daugavpils.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Latvian NPF states that CNG refuelling infrastructure should be located in urban/suburban agglomerations, but no decision on the exact planned locations is communicated at this stage.

Road LNG refuelling points along the TEN-T Core Network (2025)

The Latvian NPF provides no targets for LNG refuelling points along the TEN-T Core Network by 2025.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

The Latvian NPF communicates that a study to assess the possibility of building an LNG terminal in Ventspils led to the conclusion that it is not economically justified. The Latvian NPF provides no targets for LNG refuelling points in maritime ports by 2025.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Latvia has no inland ports in the TEN-T network.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

The Latvian NPF mentions that Riga has taken part in projects that promote hydrogen for transport. In addition, the NPF signals a preference for encouraging fuel cell electric buses for urban public transport. Furthermore, the deployment of hydrogen refuelling points in public transport depots, publicly accessible also to private car owners, is favoured.

Finally, the NPF contains a map showing potential hydrogen refuelling points sourced from the Latvian Hydrogen Association. However, it is understood that this is not an official target communicated by the Latvian government. Because the Latvian NPF states neither hydrogen infrastructure targets nor FCEV estimates, it is concluded that hydrogen is not part of the NPF.

5.19.4 Deployment of alternative fuels vehicles and vessels

With the exception of EVs, no estimates for alternative fuels vehicles and vessels are communicated in the NPF.

5.19.5 Assessment of the measures to implement Article 3

The Latvian NPF acknowledges the role policy measures play to support the uptake of alternative fuels in transport. Furthermore, the NPF highlights some measures that have been implemented in the past. For the purposes of the Directive, these are not assessed here. The NPF contains a table listing 25 measures, all given the status of 'adopted', with the exception of the incentive for EV purchase. For this measure, despite being included in the evaluation of the impact on the State budget, the status of 'under consideration' is assigned because its implementation requires additional funding. Six of the measures consist of amending legislation in accordance with the transposition requirements of the Directive. Overall, the proposed measures cover a fairly wide range of fuels and vehicles. Around half of them can be considered to be financial measures.

Assessment of the measures that can ensure national targets and objectives

As a result of the clustering analysis of the financial measures, two main policy packages emerge from the NPF. Both take both alternative fuels vehicles and infrastructure into account. The most comprehensive one focuses on road electrification. The second one puts forward measures that target CNG use in road transport.

The Latvian NPF offers details on the required funding needed to implement the plan. Latvia expects EU funding to play an important role in establishing EV recharging infrastructure along the TEN-T Core Network. The NPF declares that the implementation of measures is to proceed in line with the State financial resources.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Latvian NPF mentions plans to improve bus infrastructure, including the provision of financial support for the renewal of the bus fleet in six cities, prioritising CNG, hydrogen and electric buses. In addition, a measure targeting rail infrastructure, including railway electrification among its priorities, is listed.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Latvian NPF addresses private electro-mobility infrastructure by seeking to simplify administrative procedures for the deployment of private EV recharging points by 2019.

5.19.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The NPF does not specify how far interests of regional and local authorities, as well as those of the stakeholders concerned have been considered in its drafting. However, informing the public about the plan for the deployment of alternative fuels in Latvia is one of the strategic objectives described in the NPF. The objective is to be met through two specific measures that are to be implemented throughout the 2017-2020 period. One of them consists of involving stakeholders in policy development. In addition, the NPF lists a measure aiming at informing municipalities.

5.19.7 Assessment of MS cooperation and coordination with other Member States

The Latvian NPF mentions the possibility of sourcing LNG from the Lithuanian terminal at Klaipėda. However, no information on specific MS cooperation and coordination actions could be found in the NPF.

5.19.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	303	747*	0.10	40.6	72	150	48.0	4.21	4.98	M	c
CNG / vehicles / 2020	29				2	5	40.0	14.50		M	n
LNG / heavy duty vehicles / 2025					0				X	L	n
LNG / seagoing ships / 2025	0				0				X	X	-
LNG / inland waterway vessels / 2030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H2 / vehicles / 2025	0				0				X	X	-
LPG / vehicles	54,197				210 [EAFO] >30 [NPF]				X	X	-

*By 31 December 2023.

The Latvian NPF addresses only part of the requirements of Article 3 of the Directive. It does not contain any target for LNG refuelling points to be put in place along the TEN-T Core Network, neither for heavy-duty vehicles nor for its two maritime ports in the core network.

The Latvian NPF considers that the deployment of an appropriate EV recharging infrastructure has a high priority for fostering electro-mobility. Latvia centres on deploying a comprehensive publicly accessible high power recharging infrastructure. The NPF lacks sufficient information on electricity supply for stationary airplanes. For vessels, two studies were carried out, concluding that the costs for the deployment of shore-side electricity supply for the ports of Riga and Ventspils outweigh the benefits.

The Latvian NPF admits that the absence of a national policy plan has jeopardised the use of natural gas and hydrogen in transport. The NPF does not provide future estimates thereof. The Latvian NPF indicates that a revision of the excise duty would be a candidate measure to promote natural gas use. It has established targets for the deployment of CNG refuelling points accessible to the public. The targeted number of CNG refuelling points could support a significant increase of CNG vehicles. The coverage of the TEN-T network with CNG refuelling points is unclear.

As indicated in the NPF, Latvia has no plans for the deployment of LNG refuelling points in its ports.

The NPF does not consider hydrogen for transport.

The Latvian NPF expects that the purchase price of 'green' vehicles will remain in the near-term higher than that of conventional vehicles. However, the government of Latvia considers it has "few instruments

available to influence this". Notwithstanding, the NPF mentions the possibility of financial support between 2018 and 2020 to reduce the current 7,000 EUR financial differential between internal combustion engine vehicles and EVs on sale in Latvia. Three levels of support are under discussion: 7,000 EUR for 2018, 5,000 EUR for 2019 and 3,000 EUR for 2020.

5.20 Malta

By 1st October 2017 (cut-off date for the Commission NPF assessment), Malta had not notified an NPF to the Commission.

5.21 Netherlands

5.21.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in the Netherlands is 671 km and the length of motorways is 2,678 km. The length of the total road network in the Netherlands is 12,991 km.

The following lengths of the TEN-T Road Corridors are present in the Netherlands: 8% (334 km) of the North Sea - Baltic Corridor, 20% (282 km) of the Rhine - Alpine Corridor, 6% (254 km) of the North Sea - Mediterranean Corridor.

Through the TEN-T Road Corridors, the Netherlands is connected with the following Member States:
- Belgium (through the North Sea - Baltic and the North Sea - Mediterranean Corridor)
- Germany (through the North Sea - Baltic and the Rhine - Alpine Corridor)

Number of registered road vehicles

In January 2016, the Netherlands had 10,908,581 registered road vehicles of all types (motorcycles, passenger cars, microbuses and buses, goods vehicles, tractor units, trailers and semi-trailers and special vehicles) of which 8,100,864 registered passenger cars[4]. Presently 3% of the vehicles on Dutch roads are AFV. The example of 1.4% electric passenger cars shows progress on the coupled roll-out of AFVs and AFI, in particular for electro-mobility and is regarded by the Netherlands as exceeding the planned target for electric vehicles by far. However, the Dutch Government has noted that most of the sold electric vehicles are PHEV. A number of measures have been adopted to increase the BEV share in order to meet the ambitious target of the Dutch Energy Agreement.

Number of main agglomerations

- 51 cities > 50,000 inhabitants, 28 cities > 100,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

[4] Netherlands' Central Statistics office http://www.cbs.nl/

The Netherlands has approximately 6,242 km of navigable canals, rivers and lakes regularly used for transport. It comprises:

- 11 inland ports in the TEN-T Core Network
- 44 inland ports in the TEN-T Comprehensive Network
- 5 maritime ports in the TEN-T Core Network
- 8 maritime ports in the TEN-T Comprehensive Network

Through the TEN-T inland waterways network, the Netherlands is connected with Germany through the North Sea - Baltic and Rhine - Alpine Corridors and with Belgium through the North Sea - Baltic and North - Sea Mediterranean Corridor.

Number of airports in the TEN-T Core Network

- 2 airports in the TEN-T Core Network (Amsterdam Schiphol and Rotterdam - The Hague)
- 4 airports in the TEN-T Comprehensive Network

5.21.2 Summary of the National Policy Framework submitted

Short description of the measures

The majority of measures in the Dutch NPF are already existing and well framed by the Energy Agreement and the Fuel Vision as well as by the Dutch Maritime Strategy for 2015-2025. They cover a wide variety of support types, making use of administrative agreements and public-private partnerships. The measures address many deployment barriers. The number of proposed measures is well balanced and they cover various fuels and modes. They are presented in a well-structured and logical manner. The Dutch NPF focusses on electro-mobility (BEV and FCV) for passenger cars with the final goal of achieving CO_2 emission free passenger vehicles by 2050. Accordingly, measures are geared towards incentivising low emission vehicles whilst penalising the more contaminant ones. The Dutch NPF also addresses the use of LNG for heavy-duty transport, inland shipping and maritime transport. On the last, the NPF mentions that further support measures for LNG deployment could to be oriented to the improvement of the respective business cases until sufficient market demand is reached.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

Table 5.21-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	115,502	10,400 (NPF) 29,094 (EAFO)	140,000	17,844*				
SSE for sea-going vessels		7		8		10 (all)		10
SSE for inland shipping		45 ports (553 points)				75 ports (all)		
Electricity for stationary airplanes		64		67				

CNG for vehicles	11,269	147		145				
LNG for road	350 (NPF) 387 (EAFO)	19 (NPF) 14 (EAFO)				28		
LNG for inland ports	5	5	40					13
LNG for maritime ports		3				6		
H_2 for road	31	3	2,120	20				

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points, *Public, ** Semi-public; private is not subject to monitoring

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that all the requirements of the Directive are covered.

Table 5.21-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	X				Paragraphs: 3.1.4; 3.2.1; 3.3.2; 4.1.2; 5.1.1; 6.1.1
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	X			The document analyses the different alternative fuels and reportes data and consideration per each mode of transport	
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	X				19; 20; 22
4(1)	within networks determined by the MS	Road	Electricity		X	N.M.		
4(1)	at public transport stations	Road	Electricity		X	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	X				35; 36
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	X				35; 36
5(1)	cross-border links	Road	Hydrogen		X		MS collaboration is mentioned as desirable	38
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2025 at	Maritime ports	LNG	X				50
6(2)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2030 at inland ports	Inland ports	LNG	X				49
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	X				6
6(3)	consideration of market needs	Maritime and Inland ports	LNG	X				47; 50
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	X				52
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	X				42
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	X				48; 49
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG		X		No national targets for the creation of a CNG infrastructure have been applied in recent years because a network with nationwide coverage was already in place. No target is defined to at least maintain the currently available CNG refuelling infrastructure	39-41
	within networks determined by the MS	Road	CNG		X			39-41
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG		X			39-41
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	X				26; 29
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	X				33
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		X		not explicitly reported	
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity		X			7
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG		X		no national targets for the creation of a CNG infrastructure have been applied in recent years because a network with nationwide coverage was already in place	40
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	X				22; 19
			CNG		X			
			LNG	X				43; 45
			Hydrogen	X				38
		Maritime	Shore Side Electricity	X				27
			LNG	X				43; 45
		Inland Waterway	Shore Side Electricity	X				31
			LNG	X				43; 45
		Airports	Electricity for stationary airplane	X				9
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	X			Green deal Zero Emission bus & Administrative Agreement with the Association of Provinces of the NL. Convert diesel train engine (11%) to electric	9, 14,15
			CNG	X			Green deal Zero Emission bus & Administrative Agreement with the Association of Provinces of the NL	9, 14,15
			LNG	X			Green deal Zero Emission in Urban Logistics	14,15
			Hydrogen		X			
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		X		The least expensive option for owners is to charge their EV in their own premises. Public charging points should be seen as the "back up solution".	22
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	X			Paragraph 2.3	14
3(4)	Assessment of MS cooperation and coordination	All	All	X		N.M.		9, 52

5.21.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.21-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	6.47	7.85	-	-
CNG for vehicles	76.66	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.21-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding the electric vehicles, for the current situation, with 6.47, the index passes the assessment threshold of 10 AFV per recharging point (public and semi-public). In the Netherlands, the roll-out of recharging points is a matter of the private sector but the NPF recognises the need for limited support until viable business cases are achieved for the deployment and operation of public recharging infrastructure. The Dutch government has initiated the Green Deal for Public Charging Infrastructure and has set up the National Charging Infrastructure Platform (NKL). The Green Deal for Electric Transport 2016-2020 includes activities oriented to expanding the public recharging infrastructure. The number of private recharging points is not subject to monitoring in the Netherlands. However, it is estimated that there existed a total of 55,000 private and public recharging points at the end of 2015. On the other hand, the Dutch government is responsible for policies with regards to services alongside motorways and major roads. For 2020, the I_S value of 7.85 indicates that the number of publicly accessible recharging points will be sufficient in the Netherlands. According to the Dutch NPF, the number of rapid recharging points is to be increased along the main access routes to cities.

According to the visual assessment of spatial distribution of recharging points presented in the provided map and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one recharging point at least every 60 km is fulfilled, already today. The Dutch NPF declares that, as the number of recharging points continued to grow, a network of public "rapid recharging" points was implemented alongside motorways and major roads.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Netherlands, in the NPF, have not designated any urban/suburban agglomerations for the targets. Nevertheless, the Dutch NPF stated that with the intention of achieving a nationwide coverage with (public) infrastructure "at first instance the focus will be on Amsterdam, The Hague, Rotterdam, Utrecht and the Brabantstad network, leading to a snowball effect and more rapid implementation in other areas".

The Dutch NPF points out that many local authorities consider a distance of 300 meters[5] to the nearest recharging point to be acceptable.

