5.1 Finland (FI)

5.1.1 *Main messages from the Commission assessment of the NPF*

In its original assessment of the Finnish NPF the Commission concluded:

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.

5.1.2 *Overview of requirements' fulfilment from Annex I of the Directive*

Table 5.1.2-1 Checklist Table

Part of the Directive 2014/94/EU	Requirement	Mode of transport / Alternative Fuel (provided in the NIR)		Yes / No
ANNEX I: 1. Legal measures	Information on legal measures, which may consist of legislative, regulatory or administrative measures to support the build-up of alternative fuels infrastructure, such as building permits, parking lot permits, certification of the environmental performance of businesses and fuel stations concessions.	All / All		Yes
ANNEX I: 2. Policy measures supporting the implementation of the national policy framework	Information on those measures shall include the following elements: • direct incentives for the purchase of means of transport using alternative fuels or for building the infrastructure, • availability of tax incentives to promote means of transport using alternative fuels and the relevant infrastructure, • use of public procurement in support of alternative fuels, including joint procurement, • demand-side non-financial incentives, for example preferential access to restricted areas, parking policy and dedicated lanes, • technical and administrative procedures and legislation with regard to the authorisation of alternative fuels supply, in order to facilitate the authorisation process.	All / All		Yes
	• consideration of the need for renewable jet fuel refuelling points in airports within the TEN-T Core Network	Air	Biofuels	Yes
ANNEX I: 3. Deployment and manufacturing support	• Annual public budget allocated for alternative fuels infrastructure deployment, broken down by alternative fuel and by transport mode (road, rail, water and air).	All / All		Yes
	• Annual public budget allocated to support manufacturing plants for alternative fuels technologies, broken down by alternative fuel and by transport mode.	All / All		Yes
	• Consideration of any particular needs during the initial phase of the deployment of alternative fuels infrastructures.			No
ANNEX I: 4. Research, technological development and demonstration	• Annual public budget allocated to support alternative fuels RTD&D, broken down by fuel and by transport mode.	All		Yes
ANNEX I: 5. Targets and objectives	• Estimation of the number of alternative fuel vehicles expected by 2020, 2025 and 2030	Road / electricity, CNG		Yes
	• Level of achievement of the national objectives for the deployment of alternative fuels in the different transport modes (road, rail, water and air)	All / All		Yes
	• Level of achievement of the national targets, year by year, for the deployment of alternative fuels infrastructure in the different transport modes	All / All		Yes
	• Information on the methodology applied to take account of the charging efficiency of high power recharging points			No
ANNEX I:6 Alternative fuels infrastructure developments	Changes in supply (additional infrastructure capacity) and demand (capacity actually used)	Road, rail, air / All		Yes

The checklist shows that most of the requirements of Annex I from the Directive are covered in the Finnish NIR.

Regarding the combination of AF/AFV/AFI with transport mode, electricity is partially covered for all modes. CNG, hydrogen and synthetic fuels are partially covered for road transport, LNG for road and waterborne transport. Biofuels are partially covered for road, waterborne and air transport, while all the other combinations are either absent or not applicable.

The Finnish NIR reports 52 measures. Under the Policy and Deployment & Manufacturing sections it was possible to identify 11 AF/transport mode clusters of measures, of which seven were assessable.

5.1.3 *Quantitative assessment: Vehicles and infrastructure*

In its accompanying Excel table, the FI NIR states that "the targets for public recharging points will need to be revised. However, no decisions have yet been made regarding new targets". For natural gas infrastructure, it indicates that "targets will be set in the near future, but no formal decisions have yet been made". For hydrogen refuelling points, the following can be read: "targets will need to be revised. However, no decisions have yet been made regarding new targets". Thus it was not entirely clear at the time of writing this assessment whether the government of Finland will endorse the NPF infrastructure targets for road electricity, CNG and hydrogen. For information purposes, when considered still relevant, these will be shown in Table 5.1.3-1.