Electricity supply at airports for use by stationary airplanes

[5] A recent JRC study also used a maximum distance of 300 meters. See for more details: JRC (2016) Optimal allocation of electric vehicle charging infrastructure in cities and regions, available at: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/optimal-allocation-electric-vehicle-charging-infrastructure-cities-and-regions

One of the Netherland's airports in the TEN-T Core Network, Amsterdam-Schiphol, has according to the NPF, 64 ground power units (GPU) including preconditioned air (PCA). In 2016, 3 new platforms were to be added. Other Dutch airports are not considered in the NPF targets since, according to the Dutch NPF, they handle few intercontinental flights. Hence, airplanes there have a much quicker turn-around and spend little time at the gate or park position.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The NPF mentions that in the Netherlands the majority of large ports offer low voltage shore-side electricity supply. Four harbours (one, Rotterdam, on the TEN-T Core Network) provide as well a high voltage shore-side power supply for maritime vessels. The ambition is that ten of the major Dutch maritime ports offer high voltage power supply by 2025. For inland shipping the Dutch government has the ambition that shore-side power supply is offered in the 75 most important inland ports. Two ports on the TEN-T Core Network (Almelo and Vlissingen), which currently do not offer shore-side power supply are requested to remedy this situation. The Dutch NPF mentions that greater uniformity in payment systems for shore-side electricity should be targeted as currently employed systems are extremely disparate.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.21-3 shows that the currently available number of CNG refuelling points is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. The Dutch NPF points out that, despite recent growth, CNG has only a limited share in the passenger car and LDV market and no increase of the CNG infrastructure has been considered in the Dutch NPF. The currently available 145 public CNG refuelling points in the Netherlands could probably support up to approximately 87,000 CNG cars on Dutch roads, roughly 8 times more than today.

According to the visual assessment of spatial distribution of CNG refuelling points presented in the map at https://groengas.nl/rijden-op-groengas/tanklocaties-kaart/ and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one CNG refuelling point at least every 150 km is fulfilled, already today.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Dutch NPF states that because of the current good coverage for CNG refuelling points in the Netherlands no urban/suburban agglomerations were designated for the targets. Nevertheless, in the map at https://groengas.nl/rijden-op-groengas/tanklocaties-kaart/ with the current CNG refuelling points it is visible that main urban agglomerations are currently well covered with publicly accessible CNG refuelling points.

Road LNG refuelling points along the TEN-T Core Network (2025)

There are 19 LNG refuelling points in the Netherlands and an additional 9 points are planned. The NPF considers that this is providing sufficient coverage for heavy-duty road transport in the early stages of the market rollout. According to the visual assessment of spatial distribution of LNG refuelling points presented in the map provided in the NPF and checking the routes of the TEN-T Core Network, it seems that those 28 points are sufficient to cover the TEN-T Core Network and meet the distance requirement of at least one refuelling point every 400 km.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

At present Truck-to-Ship bunkering is available at three of the five Dutch maritime ports of the TEN-T Core Network (Amsterdam, Rotterdam and Moerdijk). The Netherlands intends to extend its bunkering facilities before 2025 to four bunkering vessels that will serve six ports (including the three in the TEN-T Core Network with already existing infrastructure). If market conditions allow additional permanent LNG on-shore points will be created replacing some of the mobile bunkering points.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

At present Truck-to-Ship bunkering is available at four Dutch inland ports (Amsterdam, Rotterdam and Moerdijk of the TEN-T Core Network and Drechtsteden) and at a permanent point in Doesburg. The Netherlands intends to create additional mobile facilities at Vlissingen (TEN-T Core Network), Den Helder and Eemshaven and seven permanent bunkering points (one at Rotterdam replacing the mobile facility, another at Nijmegen in the TEN-T Core Network, and the rest at locations to be decided) by the end of 2030, provided market conditions permit. Dual use LNG refuelling for waterborne vessels and heavy-duty trucks is an important element of the Dutch policy.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

A target of 20 hydrogen refuelling points is established for 2020. Currently, two hydrogen refuelling points are already in operation in Rotterdam and Helmond and another three will be completed in 2017. Proposals have been submitted to the EU/CEF call for co-funding of two refuelling points for buses and for eight additional 700 bar hydrogen points (pending approval). For the future deployment, coordination will be sought with the Dutch Regions and with neighbouring countries (Belgium, Germany, and Luxembourg) to ensure appropriate coverage within the country, and along the TEN-T Corridors. The NPF declares the ambition of reaching entirely renewable hydrogen supply in the future.

5.21.4 Deployment of alternative fuels vehicles and vessels

One main objective of the Dutch policy is achieving a 60% reduction of the CO_2 emissions produced by the transport sector (compared to the 1990 reference level) by 2050. To this aim a number of targets for AFV have been set: (a) From 2035 all new passenger car sold should be CO_2 emission free and from 2050 all passenger cars on the roads should be emission free; (b) the regional public transport bus services should be entirely emissions free by 2030 (or sooner), from 2025 only zero emission (TtW) buses should be procured and these run on 100% renewable fuel or energy; and (c) by 1st January 2025 all vehicles types used for inner-city logistics should be able to operate with zero emissions and in a cost effective manner.

Accordingly, the NPF is focussed on zero-emission vehicles, BEV and FCV. Electric vehicles shall account for at least 50% of new sales in 2025, 30% being fully electric. An interim target for 2020 has been set, when at least 10% of all new vehicles sold should have an electric drive line, which would represent approximately 140,000 electric vehicles. The Dutch NPF also considers an estimate of 40 inland ships with an engine running on LNG. For any of the other transport modes and for CNG the Dutch NPF does not specify any future estimates.

5.21.5 Assessment of the measures to implement Article 3

The Dutch NPF contains a well-balanced portfolio of measures, mostly based on "Green Deals" Administrative Agreements. A Green Deal is a set of agreements between the Dutch government and

several other parties, which can be from the private sector, companies, societal organisations or other government institutions, such as provincial and local authorities. Most of the measures are already in effect, and have an average duration of four years, so that continuity through that period is assured.

Green Deals and public-private partnerships have demonstrated to be effective instruments for electro-mobility deployment in the Netherlands, which gives confidence that they will may also be effective for other AFV and AFI (hydrogen, LNG, public transport and urban logistics). Accordingly, those measures related to electric road vehicles and recharging infrastructure have been assessed with a high score.

According to the assessment methodology, a medium overall assessment score is derived for LNG both heavy-duty road and waterborne transport as well as alternative fuels in public transport services. In some cases, the lack of concrete information (for example budget ceiling) makes it difficult to assess the scope according to the same methodology.

Assessment of the measures that can ensure national targets and objectives

The measures of this category cover: AFI and AFV, several fuel types, modes of transport, financial and nonfinancial support. The totality of these measures can indeed address many of the deployment barriers and, as a consequence, the portfolio of all measures can be considered quite comprehensive. Since many of the measures already exist and receive a high score for electric vehicles and a medium score for other AFV, it can be derived that the Dutch NPF seems to have defined appropriate measures in order to attain the defined targets and objectives of the NPF.

From the alternative fuel and mode of transport clustering analysis, it resulted that most financial measures focuses on benefiting zero-emission vehicles (by fiscal incentives) and related AFI (MIA (Environmental Investment Rebate) and VAMIL (Arbitrary depreciation of environmental investments)). These, coupled with administrative agreements have facilitated, for instance, the growth of electric passenger vehicles from 600 in 2011 to 87,500 at the end of 2015. The Dutch Government noted that plug-in hybrid vehicles represent a significant proportion of the EV in the Netherlands and hence the NPF considers a number of options to promote fully electric vehicles.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Dutch NPF acknowledges the importance of public transport on reducing greenhouse emissions and contains several measures in this category, covering mainly electric AFI and AFV. The measures cover buses (the regional public transport bus services should be entirely emissions free by 2030 (or sooner)), electric taxis and urban logistics in city centres. Most measures for public road transport are already in effect. They were assessed as having a medium score.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Dutch NPF notes that at local level authorities may encourage the creation of (private) recharging points. Some purchase subsidies at local level are in place. The Dutch NPF observes "that 70% of all vehicle owners park in the public domain, usually on the road outside or close to their place of residence. It is unlikely that a recharging point can be created for each and every owner. This problem will be mitigated by the further development of rapid recharging technology."

5.21.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The contents of the Dutch NPF have been subject to consultation with various stakeholders, including private sector companies, industry federations, regional and local authorities, and the Ministry of Finance. The national government engaged in consultations with the representative bodies of the Association of Provinces of the Netherlands (IPO), the Association of Netherlands Municipalities (VNG) and the Association of Regional Water Authorities. The targets set are based on the implementation agendas of earlier policy documents and "Green Deals" agreements between the Dutch Government, relevant stakeholders, and provincial and local authorities.

5.21.7 Assessment of MS cooperation and coordination with other Member States

The Netherlands has cooperated with other Member States through different fora. The NPF mentions, in particular, the cooperation with the Benelux Union in the frame of Recommendation M (2015) 10 issued in October 2015 by the Benelux Union's Committee of Ministers, "on cooperation regarding the deployment of an infrastructure for alternative fuels." The text of the Recommendation provides for the sharing of knowledge and best practices in order to achieve the various objectives of the Directive throughout the Benelux region by their respective target dates (2020, 2025 and 2030). It devotes particular attention to the transnational aspects of the envisaged infrastructure. There are as well regular meetings of officials from the Netherlands, Flanders and Germany to discuss maritime policy in which matters in connection with the Directive are considered.

The Netherlands is also engaged in informal cooperation with other EU states which have achieved notable progress in the development and use of alternative fuels and it has joined other European states on the States Representative Group of the Fuel Cell Hydrogen Joint Undertaking.

5.21.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attainment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	115,502	140,000	1.47	82.5	10,400 (NPF) 29,094 (EAFO)	17,844*	58.3	6.47	7.85	H	c
CNG / vehicles / 2020	11,269				147	145	100.0	76.66		X	-
LNG / heavy duty vehicles / 2025	350 (NPF) 387 (EAFO)				19 (NPF) 14 (EAFO)	28	67.9		OK	M	n
LNG / seagoing ships / 2025					3	6	50.0		(OK)	M	c
LNG / inland waterway vessels / 2030	5	40**		12.5	5	13	38.5		(OK)	M	c
H2 / vehicles / 2025	31	2,120**	0.02	1.5	3	20**	15.0		(OK)	M	c
LPG / vehicles	180,000				1,750				X	X	-

*Only Public, no semi-public; ** 2020 estimate

The Dutch NPF fully addresses the requirements of Article 3, except for the definition of future targets for CNG refuelling points. It contains an extensive discussion of the current state and future scenarios for alternative fuels in the transport sector. For all fuels and modes, it establishes targets as required by Article 3 of the Directive, except for CNG refuelling points.

The Dutch NPF puts a lot of emphasis on electric vehicles, although the future estimated share of 1.5% EV seems low in comparison to the current share of EVs on the road, which is already above 1%. The Netherlands already today has a considerable number of recharging points. Their spatial distribution and especially the increasing number of fast recharging points along main roads seems to appropriately cover the needs of electric vehicles in terms of distance requirements. The ratio of one public recharging point per 8 electric vehicles estimated for 2020 indicates that the Netherlands has defined appropriate targets for recharging infrastructure in line with the requirements of the Directive. The Dutch NPF also contains targets for further increasing shore-side electricity in its ports. No targets are foreseen for increasing the availability of electricity supply for stationary airplanes.

The same is true for CNG refuelling points. However, the Dutch NPF considers CNG is likely to have a limited market share and does not foresee an increase in CNG refuelling infrastructure. It does not commit to keep the current level of CNG refuelling infrastructure.

Targets for LNG refuelling for vessels and heavy-duty trucks are defined in the NPF. Dual LNG refuelling points for waterborne and road transport is the preferred option. If the planned LNG bunkering points in the Dutch ports were realised, this would guarantee that the requirement for LNG refuelling points on the maritime and inland ports of the TEN-T Core Network would be fulfilled in the Netherlands. The same is true for the targeted LNG refuelling points for heavy-duty trucks.

The Dutch NPF displays a strong commitment towards hydrogen. The deployment of 20 publicly accessible hydrogen refuelling points is planned by 2020.

The Dutch NPF contains a well-balanced portfolio of measures, mostly based on Administrative Agreements and public private co-operation. These instruments, coupled with fiscal incentives, have proven to be effective for the deployment of electric vehicles and the related recharging infrastructure. They are comprehensive and seem to have a high impact on fostering deployment. Hence, similar measures proposed for other AF can be considered having at least a medium impact on market actor's decisions. Most of the measures are already in effect, and have an average duration of four years, so that continuity through that period is assured, increasing the likelihood that targets and objectives of the NPF can be reached.

The consideration of the interests of regional and local authorities, as well as stakeholders is part of the Dutch policy, e.g. put into practice via the "Green Deals", and can be considered exemplary.

The Netherlands is actively involved in coordinating its plans on alternative fuels infrastructure with other Member States as well as collaborating with them in this field.

5.22 Poland

5.22.1 Description of the MS

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in Poland is 3,834 km and the length of motorways is 1,482 km. The length of the total road network in Poland is 173,039 km. Those figures are valid for 2014 year, and the country is developing fast its road network of motor- and express-ways. The completed part of

road TEN-T Core Network is 1,284 km (33%); existing but planned upgrade 1,072 km (28%); under construction 976 km (25%) and still in planning phase (new roads) is 502 km (13%).

The following lengths of TEN-T Road Corridors are present in Poland: 1,832 km (51%) of the Baltic - Adriatic Corridor and 975 km (24%) of the North Sea - Baltic Corridor.

Through the TEN-T Road Corridors, Poland is connected with the following Member States:
- Germany (through the North Sea - Baltic Corridor)
- Lithuania (through the North Sea - Baltic Corridor)
- Slovakia (through the Baltic - Adriatic Corridor)
- Czech Republic (through the Baltic - Adriatic Corridor)

Number of registered road vehicles

At the end of 2014, Poland had 20.0 millions of registered passenger cars and 26.5 million of registered road vehicles of all types (motorcycles, passenger cars, microbuses and buses, goods vehicles, tractor units, trailers and semi-trailers and special vehicles). The present situation of AFV on Polish roads is limited mainly to LPG vehicles with 14% share in the total number of passenger cars. Other AFV with approximately 0.03% share of the vehicle fleet are at a marginal level.

Number of main agglomerations

- 69 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 2 inland ports in the TEN-T Core Network
- 1 inland port in the TEN-T Comprehensive Network
- 4 maritime ports in the TEN-T Core Network
- 1 maritime port in the TEN-T Comprehensive Network

Through the TEN-T inland waterways network, Poland is connected with Germany through the core network.

Number of airports in the TEN-T Core Network

- 8 airports in the TEN-T Core Network
- 2 airports in the TEN-T Comprehensive Network

5.22.2 Summary of the National Policy Framework submitted

Short description of the measures

The measures listed in the Polish NPF are not differentiated at regional level. The great majority of measures in the Polish NPF do not exist yet and are only foreseen to be adopted, with only few being in the legislative process. They cover a number of important areas and are addressing many deployment barriers. The number of proposed measures is moderately high and is covering mainly electricity and natural gas as a fuel and road transport modes. Also electricity supply for ships from shore and LNG ships refuelling were in some way addressed. The biggest part of presented measures focuses on defining

the legislative framework for AF deployment. The second most abundant group of measures (tax incentives) is addressing the higher cost of AFV and AFI vis-à-vis conventional fuel vehicles and infrastructure.

Despite the low current engagement of Poland in promoting alternative fuels there are some areas where the market has developed and is already mature (LPG vehicles and infrastructure) - due to the competitive prices of LPG fuel. Poland witnesses some development for EV and recharging infrastructure, as well as a small LNG market due to competitive prices of electricity as a fuel or due to putting into commercial service of big LNG infrastructure projects, thus developing the market and business opportunities.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030.

Table 5.22-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	1,010	325	76,898 (in agglomerations 53,829)	in agglomerations 6,859	1,029,470			
SSE for sea-going vessels		low power						
SSE for inland shipping								
Electricity for stationary airplanes		existing						
CNG for vehicles	1,722	27	9,592 (in agglomerations 2,296)	in agglomerations 72	54,206	32*		
LNG for road	57	3 (NPF) 0 (EAFO)	492		3,000	14*		
LNG for maritime ports		1				4		
LNG for inland ports		0				2		2
H_2 for road	0							

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points, SSE = Shore-side electricity, * = on TEN-T Core Network

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that most requirements of the Directive are covered. The Polish NPF does not contain any measures that could encourage and facilitate the deployment of recharging points not accessible to the public.

Table 5.22-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			Current situation assessment difficult to understand (data presented in different sub-chapters not coherent, missing or outdated). Sub-chapters on: NG (poor division between CNG and LNG) - infrastructure, market, vehicles, public transport. Electric energy - infrastructure, passenger cars, public transport. Maritime transport - LNG + electric energy. LPG. Hydrogen. Synthetic fuels. Rail transport, trams, trolleybusses, metro not even mentioned. Poor assessment of airports. Market development analysis based on *a priori* assumption that in 2025 number of EVs will be 1 million. Evolution of NG vehicles presented, assumptions not mentioned.	9 - 16
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Considered for road transport, public transport and ports	
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				
4(1)	within networks determined by the MS	Road	Electricity		x	N.M.		
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen		x		NPF contains sentences: "H2 refuelling infrastructure do not exist in Poland. There is also no reason to develop H2 refuelling points in Poland during next years."	
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen		x			
5(1)	cross-border links	Road	Hydrogen		x		Poland participated in HIT-2-CORRIDORS project which foresee 30 filling stations before 2030.	
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	x			The number of permanent refuelling points is not defined, however already now it is possible to refuel the LNG ships in Gdańsk harbour (4 companies competing; using a cistern, directly from a pier, on ad-hoc agreements, the fixed procedure for a permanent service is in preparation). Other refuelling methods (from a dedicated ship or using a container) are also considered. Building a permanent onshore ifrastructure is depending on the market developement. Other ports (Gdynia, Szczecin and Świnoujście) also work on LNG refuelling, however are bit less advanced. Commercial exploitation of LNG terminal in Świnoujście since June 2016 is boosting LNG market.	
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG	x			The only inland TEN-T Core Network ports are Szczecin and Świnoujście, already described above as maritime ports.	
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x				
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG		x		already existing, e.g. Supplying LNG to refuelling point in port in Estonia, but not mentioned in NPF	
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x				
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x		Not mentioned in NPF, however in last 12 months more than 1000 cisterns were loaded in LNG terminal in Świnoujście, supplying LNG to "island" gas networks, industrial users, LNG (CNG) refuelling points including maritime port in Estonia where LNG propelled ferries (built in Gdańsk shipyard) are refuelled. So the market already exists and fastly grows.	
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x				
	within networks determined by the MS	Road	CNG			N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x				
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x			Yes, but concluded with "development is not justified economically". On the other hand such infrastructure exist and will be developed since it is expected by the aircraft operators.	
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		x		declared "no such need"	62
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x				
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x				
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x			Several measures described that can promote deployment.	
			CNG	x				
			LNG	x				
			Hydrogen		x			
		Maritime	Shore Side Electricity	x				
			LNG	x				
		Inland Waterway	Shore Side Electricity		x			
			LNG		x			
		Airports	Electricity for stationary airplane		x			
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				
			CNG	x				
			LNG	x				
			Hydrogen		x			
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		x			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x			weak - only "Establishing a programme supporting local authorities engaged in construction of public infrastructure for charging EVs and CNG refuelling."	
3(4)	Assessment of MS cooperation and coordination with other member states	All	All		x	N.M.	no formal cooperation	

5.22.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.22-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	3.11	11,21 (7.85*)	-	-
CNG for vehicles	63.78	133.22 (31.88*)	-	-

*Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points, *= data available for agglomerations/densely populated areas.*

Table 5.22-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding electric vehicles, for the current situation, according to EAFO website, with 3.11, the index is well below the assessment threshold of 10 AFV per recharging point. For 2020, the target for infrastructure is given only for agglomerations/densely populated areas and for those the sufficiency index with 7.85 is below the assessment threshold of 10 AFV per recharging point. However, under the assumption that the recharging infrastructure is located only in agglomerations/densely populated areas and the number of EVs outside the agglomerations/dense populated areas is 30% of the total number of EVs registered in Poland, the sufficiency index of 11.21 would not meet the assessment threshold of 10 AFV per recharging point and suggests that the targeted number of recharging points in the Polish NPF may be insufficient. Also the geographical distribution wouldn't be optimal with recharging capacities lacking in rural areas and low population density areas.

According to the visual assessment of spatial distribution of recharging points presented in the provided map, it seems that the distance requirement of one recharging point at least every 60 km of the TEN-T Core Network will be fulfilled at most of the network.

The Polish NPF does not contain targets for recharging infrastructure development beyond 2020.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The Polish NPF contains a list of 32 urban/suburban agglomerations selected to be equipped with electric recharging points, including the data on population, area, number of registered vehicles, community motorisation (number of vehicles/1,000 inhabitants), population density, motorisation density, number of electric cars, and targeted number of standard and high power recharging points. The criteria of the selection are well described and justified. According to this information, it can be assumed that the urban/suburban agglomerations in Poland will be well covered with publicly accessible recharging points, although rural areas may give rise to concerns (see previous sub-section).

Electricity supply at airports for use by stationary airplanes

The description of the current situation in Poland's airports in the TEN-T Core Network is missing in the Polish NPF. The analysis of the trends of air traffic foresees doubling the number of passengers until 2030. Despite this expected increase, the Polish NPF does not foresee any further development of infrastructure for electricity supply for use by stationary airplanes. However, at least the biggest Polish airports are already using fixed and mobile ground power units.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The NPF states that in the Polish maritime ports of the TEN-T Core Network there is already shore-side electricity (SSE) infrastructure of the older generation (400 V / 50 Hz / <100 kW) available, while modern, high power infrastructure is missing. The port in Gdynia already developed a concept of modernising the whole port area. Its realisation is however pending, except of the new ferry terminal where SSE is currently being built (expected to finish by end 2019). The port in Świnoujście - only for the ferry terminal a concept is already developed; the realisation date is not decided yet, pending also availability of European funds. The Polish NPF states that the best approach would be to create a pilot project in one of the four TEN-T Core Network ports to practically assess the benefits and costs. Placing such infrastructure in all ports of the TEN-T network, according to the Polish NPF, is not economically justified.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.22-3 shows that the currently available number of CNG refuelling points is sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. Regarding the future development of the market, the NPF targets only the number of CNG refuelling points in agglomerations/densely populated areas in 2020 and for CNG refuelling points located along the TEN-T Core Network in 2025. Both are well below the threshold indicating sufficient availability of refuelling points in those cases. However, the number of CNG vehicles projected for 2020 and presented in different chapters of the NPF is not coherent, on page 28 the number presented in a graph (all CNG vehicles in 2020) is 9,592 while on page 30 the number of CNG vehicles in agglomerations/dense populated areas in 2020 is projected at 2,296 (as declared it should be 70% of the total number of CNG vehicles). According to the visual assessment of spatial distribution of CNG refuelling points presented in the provided map, they would cover the country rather evenly. The number of planned CNG refuelling points gives confidence that the distance requirement should be easily met.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Polish NPF explicitly identifies 32 urban/suburban agglomerations and densely populated areas for CNG infrastructure coverage. It can be assumed that the deployment of the targeted CNG refuelling points should ensure appropriate coverage.

Road LNG refuelling points along the TEN-T Core Network (2025)

At country level a target of 14 LNG refuelling points in 2025 located along the road TEN-T Core Network (on the network or at other locations along the network that are accessible from it) is mentioned, however the location of the points is not indicated. Depending on their location, the foreseen LNG refuelling infrastructure along the TEN-T Core Network could ensure that the maximum distance requirement would be fulfilled on Polish territory.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

LNG refuelling is foreseen for all 4 Polish maritime ports of the TEN-T Core Network by 2025. Ship-to-Ship, Truck-to-Ship or Container bunkering is expected to be used instead of stationary on-land infrastructure. In Gdansk, LNG bunkering is already available today.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

There are two inland ports in the TEN-T Core Network (Szczecin and Świnoujście) and both are at the same time maritime ports for which LNG refuelling capabilities are planned. Currently, nothing is planned in Police, the only inland port in the TEN-T Comprehensive Network.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Regarding hydrogen, the Polish NPF states that "Infrastructure for hydrogen refuelling does not exist in Poland" and "There are also no grounds to develop hydrogen refuelling points in Poland in the near future". However, Poland participated in the HIT-2-CORRIDORS project in which the construction of 30 hydrogen refuelling points in urban/suburban agglomerations and along the TEN-T Corridors was advised before 2030.

5.22.4 Deployment of alternative fuels vehicles and vessels

A main focus of the Polish NPF is on electric and CNG cars. The current share of electric vehicles of the total number of registered vehicles is ~0.004% and their new vehicle share is ~0.06%. In 2020, those numbers should be around: 0.3%, and 10% respectively while in 2025 it should be ~3.5% and ~46% respectively. These estimates seem unrealistically high vis-à-vis the existing and adopted support measures. The current share of CNG vehicles of the total number of registered vehicles is ~0.014%. According to the Polish NPF, this share should rise to 0.036% in 2020 and 0.18% in 2025.

The Polish NPF declares maturity is reached for the LPG market in road transport with the current 14% share of LPG fuelled cars of the total number of cars. The NPF does not contain projections of the market development for LPG vehicles nor infrastructure.

For any of the other alternative fuels or transport modes the Polish NPF does not specify any future estimates for alternative fuels and vessels.

5.22.5 Assessment of the measures to implement Article 3

For the entirety of the measures identified in the Polish NPF, according to the assessment methodology, a low overall assessment score is derived for all fuels and modes.

The Polish NPF contains a portfolio of different measures, but most of the measures are still in the consideration phase with only few being in the legislative process. Thus, the assessment scores are low.

Most of the measures are only under consideration and there is a lack of concrete information (like budget ceiling, etc.), which makes it difficult to assess the scope according to the same methodology.

Assessment of the measures that can ensure national targets and objectives

The measures in this category cover: AFI and AFV, several fuel types, modes of transport, financial and nonfinancial support. The presented portfolio of measures can indeed address many of the deployment barriers and, as a consequence, the portfolio of all measures could be considered quite comprehensive, however its effect will depend a lot on the final details of the measures after they are adopted.

From the alternative fuel and mode of transport clustering analysis, it resulted that most measures presented address electric vehicles, which is one important focus of the Polish NPF. The share of EV in the new car market in Poland remains currently at a very low level, however with an upward trend. The main barrier of market development is the higher cost of AF vehicles and infrastructure compared to their

conventional equivalents and thus financial measures are in the focus. The other focus is on organising the legal and regulatory frames of the AF market.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Polish NPF foresees few measures in this category, covering mainly electric AFI and AFV. The measures cover support for electric buses and EV rental. Also reducing excise duties and VAT, as well as more favourable depreciation rules would contribute to support given to the public transport services sector. Most measures for public road transport are still only under consideration and thus were assessed as having a low score. Electric trams, trolley-buses and trains are not mentioned in the NPF despite the fact that they are responsible for covering a significant part of passenger transport needs of Poland.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The Polish NPF does not contain specific measures that could be classified in this category.

5.22.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Polish NPF contains measures supporting the local authorities that engaged in development of publicly available AF infrastructure. It also contains several statements (regarding e.g. Shore-to-Ship electricity supply, LNG infrastructure in ports, electricity supply to stationary airplanes) regarding the current and foreseen future demand for the AF supply, which can be seen as consideration of stakeholder needs.

5.22.7 Assessment of MS cooperation and coordination with other Member States

The Polish NPF does not mention any cooperation with other Member States. Nevertheless, some cooperation to support AFI along the TEN-T network or supply of LNG fuel in Estonia where LNG propelled ferries (built in Gdańsk) are refuelled.

5.22.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attainment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	1,010	76,898 (53,829*)	0.32	1.3	325	6,859	4.7	3.11	11.21 (7.85*)	L	c
CNG / vehicles / 2020	1,722	9,592 (2,296*)	0.04	18.0	27	72	37.5	63.78	133.22 (31.88*)	L	c
LNG / heavy duty vehicles / 2025	57	3,000	0.20	1.9	3 (NPF) 0 (EAFO)	14	21.4		OK	L	n
LNG / seagoing ships / 2025					1	4	25.0		OK	L	c
LNG / inland waterway vessels / 2030					0	2	0.0		(OK)	X	-
H2 / vehicles / 2025	0				0				X	X	-
LPG / vehicles	2,914,000				5,420				OK	X	-

*= data available for agglomerations/densely populated areas

The Polish NPF addresses most of the requirements of Article 3. It contains a description of the current state and future estimates for alternative fuels vehicles in the transport sector and establishes targets as required by Article 3 of the Directive. The analysis of agglomerations/densely populated areas and TEN-T network needs regarding AFI, including the calculation of market needs can be considered exemplary. The Polish NPF does not contain any measures that could encourage and facilitate the deployment of recharging points not accessible to the public.

The Polish NPF puts a lot of emphasis on the development of the market for electric and CNG cars; however, it is currently at a very early stage of its development. In view of the low numbers of EV and CNG cars on the road today, Poland has at the moment a sufficient network of public recharging and CNG refuelling points and this situation is going to be maintained in the time frame mentioned in the NPF. Beyond 2020, Poland, in its NPF, defined a very ambitious target of reaching more than 1 million of EVs on the road by 2025. The support measures defined in the NPF may not be sufficient to ensure target achievement, considering that the EV share in Poland is very low today. The spatial distribution of recharging points seems to appropriately cover the needs of electric vehicles in terms of distance requirements. No targets are foreseen for increasing the availability of electricity supply for stationary airplanes. Also for shore-side electricity the Polish NPF does not contain concrete targets. However, it envisages a pilot project to better assess the cost and benefits.