Table 5.1.3-1 National AFV estimates and AFI targets established in the NIR at the horizon 2020, 2025 and 2030 and their comparison with the NPF situation

Alternative fuel / Transport mode		2018		2020		2025		2030	
		AFV	AFI public	AFV	AFI public	AFV	AFI public	AFV	AFI public
Electricity / road	NIR	15,807	2,399	NA	NA (2,000*)	160,738	NA	382,790	NA (25,000*)
	Change NIR vs NPF [%]				0.00%	51.64%		45.55%	0.00%
	Attainment [%]					9.83%		4.13%	
CNG / road	NIR	6,307	40	NA	50	25,337	NA (55*)	52,788	NA
	Change NIR vs NPF [%]				-9.09%	49.04%	0.00%	-0.40%	
	Attainment [%]				80.00%	24.89%		11.95%	
LNG / road	NIR	25**	6**	NA	NA (9*)	NA	NA (11*)	NA	NA
	Change NIR vs NPF [%]				0.00%		0.00%		
	Attainment [%]								
LNG / water (maritime)	NIR	4	2	NA	NA	NA	6	NA	NA
	Change NIR vs NPF [%]						0.00%		
	Attainment [%]						33.33%		
LNG / water (inland)	NIR	0	0	NA	NA	NA	NA	NA	1
	Change NIR vs NPF [%]								0.00%
	Attainment [%]								
H2 / road	NIR	1	NA	NA	NA	NA	NA	NA	NA
	Change NIR vs NPF [%]								
	Attainment [%]								
Other AF / road (E85)	NIR	4,132	140	NA	NA	NA	NA	NA	1,800
	Change NIR vs NPF [%]								620.00%
	Attainment [%]								7.78%

* Target from the FI NPF.
** Values taken from EAFO 2018 (absent in both NPF and NIR).

Legend:		
		not applicable
		the value could not be computed
	NA	no value/information provided/available in the NIR

5.1.3.1 Road transport

The FI NIR states that the National Distribution Infrastructure Programme for Alternative Propulsion Systems in Transport has the goal that all new passenger cars and vans sold in Finland shall be compatible with an alternative propulsion system by 2030.

5.1.3.1.1 Electricity

Vehicles

Finland reported 15,807 battery-electric and plug-in hybrid electric vehicles in use in 2018 (see Table 5.1.3-1), of which 15,499 were passenger cars, 285 LCVs, 2 HCVs and 21 buses and coaches. Additionally, Finland also recorded 1,248 electric PTWs in 2018. The Finnish NIR estimates 160,738 EVs for 2025 and 382,790 for 2030, which are respectively 51.64% and 45.55% higher than in the NPF. In particular for 2030, the FI NIR foresees 364,346 passenger cars, 15,398 LCVs, 2,046 HCVs and 1,000 buses and coaches. This reflects a considerably higher policy ambition than in NPF. In contrast to the NPF, estimates for 2020 were not reported in the NIR.

The 2018 ***attainment*** of future EV estimates is 9.83% for 2025 and 4.13% for 2030. According to the assessment methodology described in Section 2.1, the 2018 situation corresponds to an ***adequate progress*** towards reaching the envisaged EV estimates. The calculated ***average annual growth rate*** corresponding to the period 2016-2030 for EV fleet evolution planned by Finland is equal to 41%.

Infrastructure

Finland reported 2,399 publicly accessible recharging points in 2018 (Table 5.1.3-1), of which 413 were high power (>22kW) recharging points. For the next decade, the FI NIR does not provide targets and mentions that those in the NPF need to be revised. The 2020 target provided in the NPF of 2,000 points has been clearly achieved and exceeded already in 2018. Considering the NPF targets for 2020 and 2030 (25,000 points), the share of publicly accessible high power recharging infrastructure is foreseen to remain constant at a value of 10%.

The 2018 ***attainment*** of the future public recharging infrastructure targets (provided in the NPF) is higher than 100% for 2020 and 9.60% for 2030. According to the assessment methodology described in Section 2.1, the 2018 situation corresponds to an ***adequate progress*** towards reaching these envisaged targets. The calculated ***average annual growth rate*** corresponding to the period 2016-2030 for publicly accessible recharging infrastructure evolution planned by Finland in its NPF is equal to 29%.

Ratio

The following table shows the ratio between vehicles and publicly accessible recharging points (i.e. sufficiency index) for the pair electricity/road. For the next decade only the 2030 value can be computed and results higher than 10, which can be regarded as potentially inadequate considering the foreseen low share of high power recharging points (10%).

Sufficiency Index		2016	2017	2018	2020	2025	2030
Electricity	road	5.08	5.61	6.59			15.31*

* Value computed with AFI target from the FI NPF.

Information on charging efficiency

Information is not available in Finnish NIR.

5.1.3.1.2 CNG

Vehicles

Finland reported 6,307 CNG vehicles in use in 2018 (Table 5.1.3-1), of which 5,599 were cars, 528 LCVs, 133 HCVs and 47 buses and coaches. In contrast to the NPF, the 2020 estimate is not reported in the NIR. The NPF estimate of 5,800 CNG vehicles in 2020 has been already achieved. The NIR presents a new estimate for 2025 (25,337 vehicles), which is 49.04% higher than in the NPF, while there is practically no change for 2030. For this latter year, the Finnish NIR expects a fleet of 52,788 CNG vehicles, composed by 43,745 passenger cars (82.9%), 7,177 LCVs (13.6%), 1,719 HCVs (3.25%) and 147 buses and coaches (0.28%).

The 2018 ***attainment*** of future CNG vehicles estimates is 24.89% for 2025 and 11.95% for 2030. According to the assessment methodology described in Section 2.1, the 2018 situation corresponds to an ***adequate progress*** towards reaching the envisaged CNG vehicles estimates. The calculated ***average annual growth rate*** corresponding to the period 2016-2030 for the CNG vehicle fleet evolution planned by Finland is equal to 26%.

Infrastructure

As Table 5.1.3-1 shows, Finland reported 40 publicly accessible refuelling points in 2018. The FI NIR provides only a new target of 50 CNG refuelling points for 2020, which means five refuelling points less in comparison to the NPF (i.e. 9.09% lower), and no target for 2025 and 2030. The NPF included also a target of 55 refuelling points for 2025 (similar to 2020), but this has not been confirmed in the NIR.

The 2018 ***attainment*** of future public CNG refuelling infrastructure targets is 80% for 2020. According to the assessment methodology described in Section 2.1, the 2018 situation corresponds to a ***fast progress*** towards reaching these envisaged targets. The calculated ***average annual growth rate*** corresponding to the period 2016-2020 for publicly accessible CNG refuelling infrastructure evolution planned by Finland is equal to 20%.

Ratio

Based on the FI NIR, the following table shows the ratio between vehicles and publicly accessible refuelling points (i.e. sufficiency index) for the pair CNG/road. It can be seen that the sufficiency index is always below the indicative value of 600 (see Section 2.1.5), even in 2025. The values for 2020 and 2030 could not be computed due to the lack of data.

Sufficiency Index		2016	2017	2018	2020	2025	2030
CNG	road	91.00	121.34	157.68		460.67*	

* Value computed with AFI target from the FI NPF.

5.1.3.1.3 LNG

Vehicles

The Finnish NIR does not report any information on LNG vehicles, either past data nor future estimates. Also the NPF had not reported any vehicle estimate for 2020-2030. The value shown in Table 5.1.3-1 of 25 LNG vehicles in 2018 is from EAFO. The FI NIR only briefly mentions about long-distance lorries using LNG and LBG (Liquid BioGas), but does not provide specific numbers.

Because there are no LNG vehicle estimates provided in the Finnish NIR, the 2018 ***attainment*** and ***progress*** could not be computed.

Infrastructure

The Finnish NIR does not report any figure for road LNG refuelling points in 2018 (the value shown in Table 5.1.3-1 of 6 refuelling points is from EAFO), but declares that in autumn 2019 there were seven LNG refuelling points in use. The NPF had a target of 9 LNG refuelling points for 2020 and 11 for 2025. The FI NIR does not confirm them numerically, but states that for liquefied natural gas and biogas (LNG, LBG) the objective for Finland is to have by 2030 a nationwide network of LNG refuelling stations on the highway for heavy-duty vehicles.

Because there are no LNG refuelling point targets provided in the Finnish NIR, the 2018 ***attainment*** and ***progress*** could not be computed.

Ratio

As no information has been provided for LNG vehicles/infrastructure in the FI NIR, the sufficiency index could not be computed. Using the EAFO numbers for 2018 the sufficiency index is equal to 4.17.