The planned LNG refuelling points for heavy-duty vehicles could guarantee that the maximum distance requirement for LNG refuelling points along the road TEN-T Core Network would be fulfilled on Polish territory.

LNG refuelling is planned for all maritime and inland ports in the TEN-T Core Network.

The Polish NPF displays no commitment towards hydrogen in the next future.

The Polish NPF contains a comprehensive list of measures; however, most of them are still only under consideration or in an early stage of the adoption process. Very few are already in place. Some of the measures, especially the ones targeting to improve the economics of AF, can be considered having a medium impact on market actor's decisions. Poland has also defined ambitious targets for low emitting vehicles in fleets of companies performing public services and fleets of public institutions. Direct incentives are foreseen aiming in increasing the AFV market share. The Polish NPF also contains targets for increasing shore-side electricity supply in its maritime ports.

The consideration of the interests of regional and local authorities, as well as stakeholders during the drafting of the Polish NPF is not evident throughout the text of the NPF. This issue should be strengthened.

Poland did not present any evidence of coordinating its plans on alternative fuels infrastructure with other countries, especially neighbouring. It is advised to provide evidence of existing collaborations and planning or to engage in such cooperation.

5.23 Portugal

5.23.1 Description of the MS

Length of the road TEN-T Core Network

The road TEN-T Core Network in Portugal has a length of 908 km. In 2014, the length of the motorway network was 3,065 km and the length of the total road network was 14,310 km.

The length of the TEN-T Road Corridors present in Portugal is 18% (796 km) of the Atlantic Corridor.

Through the TEN-T Road Corridors, Portugal is connected with Spain through the Atlantic Corridor.

Number of registered road vehicles

Based on Eurostat data, the Portuguese vehicle stock (M1+M2+M3+N1+N2+N3) in 2014 was 6,025,873. According to the NPF, EVs represented less than 0.1% of the vehicles in use in 2015. Adopting the *Plano Nacional de Ação para as Energias (PNAER) 2020* estimates, Portugal foresees an EV stock of almost 34,000 units (including two-wheelers) in 2020. By extrapolating these estimates, the NPF shows a projection of ca. 80,000 electric cars in 2030 (179,000 EVs, if two-wheelers are included).

Number of main agglomerations

- 25 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 1 inland port in the TEN-T Core Network (Porto)
- 3 maritime ports in the TEN-T Core Network (Lisbon, (Porto-) Leixões, Sines)
- 10 maritime ports in the TEN-T Comprehensive Network

Number of airports in the TEN-T Core Network

- 2 airports in the TEN-T Core Network (Lisbon, Porto)
- 13 airports in the TEN-T Comprehensive Network

5.23.2 Summary of the National Policy Framework submitted

Short description of the measures

The Portuguese NPF provides detailed information on past legislation related to the contents of the Directive. It gives the impression that the level of ambition of key policies has tended to erode over time. For instance, the *Resolução do Conselho de Ministros* n.º 81/2009 and Decree-Law n.º 39/2010 contemplated a EUR 5,000 subsidy to purchase an electric car; however, this seems to have been amended by Law n.º 82-D/2014 and Law n.º 42/2016 (pp. 3195; 3200-3201 of the NPF). Conversely, no EV purchase subsidy in Portugal for the period 2013-2016 is reported[6]. In total, the NPF contains a table listing 31 relevant policy measures, structured by type of alternative fuel.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

The Portuguese NPF does not cover aviation, thereby lacking information on electricity for stationary airplanes. As the NPF indicates, post-2020 targets related to EV infrastructure will depend on the evolution of the EV sales / stock.

Table 5.23-1. The national targets and objectives regarding alternative fuels infrastructure

	Current (EAFO	2020	2025	2030

[6] ACEA electric vehicles incentives overview

Fuel	March 2017)							
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	2,258	1,126*	14,000**	2,394*	45,000**		80,000**	
Electricity for stationary airplanes								
LPG for vehicles	>50,000	347		393				
CNG for vehicles*	618	6	858***	8		17		
LNG for road*	0	4		6	200	11		
LNG for maritime ports		1				5		
LNG for inland ports								
H_2 for road								

Legend: AFV = Alternative Fuels Vehicle, AFI = Alternative Fuels Infrastructure, *Public. **Based on a visual assessment of the chart found in the NPF. ***Buses only (based on the assumption of 500 new CNG buses, as indicated in the NPF, plus the current CNG bus fleet, thereby implicitly assuming that the existing 358 CNG buses remain / are replaced by new CNG buses).

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that the requirements of the Directive are mainly, but not fully, fulfilled.

Table 5.23-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			See Part A and B of the NPF.	3193-3224
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Rail electrification also considered.	3204-3206
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				3222
4(1)	within networks determined by the MS	Road	Electricity	x		N.M.	A minimum of 2 recharging points per municipality.	3222
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen			N.A.	Hydrogen is mentioned in the NPF. However, it seems it is not formally part of the NPF (neither targets nor policies are communicated).	3220-3221
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen			N.A.		3220-3221
5(1)	cross-border links	Road	Hydrogen			N.A.		3220-3221
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	x				3208; 3224
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG		x		Portugal has only one inland port: Porto. No info on this could be found.	
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG.	Maritime and Inland ports	LNG	x				3208; 3224
6(3)	consideration of market needs	Maritime and Inland ports	LNG	x			LNG deployment in ports to be dependent on the port's needs.	3224
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network.	Maritime and Inland ports	LNG		x			
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x				3210; 3223
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	x				3208
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x				3210; 3223
	within networks determined by the MS	Road	CNG	x		N.M.	The NPF contains a map that shows planned CNG stations.	3210
6(8)	Definition of an appropriate number of refuelling points for CNG accessible to the public to be put in place by 31 December 2025 along the existing TEN-T Core Network.	Road	CNG	x			The distance requirement defined in the Directive is mentioned in the NPF.	3210; 3223
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity		x		One relevant policy measure is listed in the NPF. However, its description is rather short and ambiguous and the measure scheduled to be introduced in 2020. The NPF does not contain further info on shore-side electricity supply for vessels and seagoing ships.	3227
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes.	Airports	Electricity		x			
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG	x			Madeira and Azores considered.	3224
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity	x			See Table 1 and 2 of the NPF. The criteria for the choice of location is listed in the NPF.	3197-3198
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG		x		Although the NPF contains a map that shows the location of existing and planned CNG refuelling points, the NPF does not designate urban/suburban agglomerations.	3210
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				3224-3227
			CNG	x				3224; 3227-3228
			LNG	x				3228
			Hydrogen			N.A.		
		Maritime	Shore Side Electricity	x			The description of the measure can be interpreted as being applicable to both inland and maritime ports.	3227
			LNG	x				3227-3228
		Inland Waterway	Shore Side Electricity	x				3227
			LNG	x				3227-3228
		Airports	Electricity for stationary airplane		x			
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x			Taxis.	3225
			CNG	x				3222; 3224
			LNG		x			
			Hydrogen			N.A.		
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	x			Three measures listed in the NPF.	3226
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All		x			
3(4)	Assessment of MS cooperation and coordination with other member states	All	All	x		N.M.	E.g. Natural gas interconnection between Portugal and Spain in the context of a CEF project.	3208

5.23.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.23-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, Is			
	Current	2020	2025	2030
Electricity for vehicles	2.01	5.85	-	-

CNG for vehicles	103.00	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Using the information from the NPF, I_S values of 2.01 and 5.85 are calculated for electric vehicles in respectively 2017 and 2020. Therefore Portugal meets today, and is expected to meet in 2020, the requirement of at least one recharging point for every 10 electric vehicles. In fact, Portugal claims in the NPF to be a pioneer in the supply of interoperable public recharging infrastructure for electric vehicles. Almost all the available public recharging points (99.7%) are normal power. Since post-2020 targets related to recharging infrastructure are not communicated, it is not possible to calculate the I_S for 2025 and 2030.

The NPF contains figures and maps. Although the NPF does not contain a map of Portugal showing the current location of electric recharging points, this information can be found in the website of the MOBI.E initiative, which is mentioned by the NPF. Based on this online map, the spatial distribution of recharging points overall seems to fulfil the distance requirement of one recharging point at least every 60 km along the TEN-T Core Network, with three exceptions: namely, between (near) Aveiro and Viseu, Setúbal and Sines as well as between Évora and the Portugal-Spain border near Badajoz. Recharging infrastructure in Southern Portugal, where the TEN-T Network is designated as Comprehensive, is more scarce than in Central and Northern Portugal.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

Based on the aforementioned MOBI.E online map, the main urban/suburban agglomerations appear to be well-equipped with electric recharging points. With regards to the two Portuguese autonomous regions, whereas recharging infrastructure can be found in Madeira, there are currently no recharging points in the Azores archipelago.

For high power recharging infrastructure, the NPF gives information on the location of installed and planned recharging points (respectively, Table 1 and 2 of the NPF). The choice of location is based on criteria such as inter-urban connection.

Electricity supply at airports for use by stationary airplanes

The Portuguese NPF does not provide information on electricity supply at airports.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

Although the Portuguese NPF devotes no section to shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports, it does include a relevant policy measure. However, the measure is rather ambiguous and is scheduled to be launched in 2020. Without communicating targets, it becomes difficult to assess the possible effect of the proposed measure.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

In Portugal, the number of public CNG refuelling points is almost as large as that of private CNG points. An I_S value of 103 is estimated, suggesting that available public CNG refuelling infrastructure, relative to current CNG stock, is adequate. In addition, when private CNG refuelling points in Portugal are taken

into account, then the index further improves, decreasing to 47.5. In other words, Portugal fulfils the requirement of one CNG refuelling point per estimated 600 CNG vehicles by a large margin. The NPF communicates the following targets related to public CNG infrastructure: 8 points by 2020 and 17 by 2025 (from 6 in 2015). Because the Portuguese NPF does not provide future estimates for CNG cars, it is not possible to derive the sufficiency index for 2020 and 2025.

The NPF includes a map of Portugal showing existing and planned CNG and LNG refuelling infrastructure. Similar to electric recharging infrastructure, there is an apparent split between Southern Portugal and the rest of the country. As a matter of fact, no CNG infrastructure is envisaged for the South. Along the TEN-T Core Network, the route between Aveiro and the border with Spain near Ciudad Rodrigo does not meet the distance requirement of one CNG refuelling point at least every 150 km. The same occurs, according to a visual assessment, between Aveiro and Santarém as well as between Setúbal and Sines. Notwithstanding the presence of CNG/LNG refuelling infrastructure between Elvas and Badajoz (Spain), this is insufficient to meet the distance requirement along this route (to Setúbal via Evora) of the TEN-T Core Network.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

Based on a visual assessment, Lisbon and Porto appear to be well-equipped with CNG refuelling infrastructure. The Portuguese NPF does not designate urban/suburban agglomerations selected to be equipped with CNG refuelling points by 2020.

Road LNG refuelling points along the TEN-T Core Network (2025)

The NPF indicates that 4 public road LNG refuelling points are currently available in Portugal. The NPF foresees 6 public road LNG refuelling points by 2020 and 11 points by 2025. The distance requirement of one publicly accessible LNG refuelling point every 400 km would not be met in the section of the TEN-T Core Network between Porto and the Portugal-Spain border near Ciudad Rodrigo. No road LNG refuelling points on that area have been stated in the Spanish NPF.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

The Portuguese NPF communicates a target of 5 LNG refuelling points in maritime ports by 2025. Three of them will be located in the three Portuguese maritime ports along the TEN-T Core Network.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

The Portuguese NPF provides no target for LNG refuelling in the inland port by 2030.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

In a section of the NPF devoted to hydrogen, Portugal indicates that the definition of infrastructure deployment targets for this alternative fuel is, at present, “premature”.

5.23.4 Deployment of alternative fuels vehicles and vessels

The Portuguese NPF relies on the estimates of the PNAER 2020 to communicate deployment numbers for electric vehicles until 2030. It is worth noticing that the stock of electric two-wheelers accounts for a substantial share of e-mobility in Portugal, not only today but also in the projections. Targets for vessels are not available.

5.23.5 Assessment of the measures to implement Article 3

The Portuguese NPF offers an overview of past legislation. This is not assessed here. For the purposes of the Directive, the policy measures listed in Table 9 of the NPF are considered. There are 4 measures for alternative fuels in general, 20 for electricity and 7 for natural gas. With one exception, these measures are expected to be introduced in 2017-2018. For this reason, the status of 'adopted' has been assigned in our assessment. The remaining measure, to start in 2020, has been assigned 'under consideration' status.

Assessment of the measures that can ensure national targets and objectives

Overall, the table of policy measures shown in the NPF is relatively sensible. From our clustering analysis, road electrification emerges as the most comprehensive policy package. CNG and LNG clusters are also identified for road transport, however they include measures that are of a nonfinancial measure. The use of LNG for water transport is also represented, with only two measures (one tackling vehicles and the other infrastructure), albeit financial.

In general, the degree of detail found in the description of each policy measure is insufficient to assess the extent to which the measure might realistically contribute to meet the targets set in the NPF.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The NPF proposes two policy measures that are, in theory, expected to be effective in the promotion of alternative fuels use in public transport. One of the measures focuses on CNG buses and the other on electric taxis. Although these measures do not necessarily promote alternative fuels infrastructure directly, they can be conceived as having a strong indirect effect.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

The NPF describes three measures targeting private electro-mobility infrastructure in Portugal. Their aim is to increase the number of recharging points in private areas, particularly in garages and new buildings.

5.23.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

No evidence of the consideration of stakeholders, regional and local authorities' interests could be found in the NPF.

5.23.7 Assessment of MS cooperation and coordination with other Member States

In the Portuguese NPF, the Declaration of Commitment to Decarbonisation of the Economy and Promotion of Electric Mobility is highlighted, which can be taken as an example of cooperation with France and Spain.

Furthermore, the need for coordination with Spain is considered in the context of the future evolution of e-mobility in at least two main respects: (i) recharging infrastructure; and (ii) grid network interconnection. Finally, the strengthening of links between Portugal and Spain for railways and natural gas supply are mentioned.

5.23.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Public AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	2,258	14,000**	0.23	16.1	1,126*	2,394*	47	2.01	5.85	M	c
CNG / vehicles / 2020	618	858***	****	****	6	8	75	103.00		M	n
LNG / heavy duty vehicles / 2025	0	200	0.11	0	4	11	36		i	L	n
LNG / seagoing ships / 2025					1	5	20		(OK)	M	n
LNG / inland waterway vessels / 2030									X	X	-
H2 / vehicles / 2025									X	X	-
LPG / vehicles / 2020	50,000				347	393	88		OK	X	-

*Public. **Based on a visual assessment of the chart found in the NPF. ***Buses only ****Not calculated because the information available relates only to buses.

The Portuguese NPF addresses most of the requirements of Article 3. It contains a description of the current state and future estimates for alternative fuels vehicles in the transport sector and establishes targets as required by Article 3 of the Directive, except LNG refuelling in its TEN-T Core Network inland port.

Thanks to its strategy to develop electric recharging infrastructure, Portugal was an early mover. However, the stock of EV has grown slowly, as corroborated by the sufficiency index. The ratio of EV per recharging point is low, suggesting that Portugal may consider implementing further support measures, specifically designed to stimulate the market uptake of EVs, in order to align the deployment of EV infrastructure with EVs on the road. The recent introduction of EV purchase subsidies (2,250 EUR for BEVs and 1,125 EUR for PHEVs) is likely to have a slightly favourable impact in this regard. The future estimate of EVs in Portugal is modest with a share of about 0.23% in 2020. The role of two-wheelers in Portugal can also be highlighted. The NPF estimates ca. 20,000 electric two-wheelers in 2020. The Portuguese NPF does not discuss electricity supply for stationary airplanes. Furthermore, the provision of shore-side electricity supply for vessels and seagoing ships is minimally addressed, but not articulated.

There appears to be a need to fulfil the distance requirements for CNG along several routes of the TEN-T Core Network. In terms of LNG, the NPF defines 2025 targets, both for road and maritime transport. It also proposes supporting policy measures which, in principle, may lead to achieving these targets. However, appropriate coverage of LNG refuelling seems not to be ensured for the complete TEN-T Core road Network crossing Portuguese territory. Given the weight of LPG in the Portuguese alternative fuels vehicle stock, the NPF offers a target for LPG refuelling points in 2020.

The Portuguese NPF, at the moment, does not foresee any targets for hydrogen for transport.

The NPF is detailed in describing past legislation and contains a relatively abundant list of policy measures, structured by type of alternative fuel. Positively, the Portuguese NPF tackles infrastructure deployment in the realms of public transport and private electro-mobility. However, there is no indication of the tentative size of funding to be earmarked for the implementation of these measures. The rate of tax

exemptions is not communicated either. This is an important issue because, as could be seen from past plans (e.g. EV purchase subsidy), translating these into action is far from a simple process.

Finally, the NPF highlights at several instances the importance of MS cooperation, particularly with Spain.

5.24 Romania

By 1st October 2017 (cut-off date for the Commission NPF assessment), Romania had not notified an NPF to the Commission.

5.25 Sweden

5.25.1 Description of the MS

Length of the road TEN-T Core Network

The road TEN-T Core Network in Sweden has a length of 3,034 km. In 2014, the length of the motorway network was 2,057 km and the length of the total road network was 98,515 km.

The length of the TEN-T Road Corridors present in Sweden is 16% (1,039 km) of the Scandinavian - Mediterranean Corridor.

Through the TEN-T Road Corridors, Sweden is connected with Norway and Denmark through the Scandinavian - Mediterranean Corridor and Finland through the core network.

Number of registered road vehicles

According to the NPF, there are almost 4,700,000 passenger cars on the Swedish roads. No estimate of the total number of vehicles is given in the NPF. Sweden is a special case in the EU because around 5% of the total car stock is capable to run on fuels with various bio-ethanol/gasoline contents (flex-fuel). Electric cars currently account for ca. 0.5% of the car stock. Sweden considers that the electric vehicle stock 'will increase steadily' but communicates no future quantitative estimates.

Number of main agglomerations

- 13 cities > 50,000 inhabitants (source – Eurostat)

Number of ports in the TEN-T Core Network

- 2 inland ports in the TEN-T Core Network (Gothenburg, Stockholm)
- 2 inland ports in the TEN-T Comprehensive Network
- 5 maritime ports in the TEN-T Core Network
- 20 maritime ports in the TEN-T Comprehensive Network

Number of airports in the TEN-T Core Network

- 3 airports in the TEN-T Core Network
- 23 airports in the TEN-T Comprehensive Network

5.25.2 Summary of the National Policy Framework submitted

Short description of the measures

Most of the measures highlighted in the Swedish NPF are already in place. The intention to introduce an ambitious measure (a bonus-malus system) is communicated. If implemented, it can be expected that this measure will have a positive impact on the future number of low-emission vehicles registered in the country.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030

The Swedish NPF does contain neither any future AFI targets, nor any quantitative future AFV estimates.

Table 5.25-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	34,633	2,854						
Electricity for stationary airplanes		10						
Biofuel for vehicles	235,000*	1,828**						
CNG for vehicles	30,354 (EAFO) 44,109 (NPF)	163						
LNG for road	69	6***						
LNG for inland ports								
H_2 for road	10 (NPF) 28 (EAFO)	3		5				

Legend: AFV = Alternative Fuels Vehicle, AFI = Alternative Fuels Infrastructure, *Cars, **E85, ***Public.

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that the requirements of the Directive are largely unmet.

Table 5.25-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			The NPF does not specifically reflect on cross-border continuity	pp. 9-21
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Rail and cycle briefly mentioned	18; 27
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity		x			
4(1)	within networks determined by the MS	Road	Electricity		x	N.M.		
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	x				18
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen		x			
5(1)	cross-border links	Road	Hydrogen		x			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG		x			
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG		x			
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG.	Maritime and Inland ports	LNG		x			
6(3)	consideration of market needs	Maritime and Inland ports	LNG		x			
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network.	Maritime and Inland ports	LNG		x			
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG		x			
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x			
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG		x			
	within networks determined by the MS	Road	CNG		x	N.M.		
6(8)	Definition of an appropriate number of refuelling points for CNG accessible to the public to be put in place by 31 December 2025 along the existing TEN-T Core Network.	Road	CNG		x			
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity		x			
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes.	Airports	Electricity		x			
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		x			
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity		x			
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG		x			
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				pp. 25-30
			CNG	x				pp. 25-30
			LNG	x				pp. 25-30
			Hydrogen	x				pp. 25-30
		Maritime	Shore Side Electricity	x				pp. 27-28
			LNG	x				pp. 27-28
		Inland Waterway	Shore Side Electricity		x			
			LNG		x			
		Airports	Electricity for stationary airplane		x			
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	x				pp. 26-28
			CNG	x			CNG not explicitly mentioned but considered to fall under measure targeting all alternative fuels	pp. 26-27
			LNG	x			LNG not explicitly mentioned but considered to fall under measure targeting all alternative fuels	pp. 26-27
			Hydrogen	x			Hydrogen not explicitly mentioned but considered to fall under measure targeting all alternative fuels	pp. 26-27
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		x			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x			For example, the 'Fossil-Free Sweden' initiative	29
3(4)	Assessment of MS cooperation and coordination with other member states	All	All	x		N.M.	Reference to establishing a system of similar fairway charging structures in the Baltic Sea Area	28

5.25.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.25-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, Is			
	Current	2020	2025	2030
Electricity for vehicles	12.13	-	-	-
CNG for vehicles	186.22	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

An I_S of 12.13 is estimated at present for electric vehicles using the information from EAFO. Thus, Sweden is currently not meeting the requirement of at least one recharging point for every 10 electric vehicles. The Swedish NPF indicates that 'a very large number' of private recharging points exists in houses, workplaces and car parks, but these are excluded from the official statistics. According to EAFO, in 2016 there were 2,738 public recharging points in the country.

According to the visual assessment of spatial distribution of recharging points presented in the provided map and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one recharging point at least every 60 km is not met in sections of the core network. This conclusion might be reversed if sufficient details on spatial distribution of normal power recharging points are provided.

Based on the information available in the Swedish NPF, it is not possible to calculate the values for the horizons 2020, 2025 and 2030. Note that the NPF says that 'the Climate Leap has contributed to a total of 3,849 new recharging points', but it is unclear what the expected number of AFI for electric vehicles in 2020 is.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

Only insufficient information on this matter can be found in the Swedish NPF. Maps are provided, though these show only high power recharging points. Notwithstanding the limited information, the main urban agglomerations (13 cities with a population greater than 50,000 inhabitants) currently seem to be adequately equipped with public electric recharging points.

Electricity supply at airports for use by stationary airplanes

The Swedish NPF reports electricity supply for use by stationary airplanes only for the Swedavia AB airports. Seven of them have 'an electrically connected Ground Power Unit (GPU) at all aprons'. The rest (three airports) have GPUs in either some or most of their aprons.

The NPF does not provide any indication as regards future developments on this area.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The Swedish NPF provides no numerical estimates of shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports by 2025.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

With an I_S value equal to 186.22, Sweden meets the requirement of one CNG refuelling point per estimated 600 CNG vehicles. The I_S was calculated using the value of 163 CNG refuelling points from EAFO. As the NPF states, there are more private and municipal points than reported. In principle, the currently available CNG infrastructure could accommodate a CNG stock of around 120,000 vehicles. This would entail almost a tripling of the current stock.

According to the visual assessment of spatial distribution of refuelling points presented in the provided map and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one refuelling point at least every 150 km is unfulfilled because this criterion is not met in the northern section of the TEN-T Core Network. Sweden justifies this by mentioning sparse population in northern

inland areas. The southern part of the country seems to have adequate CNG refuelling infrastructure coverage.

The Swedish NPF provides no numerical estimates of future CNG vehicle and infrastructure deployment.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The Swedish NPF provides no designation of the agglomerations selected to be equipped with CNG refuelling infrastructure by 2020.

Road LNG refuelling points along the TEN-T Core Network (2025)

The Swedish NPF states that there are currently 6 public road LNG refuelling points. By visually assessing the corresponding map contained in the NPF, it can be concluded that all the 6 points are located in southern Sweden, in sites along the TEN-T Core Network. Thus, there are no public road LNG refuelling points in the central and northern sections of the Core Network. The distance between the available refuelling points does not seem to exceed 400 km.

The NPF provides no numerical estimates of road LNG refuelling points by 2025.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

The Swedish NPF provides no numerical estimates of LNG refuelling points in maritime ports by 2025.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

The Swedish NPF provides no numerical estimates of LNG refuelling points in inland ports by 2030.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

The Swedish NPF communicates the current number of hydrogen AFV and AFI but does not provide any indication on the deployment prospects of this technology/fuel in the country.

5.25.4 Deployment of alternative fuels vehicles and vessels

The Swedish NPF indicates neither targets nor future estimates for alternative fuels and vessels. The NPF seems to implicitly assume, given the proposed measures, future steady growth for electric vehicles.

5.25.5 Assessment of the measures to implement Article 3

The Swedish NPF contains a relatively comprehensive portfolio of measures. In total, the NPF describes 21 policy instruments and other incentives relevant to the contents of the Directive. The majority of these instruments are in effect. Regulatory measures complement economic instruments. For four of them, additional funding and/or temporal extension has been proposed. It is desirable for these measures to come into effect. Overall, Sweden appears to be implementing a solid policy package, beneficial to the deployment of alternative fuels vehicles. This is amongst others visible in the currently relatively high shares of newly registered EVs in Sweden.

Assessment of the measures that can ensure national targets and objectives

From the alternative fuel and mode of transport clustering analysis, it can be concluded that most of the policy measures address road electrification. Policies targeting the use of other alternative fuels (basically

CNG and biofuels) for road transport activities are also relatively well represented. In addition, the Swedish NPF contains a policy bundle addressing electricity for vessels. Most of the measures focusing on hydrogen are nonfinancial.

Although the description of policy measures in the NPF is well-balanced, it is difficult to assess how they can ensure the achievement of national targets and objectives, as Sweden provides insufficient information on these.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The Swedish NPF describes a set of four existing measures that can promote alternative fuels infrastructure in public transport services. These are all of a financial nature and target both AFV and AFI. The set of measures is not restricted to electric vehicles only. For one of the measures, additional funding and a broadening of the scope of activities (including investment in cycling infrastructure) is envisaged.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

Private recharging points are briefly mentioned in the Swedish NPF but official statistics on deployment are not available. Sweden does not indicate measures that can promote the deployment of private electro-mobility infrastructure.

5.25.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

Sweden explicitly addresses (section 1.2 of the NPF) how the interests of affected stakeholders have been taken into account. In particular, one event and two hearings with representatives of special interest groups, regional organisations, municipalities and authorities are mentioned.

In addition, a formal task to coordinate the switch to a fossil-free transport sector has been set up. This includes the development of a strategic plan, due in 2017. As part of this task, a dialogue with relevant stakeholder groups is expected to be conducted.

Furthermore, over 170 stakeholders take part of the 'Fossil-Free Sweden' initiative.

5.25.7 Assessment of MS cooperation and coordination with other Member States

With regards to the environmental impact of ships, Sweden considers that an important step in the Baltic Sea Area would be to create 'similar' charging structures (fairway and port dues) in 'as many ports as possible'.

5.25.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	34,633				2,854			12.13		M	c
CNG / vehicles / 2020	30,354 (EAFO) 44,109 (NPF)				163			186.22		M	c
LNG / heavy duty vehicles / 2025	69				6				X	X	-
LNG / seagoing ships / 2025									X	X	-
LNG / inland waterway vessels / 2030									X	X	-
H2 / vehicles / 2025	10 (NPF) 28 (EAFO)				3	5	60.0		X	L	n
Biofuels / vehicles	235,000*				1,828**				X	M	c
LPG / vehicles	491				39				X	M	c

*Cars, **E85

The Swedish NPF addresses only very few of the requirements of Article 3. According to the Swedish NPF, climate change is 'one of the top priority issues for the government'. The expression 'fossil-free' is emphasised throughout the NPF. Sweden clusters national policy objectives of interest to the Directive into 6 groups: climate, energy, transport, regional, industry and consumer. Numerical targets are shown only for the first two. The Swedish NPF does neither contain any future estimates for alternative fuels vehicles nor any targets for alternative fuels recharging or refuelling infrastructure. This violates a basic requirement of the Directive. It can pose a serious risk to cross-border continuity and a functioning internal market for alternative fuels vehicles.

Concerning future estimates of electric vehicle stock, the Swedish NPF is rather vague. The lack of clear targets for future electric vehicle market deployment jeopardises the assessment and may represent an obstacle to policy efforts towards electro-mobility. It will be important to establish appropriate infrastructure targets in line with the market developments.