5.1.3.1.4 Hydrogen

Vehicles

In 2018, there was just one hydrogen passenger car on the road in Finland, since 2016. The FI NIR does not provide estimates for the next decade, thus the 2018 ***attainment*** and ***progress*** could not be computed.

Infrastructure

The Finnish NIR did not include hydrogen infrastructure provisions. According to the NPF, an objective for Finland was to have 21 hydrogen refuelling stations in main urban centres by 2030, with a distance between them of approximately 300 kilometres and a radius of influence of 150 kilometres each. Back in 2016, in Finland there were two hydrogen filling stations. By 2019, there was no longer any publicly accessible hydrogen refuelling station in Finland. The FI NIR states that it is unlikely that the network of hydrogen stations will grow in line with the targets set in 2016 (see also Section 5.26.4.2).

Because of the lack of hydrogen data in the Finnish NIR, the 2018 ***attainment*** and ***progress*** have not been computed.

Ratio

As no information has been provided for vehicles and infrastructure, the sufficiency index could not be computed.

5.1.3.1.5 Biofuels

Vehicles

The Excel file accompanying the FI NIR shows 4,132 vehicles powered by other alternative fuels in 2018, of which 94 were HCVs, 6 LCVs and the rest passenger cars. It is, however, unclear whether they refer to E85 vehicles only. The NIR states that around 4,300 E85 fuelled vehicles were in use in autumn 2019 (see Section 5.26.4.2.1 for information on vehicle conversions) but it also explains that not all the E85 vehicles are included in this statistics because there are conventional vehicles that are later converted to E85 and are not immediately ri-registered as such. The FI NIR also mentions that there are a few trucks used for refuse collection and freight distribution, as well as some buses used in public transport in Helsinki running on ED95.

The FI NIR indicates the following objectives for the share of vehicles being able to use some alternative mode of propulsion, including E85 and ED95 (see also Section 5.26.3.1.7):

- For new passenger cars and vans: the target is to have 20% of the vehicles in 2020, 50% in 2025 and 100% in 2030.
- For new heavy-duty vehicles (HCV and buses): 40% in 2020, 60% in 2025 and 100% in 2030.

The FI NIR also explains that, due to the absence of new E85 vehicle models on the market, the only way for E85 to contribute to the above objectives is through the conversion to E85 of the existing conventional vehicles, for which Finland provides subsidies.

Because there are no numerical E85 vehicle estimates in the Finnish NIR, the 2018 ***attainment*** and ***progress*** could not be computed.

Infrastructure

The FI NIR reports a network of 140 E85 refuelling stations (a map was also included in the NIR) and one ED95 refuelling point (with another one under construction)[1]. While for 2020 and 2025, both the NPF and the NIR indicate no targets, for 2030 the FI NIR has a new target of 1,800 refuelling points offering biofuels, which constitutes an increase of 620% compared to the NPF target of 250 refuelling points. In fact, the FI NIR states that "*An objective in the national distribution infrastructure programme for alternative propulsion systems in transport was that by 2030 all filling stations would include in their range of products a high blend fuel (such as 100% renewable diesel, high blend ethanol E85 or ethanol diesel ED95). The dominant grade would be, for example, E20/25 petrol*" (see also Section 5.26.3.1.7).

Ultimately, the FI NIR mentions that the trend in the availability of, E85 and ED95 fuel will depend on the demand. It also states that the network can grow quickly and in response to market demand at any given time, reaching, if necessary, several hundred stations.

[1] However, from the information provided in the FI NIR it is not clear which is the total number of refuelling stations providing at least one type of biofuels in 2018.

Considering the publicly accessible E85 refuelling infrastructure, the 2018 ***attainment*** of the future targets is 7.78% for 2030. According to the assessment methodology described in Section 2.1, the ***progress*** obtained by Finland from 2016 until 2018 for the deployment of publicly accessible biofuels (E85) refuelling infrastructure is 2.35% of the overall planned deployment during the period 2016-2030[2].

Ratio

Based on the Finnish NIR, the following table shows the ratio between vehicles and publicly accessible refuelling points (i.e. sufficiency index) for the pair E85/road. It is worth reminding that the number of vehicles used to calculate these ratios might be underestimated, due to the uncertain number of E85 converted vehicles in the official statistics.