The Swedish NPF indicates regional discrepancies with regards to the share of natural gas use. No natural gas refuelling points can be found in large inland areas in Northern Sweden (see Figures 7-8 of the NPF). CNG refuelling infrastructure halfway the Skellefteå - Härnösand route (around southern Umeå) as well as halfway the Sundsvall - Gävle route (around Hudiksvall) would appear sufficient to meet the requirement of one refuelling point at least every 150 km.

The use of alternative fuels for public transport activity is concisely addressed. Rail is briefly mentioned. Additional details would be desirable.

The Swedish NPF highlights the role of biofuels in the country's transport sector and the fact that Sweden has already met the sectoral 2020 target set by the Renewable Energy Directive. The Swedish NPF stresses that no special infrastructure is required for biofuels and regards this as a cost-effective solution for road vehicles. At the same time, the NPF indicates that new flex-fuel car registrations have decreased dramatically in recent years (0.4% share in 2015).

The Swedish NPF contains a relatively comprehensive portfolio of measures. Overall, Sweden appears to be implementing a solid policy package, beneficial to the deployment of alternative fuels vehicles, also

visible in the current high shares of newly registered EV; but, as the Swedish NPF does not contain future quantitative targets for AFI, it is difficult to judge how the support measures can support reaching the objectives.

Further elaboration on the possibility of Member State cooperation to establish a harmonised fairway and port recharging system in the Baltic Sea Area would be advantageous.

Information on AFI targets related to inland waterways, airports and private electro-mobility is inadequate. Information on these is essential in view of the requirements stipulated in the Directive.

5.26 Slovenia

By 1st October 2017 (cut-off date for the Commission NPF assessment), Slovenia had not notified an NPF to the Commission. [7]

5.27 Slovak Republic

5.27.1 Description of the MS

Length of the road TEN-T Core Network

The total road length of Slovakia (including motorways, main/national roads, secondary/regional roads) is 17,954 km from which 420 km is motorways and 832 km the length of the TEN-T Core Network, out of which 48% of the Core Network still have to be built.

The following lengths of the TEN-T Road Corridors are present in Slovakia: 7% (256 km) of the Baltic - Adriatic Corridor, 1% (81 km) of the Orient / East - Mediterranean Corridor and 9% (395 km) of the Rhine - Danube Corridor.

Through the TEN- T Road Corridors, Slovakia is connected with the following Member States:
- Austria (through the Baltic - Adriatic and the Rhine - Danube Corridor)
- Poland (through the Baltic - Adriatic Corridor)
- Czech Republic (through the Orient / East Mediterranean and the Rhine - Danube Corridor)
- Hungary (through the Orient / East Mediterranean and the Rhine - Danube Corridor)

Number of registered road vehicles

At the end of 2014, according to the Slovak NPF, Slovakia had 1,949,055 registered passenger cars from the total of 2,725,538 registered road vehicles of all types (passenger cars, trucks, buses, tractors, semitrailers and motorcycles). The present situation of less than 0.04% (around 1,000 out of 2,700,000) of AFV is regarded by Slovakia as insufficient and in need of improvement. On 30 June 2015, there were 1706 registered vehicles in Slovakia that can run on CNG (0.074% of the total number of vehicles registered in Slovakia), out of which 363 powered exclusively by CNG (out of which 228 are buses with

[7] However, by adoption date of this SWD Slovenia had notified its NPF.

an average age of seven years). There were 178 battery electric vehicles and 318 hybrids (petrol + electricity, and diesel + electricity), with only a smaller share plug-in hybrids (76).

Number of main agglomerations

- 8 cities >50,000 inhabitants: Bratislava, Kosice, Banská Bystrica, Nitra, Presov, Zilina, Trnava, Trencín (source – Eurostat)

Number of ports in the TEN-T Core Network

- 2 inland ports in the TEN-T Core Network: Bratislava and Komarno.
- No ports in the TEN-T Comprehensive Network.
- No maritime ports.

The Rhine - Danube Core Network connects by water the Slovak section of the River Danube from the Austrian border to the Hungarian border (including the cities of Devin, Bratislava, Komárno and Štúrovo). The second core network includes the section of the River Váh from its mouth at the Danube (Komárno) and via Sereď to Žilina.

Number of airports in the TEN-T Core Network

- 1 airport in the TEN-T Core Network: Bratislava
- 2 airports in the TEN-T Comprehensive Network: Košice, Poprad Tatry.

5.27.2 Summary of the National Policy Framework submitted

Short description of the measures

The measures of the Slovak NPF are mainly oriented to ensure national targets and objectives will be reached. Some measures are tax incentives and direct incentives for purchase of vehicles but most of the measures are administrative. This could result in having only a limited effect. Specific measures to promote AFI in public transport services or to promote private electro-mobility infrastructure have not been considered in the Slovak NPF.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030.

Table 5.27-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	586	440	10,000	750	20,000	1,500	35,000	
CNG for vehicles	822	10	5,000	41	15,000	90	30,000	
LNG for road						2		
LNG for inland ports								2

LPG for vehicles	13	1,000						
H_2 for road	9							

Legend: AFV = Number of Alternative Fuels Vehicles, AFI = Number of Alternative Fuels Recharging/Refuelling Points.

Checklist to assess whether all requirements to be addressed in the NPF are fulfilled

The checklist shows that more than half of the Directive requirements have been covered. The Slovak NPF did not consider electricity recharging points at public transport stations or within other networks. Slovakia will analyse opportunities to further advance on hydrogen infrastructure, however, does not include hydrogen refuelling points in the NPF. No measures have been taken or proposed to promote alternative fuels infrastructure in public transport services or to facilitate the deployment of private electro-mobility infrastructure.

Table 5.27-2. Checklist results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	x			Chapter 1	7
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	x			Chapter 1 and 2	7; 13
3(1)-second indent	**Establishing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	x				22
4(1)	within networks determined by the MS	Road	Electricity		x	N.M.		
4(1)	at public transport stations	Road	Electricity		x	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen				Slovakia will analyse opportunities to further the advancement of hydrogen infrastructure	25
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen		x			
5(1)	cross-border links	Road	Hydrogen		x			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2025 at maritime ports	Maritime ports	LNG			N.A.		
6(2)	Definition of an appropriate number of refuelling points accessible for LNG to be put in place by 31 December 2030 at inland ports	Inland ports	LNG	x				32; 33
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	x				32
6(3)	consideration of market needs	Maritime and Inland ports	LNG		x			
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG	x				36, 39
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	x				32
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG		x			
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	x				31
	within networks determined by the MS	Road	CNG	x		N.M.		31
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	x				31
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	x			The NPF mentions that does not seem efficient to consider the installation, in the near future, of recharging points in public ports in Slovakia, or to set objectives aimed at the promotion of electricity use in inland ports in this document. Nevertheless, the requirement under Directive 2014/94/EU means that this matter needs to be addressed when the strategy is updated, and the opportunities available in relation to this issue need to be reassessed. No numbers are given.	11; 12
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	x			In the future the purchase of mobile units using new engines that are smaller, more powerful and more efficient is expected. No numbers are given.	12
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		x			
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity		x			
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG	x				31
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	x				20, 36, 38, 39, 41
			CNG	x				39, 40, 41
			LNG	x				39, 40
			Hydrogen		x			
		Maritime	Shore Side Electricity			N.A.		
			LNG			N.A.		
		Inland Waterway	Shore Side Electricity	x				39, 40
			LNG	x				39, 40
		Airports	Electricity for stationary airplane		x			
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity		x			
			CNG		x			
			LNG		x			
			Hydrogen		x			
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity		x			
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	x			Yes during process of document preparation	5
3(4)	Assessment of MS cooperation and coordination	All	All	x		N.M.	In the context of EU funded projects	

5.27.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.27-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, I_S			
	Current	2020	2025	2030
Electricity for vehicles	1.33	13.33	13.33	-
CNG for vehicles	82.20	121.95	166.67	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.27-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding electric vehicles, for the current situation, with 1.33, the index passes largely the assessment threshold of 10 AFV per recharging point. For 2020 and 2025, the value of 13.33 of the index suggests that the targeted number of recharging points in the Slovakian NPF may be insufficient. The greatest distance between any two directly neighbouring rapid-recharging points is approximately 80 km, which according to the Slovakian NPF seems insufficient and does also not meet the distance requirement of a maximum of 60 km between two recharging points. According to the NPF, South Slovakia is poorly – perhaps even inadequately – covered in terms of all types of recharging. This is also visible in the distribution of recharging points on the TENtec infrastructure map.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

Several of the largest cities, specifically Bratislava, Košice, Prešov and Trebišov, have recently subscribed to the promotion of electro-mobility in Slovakia by signing a Memorandum on the Support of electro-mobility. Slovakia has been building up a core network of rapid recharging points. This network seamlessly connects the cities of Bratislava and Kosice along the main roads. Other larger cities have also introduced basic recharging infrastructure coverage, which tends to offer medium-fast recharging. According to the Slovak NPF, some of the larger regions are partially covered as well, but no specific information is given on this regard.

Electricity supply at airports for use by stationary airplanes

The MR Štefánik Airport in the TEN-T Core Network currently uses mobile ground power units for use by stationary airplanes. These electricity generators are powered by six-cylinder diesel units. In the future, it is expected to install fixed ground power units and to purchase mobile units using new engines that are smaller, more powerful and more efficient. However, the Slovak NPF does neither specify the number of power units on this airport nor on the comprehensive network airports and does not include any measure in this regard.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The Slovakian NPF does not include estimates or targets for shore-side electricity supply for inland ports. The NPF states that this could be reinvestigated when the Strategic Plan for the Development of Transport Infrastructure up to 2020 is updated, and there specifically the strategic objective dealing with reducing the environmental impact of water transport.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

Table 5.27-3 shows that the currently available number of CNG refuelling points and the ones predicted by 2020 and 2025 are sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles. According to the visual assessment of spatial distribution of CNG refuelling points presented in the map provided in the Slovak NPF and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one CNG refuelling point at least every 150 km is fulfilled, already today.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

According to the Slovakian NPF the first step, up to 2020, will necessitate the construction of CNG refuelling points in all towns and cities with more than 25,000 inhabitants and on the main roads in the TEN-T Core Network, i.e. 31 points in all, followed by the establishment of points in towns with more than 10,000 inhabitants by 2025 (i.e. a further 37 CNG refuelling points). It will be necessary to build one refuelling point in both the Bratislava Region and the Košice Region, plus a further approximately 10 points in the districts of Bratislava I to Bratislava V and Košice I to Košice IV, as well as on main roads in the TEN-T Core Network.

Road LNG refuelling points along the TEN-T Core Network (2025)

The Slovak NPF considers that the establishment of at least two LNG refuelling points is required for heavy goods vehicles (which is here assumed as the targeted number). However, it also considers that the ideal situation appears to be 3-5 public LNG refuelling points for road transport by 2025. Considering the network of motorways and expressways in Slovakia and the levels of traffic, the construction of LNG refuelling points, according to the NPF, appears to be most appropriate in the vicinity of the following junctions: Bratislava area, Žilina area, Košice/Prešov area and Zvolen area.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

Not applicable.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Compliance with obligations deriving from the Directive would require the construction of LNG bunkering facilities in the ports of Bratislava and Komárno but this is not yet formulated as a firm target in the Slovak NPF.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their National Policy Framework (2025)

Slovakia will analyse opportunities to further the advancement of hydrogen infrastructure by reference to current hydrogen use and existing storage-related challenges. It will follow closely and contribute to R&D efforts in the field.

5.27.4 Deployment of alternative fuels vehicles and vessels

A main focus of the Slovak NPF is on electric vehicles and CNG vehicles with an ambitious plan on increasing the number of electric recharging points by 2020 (from actual 204 to 750). The NPF foresees a share of roughly 0.5% electric vehicles in 2020 and further growth until 2030 when this share is estimated to increase to levels around 1.8%. Regarding CNG, it foresees a share of roughly 0.25% of CNG vehicles in 2020 and 1.5% in 2030. For other alternative fuels or transport modes (LNG or hydrogen), the Slovak NPF does not specify any future estimates for alternative fuels and vessels.

5.27.5 Assessment of the measures to implement Article 3

Assessment of the measures that can ensure national targets and objectives

The Slovak NPF contains a short list (of 12) well-defined and detailed measures. Some of the measures are already in effect and their prolongation is considered. Most of the measures (7 out of 12) are administrative measures. The financial measures in support of deployment of electric vehicles have been assessed as having a low to medium impact, based on the overall defined budget envelope compared to the targeted number of electric vehicles. Similarly, other financial incentives (reduction in the fee for registration of vehicles running on alternative fuels, not increasing the excise duty tax on natural gas intended for use as fuel or the reduction of the yearly tax rate on vehicles running on CNG) have been rated as low. The total mix of measures can be considered as comprehensive for electric vehicles as they target vehicle and infrastructure deployment alike and as they address various deployment barriers through a combination of financial and nonfinancial measures. For the other fuels and modes, the measures have a low score and are not comprehensive.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

Specific measures to support alternative fuels in public transport services have not been considered. Although the direct incentives given for purchasing electric vehicles can also be used for public passenger service fleets.

Assessment of the measures that can promote the deployment of private electro-mobility infrastructure

Specific measures to promote the deployment of private electro-mobility infrastructure have not been considered.

5.27.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The Slovak NPF was drawn up in collaboration with the Ministry of Economy's Working Party on Electro-mobility, the members of which (in addition to representatives of State administration) are representatives of the Automotive Industry Association, the Slovak Electric Vehicle Association, energy companies, automotive industry companies, and civic associations active in the field of electro-mobility, representatives of science and research (universities and research institutions), the National Union of Employers, Klub 500, other professional organisations, and representatives of the Association for the Production and Use of Biofuels.

5.27.7 Assessment of MS cooperation and coordination with other Member States

No specific cooperation programs have been listed; however, there are some examples given where collaboration is shown. Slovakia has cooperated with Czech Republic within the Connecting Europe Facility programme. In 2015, 29 rapid recharging points were installed in Slovakia and the Czech Republic.

The Slovakian ministry moreover has also assisted since 2013 on the implementation of the TEN-T project LNG Masterplan for the Rhine-Main-Danube Corridor.

5.27.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Publicly accessible AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	586	10,000	0.49	5.9	440	750	58.7	1.33	13.33	M	c
CNG / vehicles / 2020	822	5,000	0.24	16.4	10	41	24.4	82.20	121.95	L	n
LNG / heavy duty vehicles / 2025					0	2	0.0		OK	L	n
LNG / seagoing ships / 2025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LNG / inland waterway vessels / 2030						2			OK	L	n
H2 / vehicles / 2025					0				X	L	n
LPG / vehicles	42,982 (NPF) 15,500 (EAFO)				380 (NPF) 210 (EAFO)				X	X	-

The Slovak NPF addresses partly the requirements of Article 3. It contains a discussion of the current state and future scenarios for alternative fuels in the transport sector. For all the mandatory fuels and modes (electricity and natural gas) it establishes targets as required by Article 3 of the Directive. No measures have been taken or proposed to promote alternative fuels infrastructure in public transport services or to facilitate the deployment of recharging points not accessible to the public.

The Slovak NPF puts a comparably low emphasis on electric vehicles and estimates only 0.5% electric vehicles on the road in 2020. The number of electric recharging points foreseen for 2020 and 2025 seems not sufficient to cover the needs of Slovakia in terms of number of the estimated number of vehicles and distance requirements. This could evolve to become a barrier for the further deployment of electric vehicles in Slovakia and could also lead to market fragmentation within the EU. The spatial distribution of the recharging points is not given. According to the Slovak NPF, the greatest distance between any two directly neighbouring rapid-recharging points is at the moment approximately 80 km which seems insufficient. Also according to the Slovak NPF, South Slovakia is at the moment poorly – perhaps even inadequately – covered in terms of all types of recharging. It will be important to closely monitor this development and correct the infrastructure targets in line with the market developments. Purchase incentives have been defined to increase the number of electric vehicles in Slovakia. The Slovakian NPF does not include concrete plans for shore-side electricity supply for inland ports. However, it mentions that this will be further investigated in the future. The Slovak NPF discusses electricity for stationary airplanes at the Bratislava TEN-T Core Network airport. It does not specify any quantitative targets for this.

Regarding CNG, the NPF shows that the available number of CNG refuelling points and the ones planned for 2020 and 2025 are sufficient to pass the threshold value of one CNG refuelling point per 600 vehicles today and in the future. The distance requirement of at least one refuelling point every 150 km is met already today. The NPF shows also the ambition of increasing the number of CNG refuelling points with a specific plan on selected urban/suburban agglomerations. Some lower impact financial measures have been defined to promote the use of CNG vehicles on the roads.

The Slovak NPF considers that at least two LNG refuelling points for heavy goods vehicles will be required and mentions that the ideal situation appears to be 3-5 public LNG refuelling points for road transport by 2025. If at least two LNG refuelling points were realised (one on each TEN-T Corridor; Bratislava area, Žilina area and/or Košice/Prešov area) this could guarantee that the maximum distance requirement for LNG refuelling points along the TEN-T Core Network would be fulfilled on Slovak territory.

The construction of LNG bunkering facilities in the two TEN-T Core Network inland ports (Bratislava and Komárno) is planned and measures are proposed to support the construction of these LNG facilities on the Slovak section of the River Danube.

The Slovak NPF does not include hydrogen but will analyse opportunities to further the advancement of hydrogen infrastructure.

According to the Slovak NPF, LPG is actually covered by a relatively large nationwide network of refuelling points (fulfilling the needs of vehicle operators) and the infrastructure of LPG refuelling points is constantly expanding. However, one of the main barriers preventing the development of LPG vehicles seems to be the restriction on parking in underground parking facilities.

The Slovak NPF contains a comprehensive list of support measures for electricity for vehicles, most already in place and for some a prolongation is foreseen. They can be considered having a low to medium impact on market actor's decisions. Longer periods for their validity could provide certainty for market actors and hence increase the likelihood that the national targets and objectives of the NPF can be reached. For other modes and fuels, the measures in the Slovak NPF seem to have a rather low impact and are incomprehensive. No measures are discussed to promote AFI in public transport services or to promote the deployment of private electro-mobility infrastructure.

The Slovak NPF has taken into consideration the interests of regional and local authorities, as well as other stakeholders during its drafting.

Slovakia has not listed specific cooperation programmes; however, some collaboration examples are given. Slovakia has cooperated with the Czech Republic within the Connecting Europe Facility programme and, since 2013, has also assisted in the implementation of the TEN-T project LNG Masterplan for the Rhine - Main - Danube Corridor.

5.28 United Kingdom

5.28.1 Description of the MS:

Length of the road TEN-T Core Network

The length of the road TEN-T Core Network in the United Kingdom is 2,872 km and the length of motorways is 3,760 km. The length of the total road network in the United Kingdom is 85,945 km.

The length of the TEN-T Road Corridor network present in the United Kingdom is 35% (1,457 km) of the North Sea-Mediterranean Corridor.

Through the TEN-T Road Corridors, the United Kingdom is connected with Ireland, as well as via important ferry connections to Belgium, the Netherlands, and France through the North Sea - Mediterranean Corridor.

Number of registered road vehicles

At the end of 2016, according to national statistics, the United Kingdom had 31,792,259 registered passenger cars and 38,388,214 registered road vehicles of all types. According to the NPF, the present situation of 0.35% AFV on UK roads is regarded as insufficient and in need of improvement (gas vehicles (mainly LPG) represent 0.12% and electric vehicles 0.23% of the total number of registered vehicles).

Number of main agglomerations

- 166 cities > 50,000 inhabitants (source – Eurostat)
- 9 urban nodes in the TEN-T Core Network

Number of ports in the TEN-T Core Network

- no inland ports in the TEN-T Core Network
- no inland ports in the TEN-T Comprehensive Network
- 15 maritime ports in the TEN-T Core Network
- 28 maritime ports in the TEN-T Comprehensive Network

Number of airports in the TEN-T Core Network

- 12 airports in the TEN-T Core Network
- 28 airports in the TEN-T Comprehensive Network

5.28.2 Summary of the National Policy Framework submitted

Short description of the measures

Most of the measures listed in the UK NPF are not differentiated at regional level, with some exceptions for Scotland. The great majority of measures listed in the NPF already exist, with few future ones proposed or in adoption while some of them are already expired. The differentiation between existing, future and past (here not evaluated) measures is generally difficult to derive from the information provided in the UK NPF. Their budget status is not clear in all cases. For some numbers for money spent until now is provided (evident for some measures), for others the total ceiling available is given (in the last case there is no information on the money spent until now). In these cases it is difficult to assess the scope of the measures. Altogether, the support measures contained in the UK NPF cover a number of important areas and are addressing many deployment barriers. The number of proposed measures is high and is covering mainly electricity, to a lesser extent natural gas and hydrogen as road transport fuels. The biggest part of presented measures is addressing the cost burden of AFV and AFI through incentives for the purchase of vehicles and installation of refuelling/recharging infrastructure. The second group of measures targets R&D and public awareness campaigns.

Table with the national targets and objectives established for the deployment of alternative fuels infrastructure at the horizon 2020, 2025 and 2030.

Table 5.28-1. The national targets and objectives regarding alternative fuels infrastructure

Fuel	Current (EAFO March 2017)		2020		2025		2030	
	AFV	AFI	AFV	AFI	AFV	AFI	AFV	AFI
Electricity for vehicles	89,977 (NPF) 104,751 (EAFO)	9,345 public (NPF) 12,957 public (EAFO) >85,000 private (NPF)	396,000 – 431,000	12,000 – 13,500 (public) 344,900 – 375,300 (private)				
Electricity for stationary airplanes		existing, limited data						
CNG for vehicles	57	7 (NPF) 8 (EAFO)		8 - 13		13 - 32		
LNG for road	621	11 (NPF) 20 (EAFO)		12 - 20		20 - 48		
LNG for maritime ports		2				4 - 5		
LNG for inland ports	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LPG for road	135,000	1,300 (NPF) 1,400 (EAFO)						
H2 for road	38 (NPF) 79 (EAFO)	15 (NPF) 12 (EAFO)				65		

Legend: AFV = Number of Alternative Fuel Vehicles, AFI = Number of Alternative Fuel Recharging/Refuelling Points

Check-list to assess whether all requirements to be addressed in the NPF are fulfilled

The check-list shows that the requirements of the Directive are covered.

Table 5.28-2. Check list results

Article of the Directive	Requirement	Mode of transport	Alternative Fuel	Yes	No	N.A./ N.M.	Notes	Page
3(1)-first indent	Assessment of the current state and future development of the market as regards alternative fuels in the transport sector, including in light of their possible simultaneous and combined use, and of the development of alternative fuels infrastructure, considering, where relevant, cross-border continuity	All	All	X			LNG, CNG and LPG data combined together for current situation; future estimates only for EVs	7, 11, 28
3(2)	Consideration of the needs of the different transport modes existing on the MS territory, including those for which limited alternatives to fossil fuels are available	All	All	X			no information about rail-transport, trams, trolley-buses is provided; UK Government funds (£20m 2018-2020) projects to develop low carbon waste-based fuels for planes and lorries, e.g. sustainable jet fuel	24
3(1)-second indent	**Fixing Targets per Alternative Fuel**							
	Electricity supply for transport							
4(1)	Definition of an appropriate number of recharging points accessible to the public to be put in place by 31 December 2020 - in urban/suburban agglomerations and other densely populated areas	Road	Electricity	X			The number is given, but it is very close to the current one; urban areas are considered the urban nodes on the TEN-T Core Network (no AFI quantitative details provided)	28
4(1)	within networks determined by the MS	Road	Electricity	X		N.M.	TEN-T network and corresponding urban nodes mentioned (map) but no analysis available	27
4(1)	at public transport stations	Road	Electricity		X	N.M.		
	Hydrogen supply for transport					N.M.		
5(1)	Does Member State decide to include hydrogen refuelling points in their national policy frameworks?	Road	Hydrogen	X			early nature of market mentioned, measures for AFV and AFI already in place	15
5(1)	Definition of an appropriate number of refuelling points accessible to the public to be put in place by 31 December 2025	Road	Hydrogen	X			target provided for initial network to be in place by 2025	29
5(1)	cross-border links	Road	Hydrogen		X			
	Natural Gas supply for transport							
6(1)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2025 at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Maritime ports	LNG	X			numerical target provided	29, 30
6(2)	Definition of an appropriate number of refuelling points for LNG to be put in place by 31 December 2030 at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network	Inland ports	LNG			N.A.	No inland ports on TEN-T Core Network	29
6(3)	Designation of maritime and inland ports that are to provide access to the refuelling points for LNG	Maritime and Inland ports	LNG	X			indicative areas of the spatial allocation listed (map of current situation missing) for maritime ports No inland ports on TEN-T Core Network	30
6(3)	consideration of market needs	Maritime and Inland ports	LNG		X		No inland ports on TEN-T Core Network	
6(1) and 6(2)	Cooperation among neighboring Member States to ensure adequate coverage of the TEN-T Core Network	Maritime and Inland ports	LNG		X		No inland ports on TEN-T Core Network	
6(4)	Definition of an appropriate number of refuelling points for LNG accessible to the public to be put in place by 31 December 2025 at least along the existing TEN-T Core Network (for heavy duty vehicles) where there is demand	Road	LNG	X			The number is given, no analysis available to support the number, no spatial distribution provided	28
6(6)	Definition of an appropriate LNG distribution system on the national territory, including loading facilities for LNG tank vehicles, in order to supply the refuelling points installed for inland and maritime vessels and heavy duty trucks (requirement could be covered by a pool of neighboring Member States by way of derogation)	Road	LNG	X			current (Milford Haven, the Isle of Grain) and planned (off the coast of North-West England) LNG import terminals listed + road tanker loading facilities available at the Isle of Grain facility	29
6(7)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2020 in urban/suburban areas and other densely populated areas	Road	CNG	X			The number is given, no analysis available to support the number, no spatial distribution provided	28
	within networks determined by the MS	Road	CNG		X	N.M.		
6(8)	Definition of an appropriate number of CNG refuelling points accessible to the public to be put in place by 31 December 2025, at least along the existing TEN-T Core Network	Road	CNG	X			The number is given, no analysis available to support the number, no spatial distribution provided	28
3(1)	**Assessment of the need of alternative fuel infrastructures**							
4(5)	Assessment of the need for shore-side electricity supply for inland waterway vessels and seagoing ships in maritime and inland ports. Priority of installation in ports of the TEN-T Core Network and in other ports by 31 December 2025.	Inland and maritime ports	Electricity	X			Several reasons for the non-existence of SSE supply are listed: unsuitability for short-term berthing (e.g. ferries), availability of other means to reduce emissions (e.g. low sulphur fuel), reliability risks and lack of suitable electricity grid supplies to support large vessels, noise from ships' engine not considered as a noise pollution issue. No inland ports on TEN-T Core Network	22, 30
3(1)-eighth indent	Consideration of the need to install electricity supply at airports for use by stationary airplanes	Airports	Electricity	X			very general description of the current situation and no analysis of future trends is given. Development left to airport operators and owners on economical or environmental ground	23, 24, 31
3(1)-seventh indent	Assessment of the need to install refuelling points for LNG in ports outside the TEN-T Core Network	Inland and maritime ports	LNG		X			
3(1)	**Designation of areas to be equipped with alternative fuel infrastructures**							
3(1)-fifth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with recharging points accessible to the public in accordance with Article 4(1)	Road	Electricity		X		the urban areas considered are the 9 urban nodes on the TEN-T Core Network	26, 27
3(1)-sixth indent	Designation of the urban/suburban agglomerations, of other densely populated areas and of networks which, subject to market needs, are to be equipped with CNG refuelling points in accordance with Article 6(7)	Road	CNG		X		the urban areas considered are the 9 urban nodes on the TEN-T Core Network	26, 27
3(1)	**Definition of measures to support the deployment of alternative fuels**							
3(1)-third indent	Measures necessary to ensure that the national targets and the objectives contained in the national policy framework are reached	Road	Electricity	X			most of the measures presented	32-35
			CNG	X			few general "low emission" measures, not specially dedicated ones	32-35
			LNG	X			few general "low emission" measures, not specially dedicated ones	32-35
			Hydrogen	X			2 measures dedicated specifically to hydrogen/FCs	32-35
		Maritime	Shore Side Electricity		X		Development left to port operators and their costumers	30
			LNG		X		No support measures mentioned	
		Inland Waterway	Shore Side Electricity			N.A.	No inland ports on TEN-T Core Network	
			LNG			N.A.	No inland ports on TEN-T Core Network	
		Airports	Electricity for stationary airplane		X		Development left to airport operators and owners	31
3(1)-fourth indent	Measures that can promote the deployment of alternative fuels infrastructure in public transport services	Road	Electricity	X			buses and taxis supported	32-35
			CNG	X			general measures	32-35
			LNG	X			general measures	32-35
			Hydrogen	X			general measures	32-35
4(3)	Measures to encourage and facilitate the deployment of recharging points not accessible to the public (private electro mobility infrastructure)	Road	Electricity	X			home- and work-charging schemes, 4 measures in total	35
3(3)	Provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered	All	All	X			in 6 measures	32-35
3(4)	Assessment of MS cooperation and coordination with other member states	All	All		X	N.M.		