Sufficiency Index		2016	2017	2018	2020	2025	2030
Other AF (E85)	road	36.50*		29.51			

* Value computed with 2016 AFI number from the FI NPF

5.1.3.1.6 LPG

Vehicles

Information is not available in the Finnish NIR.

Infrastructure

Information is not available in the Finnish NIR.

5.1.3.1.7 Synthetic and paraffinic fuels

Vehicles

The FI NIR indicates that the use of renewable diesel, by bus operators, taxis and other transport firms as well as for non-road mobile machinery, is increasing. For instance, the NIR expected that all the vehicles operating at Finavia's regional airports would be using renewable diesel by the end of 2019.

The FI NIR objectives indicated in Section 5.26.3.1.5 also apply to vehicles running on 100% renewable diesel that do not rely on any special technology to do so.

Infrastructure

Information on the number of publicly accessible synthetic and paraffinic refuelling points in use between 2016 and 2018 is not available in the Finnish NIR. Finland recorded 20 renewable paraffinic diesel (HVO) refuelling points for heavy-duty vehicles (a map was also included in the NIR) and 34 for all vehicles in summer 2019.

The FI NIR identifies the limited network of refuelling stations as a bottleneck to greater renewable diesel use. The objective mentioned in Section 5.26.3.1.5, related to the national

[2] Calculation performed using the value of 100 E85 refuelling stations existing in 2016 as indicated in the FI NPF.

distribution infrastructure programme for alternative propulsion systems in transport also applies to 100% renewable diesel HVO100. The NIR again specifies that future HVO100 availability is conditional to market demand.

5.1.3.2 Rail transport

5.1.3.2.1 Electricity

Vehicles

Information is not available in the Finnish NIR.

Infrastructure

The FI NIR states that "*an objective of the national distribution infrastructure programme for alternative propulsion systems in transport was that rail would be nearly 100% electrified by 2050*", therefore the electrification of the state rail network will continue for 2020/2025/2030.

5.1.3.3 Waterborne transport (maritime)

5.1.3.3.1 Electricity

Vessels

The NIR mentions two electric vessels in operation since 2018: the 'Aranda' marine research vessel, capable of relying on its battery for short journeys, and a cable reel ferry operating between Nauvo and Högsar. According to the NIR, there were a few electric vessels in use in Finland in autumn 2019. The NIR expects new electric cable ferries to be deployed in the future as well as a new electric ferry to be sailing in the archipelago off Turku. In addition, the NIR reports hybrid (electric) vessels: the 'Elektra', in service between Parainen and Nauvo since mid-2017, and three new ones (fitted with batteries to be charged by diesel electric generators, whose power will be used at ports) commissioned by Finnlines and expected to be ready between 2020 and 2021.

Because there are no numerical estimates of electric vessels to be deployed in the maritime ports provided in the Finnish NIR, the 2018 ***attainment*** and ***progress*** could not be computed.

Infrastructure

Similarly to the NPF, the Finnish NIR did not provide numerical data regarding the shore-side electricity supply points in 2018. However, the NIR reports that in autumn 2019 shore-side power was available at the ports of Helsinki, Oulu and Kemi. The Finnish NPF had reported 4 SSE supply points in 2016.

For shore-side electricity, the development plans over the next years vary from port to port. The FI NIR mentioned the objective that the largest ports should have a shore-side electricity facility by 2030. To this end, several projects have started during the implementation period and are currently continuing at the ports of Helsinki, Oulu and Kemi, but also at the ports of Turku and Långnäs. The Finnish NIR indicates technical and economic challenges with the supply of shore-side electric power, as individual cruisers need about 15 MW each.

Because there are no numerical targets for shore-side electricity supply in the maritime ports provided in the Finnish NIR, the 2018 ***attainment*** and ***progress*** could not be computed.

5.1.3.3.2 LNG

Vessels

In 2018, LNG was the fuel used by four vessels under Finnish flag. LNG consumption data on one of them (the Viking Grace) accounted for 94% of all the fuel used in 2018. The NPF had indicated 17 LNG seagoing ships in 2016.

The number of LNG-fuelled vessels is expected to increase in the next years, but no numerical data for 2020/2025/2030 were provided in the NIR. The only exception being the indication that five new vessels powered by LNG were in the order book in September 2019, although it is not certain whether all will be registered with the Finnish flag.