5.28.3 Assessment of targets and objectives (infrastructure) established

Infrastructure sufficiency for recharging points (number and distance, 2020 and 2025)

Table 5.28-3. Index of AFI sufficiency

Fuel	Index of AFI sufficiency, Is			
	Current	2020	2025	2030
Electricity for vehicles	9.63	31.93 - 33	-	-
CNG for vehicles	8.14	-	-	-

Legend: Index of AFI sufficiency, I_S =Number of AFV / Number of AF Recharging/Refuelling points

Table 5.28-3 shows the values of the sufficiency index I_S = Number of AFV / Number of AF Recharging/Refuelling points. Regarding electric vehicles, for the current situation, according to the UK NPF, the index is better than the assessment threshold of 10 AFV per recharging point. According to the provided information, the number of electric vehicles is expected to more than triple in the UK by 2020, while the targeted number of recharging infrastructure is only about 10% higher than the currently available one. This may lead to an insufficient publicly available recharging infrastructure in 2020 as indicated by the calculated sufficiency index, with more than 30 far worse than the threshold of 10. The UK NPF objectives for 2020 contain a network of 2,200-2,500 high power recharging points and 9,800-11,000 normal power recharging points.

According to the visual assessment of the spatial distribution of recharging points presented in the provided map and checking the routes of the TEN-T Core Network, it seems that the distance requirement of one recharging point at least every 60 km is fulfilled, already today. UK has currently the largest high power recharging network for electric vehicles in the European Union with more than 2,200 recharging points and it targets one high power recharging point at least every 32 km along 95% of the England's Strategic Road Network by 2020.

Designation of the urban/suburban agglomerations selected to be equipped with electric recharging points

The UK NPF prioritises for recharging point deployment the urban nodes connected by the TEN-T Core Network. The list of these nine urban agglomerations is given (Birmingham, Bristol, Edinburgh, Glasgow, Leeds, London, Manchester, Portsmouth, Sheffield). No quantitative analysis of the future number of cars/needs for AFI is given per urban node but from the provided map they seem to be well covered by recharging infrastructure, already now.

Electricity supply at airports for use by stationary airplanes

The description of the current situation of electricity supply for stationary airplanes in the UK's airports of the TEN-T Core Network is very general and no analysis of future trends is given in the NPF. It is stated that 9 out of the 12 airports of the TEN-T Core Network have installed or have policies encouraging the installation of fixed electrical ground power units. Concerning the airports of the TEN-T Comprehensive Network, out of 28 existing airports the NPF mentions two airports that have fixed electrical ground power units while at least five have mobile ground power units in use. The UK government considers that the airport owners and operators are the best placed to assess the needs and cost/benefits, also environmental, for electricity supply for stationary airplanes.

Shore-side electricity supply for inland waterways vessels and seagoing ships in maritime and inland ports of the TEN-T Core Network and in other ports (2025)

The NPF states that except very small ports and marinas there is no shore-side electricity (or cold ironing) provided in UK ports. Given the current costs, according to the NPF, it is not considered to be currently a commercially attractive proposition. Several reasons for this situation are listed: unsuitability for short-term berthing (e.g. ferries), availability of other means to reduce emissions (e.g. low sulphur fuel), reliability risks and lack of suitable electricity grid supplies to support large vessels, noise from ships' engine not considered as a noise pollution issue. Some ports (including Dover and Tilbury) considered investing in SSE systems but decided not to proceed for the moment. The UK government has encouraged the design of new developments so that the necessary SSE equipment could be installed without undue cost or disruption but intends to leave the provision of SSE facilities to port operators and their customers to implement it on a purely commercial basis and doesn't present any target for 2025.

Infrastructure sufficiency for CNG refuelling points (number and distance, 2020 and 2025)

A complete analysis of the CNG infrastructure sufficiency is not possible due to the lack of any estimation of future numbers for CNG vehicles in the UK NPF. The current number of publicly accessible CNG refuelling points is 7 (12 in total), the 2020 foreseen public number is 8-13 and the 2025 target is 13-32. From the provided map of current CNG refuelling points it can be concluded that on the TEN-T Core Network the geographical distribution is not homogeneous and the north part of Great Britain, especially Scotland as well as Northern Ireland lack CNG refuelling points. The UK government is aware of this gap; expects "this situation to rectify itself as the gas network develops further" and does not exclude action to ensure an appropriate coverage.

Designation of the urban/suburban agglomerations selected to be equipped with CNG refuelling points (2020)

The UK NPF prioritises the nine urban nodes of the TEN-T Core Network for the CNG infrastructure deployment, however no quantitative analysis or spatial distribution is provided for the future.

Road LNG refuelling points along the TEN-T Core Network (2025)

The current number of publicly accessible LNG refuelling points for heavy-duty vehicles is 11 (22 in total) and the 2025 foreseen number of publicly accessible LNG refuelling points is 20-48 (no spatial distribution being given for 2025). From the provided map of current LNG refuelling points and taking into account the 2025 target, it can be concluded that the maximum distance requirement for LNG refuelling points along the TEN-T Core Network could be fulfilled on UK territory.

LNG refuelling points in maritime ports along the TEN-T Core Network (2025)

LNG bunkering is currently available in two UK maritime ports of the TEN-T Core Network (Southampton and Teesport). By 2025, 2-3 additional bunkering facilities are expected that could be located close to the UK's existing LNG supply terminals at Milford Haven and the Isle of Grain, and the planned terminal off the coast of North-West England.

LNG refuelling points in inland ports along the TEN-T Core Network (2030)

Not applicable since UK has no inland ports along the TEN-T Core Network.

Hydrogen refuelling points on networks determined by Member States having decided to include hydrogen refuelling points accessible to the public in their national policy framework (2025)

Regarding hydrogen, the UK NPF states that the market for hydrogen is currently in its infancy but 15 refuelling points are already in operation. It targets an initial network consisting of 65 hydrogen

refuelling points by 2025, "covering major population centres and connecting roads" as concluded in the joint industry-government UKH2 Mobility project.

5.28.4 Deployment of alternative fuels vehicles and vessels

The UK NPF focuses on electric vehicles in road transport and the infrastructure related to it. The current share of electric vehicles of the total fleet of registered vehicles is ~0.23%, while in 2020 it is expected to be around 1.1 %. The current electric vehicles share in the new registered vehicles is ~2 %.

The current share of gas vehicles (LPG + CNG + LNG) of the total number of registered vehicles is ~0.12 % (less than 50,000 vehicles). It is stated that the majority of gas vehicles are cars, of which the majority run on LPG. The UK NPF declares the LPG road vehicle market is relatively mature but remains a niche market, although more than 1,300 LPG refuelling points are available in the UK. The NPF does not contain any projection of the market development for LPG vehicles nor future targets for the related infrastructure.

For any other alternative fuel or transport mode, the UK NPF does not specify any future estimate for alternative fuelled vehicles or vessels.

5.28.5 Assessment of the measures to implement Article 3

The UK NPF contains a big portfolio of measures, the majority already in effect and of the financial type. It also presents some already expired measures but they are not analysed here. The measures defined in the UK NPF can be considered comprehensive for electricity and hydrogen in road transport, as well as for public transport, private electro-mobility infrastructure.

Even though the budget is provided for the majority of the measures, in some cases it is not clearly defined which part is still available for the future years and this makes it difficult to assess the likely effect of these measures.

Assessment of the measures that can ensure national targets and objectives

The 20 measures of this category (11 financial, one non-financial and eight of “other” type, but three already expired) cover both, AFI and AFV, several fuel types and road transport. The presented portfolio of measures addresses the main deployment barriers: higher cost of AFI and AFV and initial lack of infrastructure.

As mentioned before, electricity for road is the main interest of the UK NPF. This cluster achieves a high overall assessment score. Currently, EVs can benefit from direct incentives for the purchase (cars up to €5,000 per vehicle, vans up to €9,000 per vehicle).

Other alternative fuels, like CNG and LNG for road transport, receive limited attention within the NPF, benefitting only from reduced rates of fuel excise duties and from the introduction of Clean Air Zones.

The UK NPF presents several measures focusing on R&D or demonstrating new technologies and fuels.

Assessment of the measures that can promote alternative fuels infrastructure in public transport services

The UK NPF contains six measures in this category (all of the financial type, one of which expired), all related to road transport and covering mainly electric vehicles and recharging infrastructure. The measures cover support for purchasing new electric buses (covering for zero-emission vehicles from 75% to 90% of the additional costs compared to conventional vehicles) and taxis, but also grant schemes for

retrofitting old vehicles (mainly buses). The set of this type of measures can be considered comprehensive and has a high overall score.

Assessment of the measures that can promote the deployment of private electromobility infrastructure

The UK NPF lists four measures of this type, all financial and regarding electricity for road transport. The "electric vehicle home charging scheme" measure assures, as direct incentive for building domestic recharging points, up to £500/unit, while the "workplace charging scheme" measure for companies assures up to £300/unit. The overall score of this set of measures is high and it can be considered comprehensive.

5.28.6 Assessment of the provided evidence whether the interests of regional and local authorities, as well as those of the stakeholders concerned has been considered

The UK NPF considers the interests of local authorities. It presents six measures supporting the local authorities that engaged in development of AF infrastructure, all of the financial type and targeting road transport; most of them regard electricity as alternative fuel.

5.28.7 Assessment of MS cooperation and coordination with other member states

The UK NPF does not mention any cooperation with other member states.

5.28.8 Conclusions and possible recommendations

Tabular overview

	AF Vehicles / Vessels				Public AF Infrastructure					Measures	
Fuel / transport mode / targets year	Current situation (from EAFO March 2017)	Future Estimate	Future share (%)	Estimate reached (%)	Current situation (from EAFO March 2017)	Target	Target attain-ment (%)	Sufficiency (Index / Assessment)		Score	Compre-hensive-ness
								Current	Future		
Electricity / vehicles / 2020	89,977 (NPF) 104,751 (EAFO)	396,000 - 431,000	1.02 - 1.11	22.7 - 20.9	9,345 (NPF) 12,957 (EAFO)	12,000 - 13,500	77.9 - 69.2	9.63	33.00 - 31.93	H	c
CNG / vehicles / 2020	57				7 (NPF) 8 (EAFO)	8 - 13	63.6	8.14		L	n
LNG / heavy duty vehicles / 2025	621				11 (NPF) 20 (EAFO)	20 - 48	55.0		(OK)	L	n
LNG / seagoing ships / 2025					2	4 - 5	50.0 - 40.0		(OK)	X	-
LNG / inland waterway vessels / 2030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H2 / vehicles / 2025	38 (NPF) 79 (EAFO)				15 (NPF) 12 (EAFO)	65	23.1		OK	M	c
LPG / vehicles	135,000				1,300 (NPF) 1,400 (EAFO)				X	L	n

The UK NPF addresses all of the requirements of Article 3. It is well structured, contains a description of the current state and some future estimates for alternative fuels vehicles in the transport sector and establishes targets required by Article 3 of the Directive.

The UK NPF puts a lot of emphasis on the development of a market for electric vehicles. It contains relatively high estimates for the future deployment of EV with an estimated roughly 1.1% electric vehicles on the road in 2020. Today, the spatial distribution of recharging points seems to appropriately cover the needs of electric vehicles in terms of distance requirements in the UK. For the future, the targeted ratio of less than one public recharging point per 30 electric vehicles estimated for 2020 could evolve to become a barrier for the further market deployment of electric vehicles. It will be important to

carefully monitor this development and correct infrastructure targets in line with the market developments. Regarding electricity supply for stationary airplanes, the UK government considers that the airport owners and operators are the best placed to assess the needs and cost/benefits, including environmental, for electricity supply for stationary airplanes. The NPF mentions shore-side electricity is not considered to be currently a commercially attractive proposition. Consequently, it does not provide any target for shore-side electricity and leaves it to the port operators and their customers to implement it on a purely commercial basis.

The UK currently features seven publicly accessible CNG refuelling points and plans to increase this number by 2020 to 8-13. The current number of publicly accessible LNG refuelling points is 11 and the 2025 target is set to 20-48, suggesting that the maximum distance requirement of at least one refuelling point every 400 km for LNG refuelling points along the TEN-T Core Network could be fulfilled on UK territory by that year.

In view of the lack of distinction in the NPF between LPG, CNG and LNG vehicles, it is difficult to understand the current market status for those fuels. Future CNG or LNG vehicle estimates are missing in the NPF. This makes an assessment of the future situation impossible.

There is a lack of information on the future targeted spatial distribution for recharging points and CNG and LNG refuelling points in the UK NPF, along the TEN-T Core Network as well as within agglomerations/densely populated areas (urban nodes).

UK currently offers LNG refuelling in 2 (out of 15) maritime ports in the TEN-T Core Network and 2-3 additional facilities are considered before 2025 allowing for the circulation of LNG vessels as required in the Directive.

The UK NPF displays a commitment towards developing an early market for hydrogen in 2025 timeframe, targeting the availability of 65 publicly accessible refuelling points.

The UK NPF contains a quite comprehensive list of measures; the great majority of them are in force and foreseen to stay, only few being obsolete. Some of them, especially the ones targeting to improve the economics of alternative fuels, can be considered having a medium or high impact on market actor's decisions, especially for electricity for road transport as well as private recharging infrastructure and public transport. Most of the measures are addressing financing and early market barriers, being essential in the market development. Even though the budget is provided for the majority of the measures, in some cases it is not clearly defined which part of this is still available for future years, which makes their assessment difficult. The UK also supports research, development, and demonstration activities in the field of alternative fuels and propulsion systems.

The UK supports companies realizing public transport services and public institutions in acquiring low emitting vehicles for their fleets. The measures cover direct incentives for purchasing new electric buses (covering for zero-emission vehicles from 75% to 90% of the additional costs compared to conventional vehicles) and taxis, but also grant schemes for retrofitting old vehicles (mainly buses).

The consideration of the interests of regional and local authorities and stakeholders engaged in alternative fuels is evident throughout the text of the NPF.

The UK did not present any evidence of coordinating its plans on alternative fuels infrastructure with other countries, especially neighbouring member states.