Because there were no numerical estimates in the Finnish NIR of LNG vessels to be deployed in the maritime ports, the 2018 ***attainment*** and ***progress*** could not be computed.

Infrastructure

The Finnish NIR mentions that LNG bunkering operations are currently carried out in the TEN-T Core port of Helsinki. On the west coast of Finland, an LNG terminal is available since September 2016 in Pori, while another one was completed in June 2019 in Tornio. The FI NIR confirms the 2025 target of 6 refuelling points provided in the NPF. More specifically, it mentions that the Finnish national distribution infrastructure programme for alternative propulsion systems in transport aimed at having bunkering facilities (LNG or LBG) at all TEN-T Core Network ports (Hamina-Kotka, Helsinki, Naantali and Turku) and in the ports of Pori and Tornio by 2025.

The FI NIR states that the increase in the number of LNG-fuelled ships used for domestic and international transport will be a factor that supports the development of the LNG infrastructure in the longer term and that low oil prices might slow down the investments.

The 2018 ***attainment*** of future LNG refuelling infrastructure targets for seagoing ships is 33.33% for 2025. The ***progress*** could not be computed due to the lack of necessary data.

5.1.3.3.3 Biofuels

Finland reports the intention to increase the use of VG Marine EcoFuel, produced in Finland, by four or five times the current volume of 450 tonnes a year by the end of 2021.

Vessels

The FI NIR does not provide numerical data on the number of vessels using biofuels in 2018, but gives information indicating that at least four vessels that fly the Finnish flag can use biofuels. On two of them, the fuel consumption in 2018 included approximately 25% bio-oil, manufactured in Finland from vegetable fat and fish gut waste.

The number of biofuesl vessels is expected to increase in the next years, but no numerical data for 2020/2025/2030 were provided. The Act on the Promotion of Biofuels in Transport aims at increasing the use of biofuels on boats that use the same fuels as road transport. At the same time, the stock of boats and boat engines in Finland is replaced slowly.

5.1.3.4 Waterborne transport (inland)

5.1.3.4.1 Electricity

Information is not available in the Finnish NIR.

5.1.3.4.2 LNG

Vessels

Information is not available in the Finnish NIR.

Infrastructure

The FI NIR confirms the target of one LNG refuelling facility for inland waterways provided in the NPF for 2030. More specifically, it is stated that the potential needs for LNG/LBG of vessels navigating in the Saimaa lake deep-water routes will be covered by a mobile bunkering point or similar solution located in Mustola, near Lappeenranta, by 2030.

5.1.3.5 Air transport

The FI NIR does not give any numerical data on airplanes and infrastructure, but the objective for air transport is to reach a 40% share of renewables or of other solutions to cut emissions by 2050, and airport terminals traffic emission-free by 2050.

5.1.3.5.1 Electricity

Airplanes

Information is not available in the Finnish NIR. Finavia predicts that Finland will have pure electric passenger aircraft on domestic routes by the end of the 2030s at the earliest.

Infrastructure (for stationary airplanes)

It is not fully clear from the NIR whether electricity for stationary airplanes continues to be available at the major Finnish airports, as indicated in the NPF, and what the current situation for smaller airports is. The number of electric recharging infrastructure for stationary airplanes is expected to increase in the next years, but no numerical data for 2020/2025/2030 were provided.

Electricity is used by about 30% of non-road machinery of ground handling companies at Helsinki-Vantaa Airport, and the replacement rate for rechargeable equipment is 5-15% per year.

5.1.3.5.2 Biofuels

Finland reports an objective on blending obligation, which would allow for sustainable biofuels to achieve a 30% share in aviation fuels by 2030, but no measures have yet been put in place to achieve it.

Airplanes

Information on flights / airplanes powered by biofuels is not provided in the FI NIR.

Infrastructure

Finland did not provide data on the biofuels refuelling infrastructure for airplanes in its NIR.

5.1.4 ***Measures assessment***

As in the NPF, the Finnish NIR contains an extensive and detailed description of measures, most of them in place during the implementation period. They cover a wide variety of AFs and transport modes. The majority focuses on electricity, natural gas and biofuels as AF and on road as transport mode, however measures for waterborne maritime, rail and air are also present.

5.1.4.1 Legal measures

The Finnish NIR contains 7 legal measures (versus 12 in the NPF) to promote AF. One of them focuses exclusively on biofuels, while the rest target a combination of AFs.

An overall assessment of the legal measures is that the Finnish NIR shows an increased ambition level compared to the NPF.

5.1.4.1.1 Legislative & Regulatory

Almost all the legal measures listed in the NIR can be categorised as legislative and regulatory measures. They tend to target a combination of AFs in road transport, such as:

- Act on Transport Services (320/2017);
- Act on Consideration for the Energy and Environmental Impact of Vehicles in Public Procurement;
- Act on the Distribution of Alternative Fuels for Transport.

In addition, the Act on the Promotion of Biofuels in Transport entered into force in 2019 and set a mandatory target for 2030 of 30% biofuels share (10% share of advanced biofuels). Biogas is also being considered.

Traficom, the Finnish Transport and Communications Agency, and many other Finnish actors have established collaborations. In November 2018, the Finnish government and the automotive industry concluded a climate agreement known as the ‘green deal’, to be in effect until the end of 2025. Among its goals there are: increasing the registration share of new vehicles with alternative propulsion systems to at least 25% by 2025, reducing average CO_2 emissions from new light-duty vehicles by at least 4% a year as well as promoting biofuels use in heavy-duty vehicles.

The FI NIR reports as well contribution to targets and measures agreed upon at international level, as Finland has actively participated in the work of the ICAO and IMO to promote the use of alternative means of propulsion.

5.1.4.1.2 Administrative

The Finnish NIR provides information on one administrative measure regarding the contribution to EU objectives and measures, targeting a combination of AFs and transport modes.

5.1.4.2 Policy measures

The Finnish NIR contains 29 policy measures at national level, a strong increase compared to the 12 policy measures identified in the NPF. Of all the policy measures reported in the NIR, 83% have a financial nature, 55% can be characterised as targeting a combination of alternative fuels, 31% a combination of transport modes and 28% as targeting a combination of both.

Finland based their policy measures and financial incentives on the emissions level to encourage introduction of alternative fuels vehicles and other sustainable transport modes. The main focus in the Finnish NIR is on electric, biofuels and CNG/LNG vehicles, where financial instruments are introduced for different vehicle categories.

The NIR reports at least one policy measure that targets exclusively each of the AFs as defined in the Directive, with the exception of hydrogen and synthetic and paraffinic fuels. As a matter of fact, hydrogen seems to have lost (part of) its relevance in Finnish plans and the NIR reports a decrease of ambition justified with different directions of market development. Nevertheless, some subsidising possibilities for hydrogen are still possible under the 'Energy support programme' and the taxation system.

5.1.4.2.1 Measures to ensure national targets and objectives

Of all the national policy measures described in the Finnish NIR, 19 can be categorised as measures to ensure national targets and objectives.

Road transport

Among the policy measures that focus on road transport, the following can be highlighted:

- BEV purchase subsidy: granting €2,000 to private persons (applicable also to long-term leases);
- Financial aid for ethanol[3] and gas-powered vehicle conversions: €200 and €1,000 respectively;
- Scrapping premium: €2,000 for the purchase of vehicles powered by high blend ethanol, electricity or methane, topped up with an industry discount of €500. The measure was in place in 2018 and resulted in 6,677 new vehicle purchases, mostly petrol vehicles. Of the total budget of 8 million €, circa 90% was used. The NIR compares the share of total vehicle purchases AFVs held both with and without the premium in the same period: in both cases, AFVs accounted for around 6% of the total vehicle purchases. However, the share of gas-powered vehicles was much higher with the premium (4.4% compared to ca. 1% without the premium).

[3] As the NIR states, the conversion of old vehicles into ethanol-powered flex-fuel cars is motivated by the lack of new model availability, the slow rate of replacement of the vehicle stock and its age.

- Differential fuel and vehicle registration taxation: four measures aim at taxation of the road vehicles, either privately owned or company cars;
- Information measures: All cars registered in Finland after 2001/2002 have an energy label developed for all new and used vehicles for which there is type approval information on emissions.

It seems that the BEV purchase subsidy and conversion aid have together an annual estimated budget of 6 million € over 2018-22, of which only 15.16% of the 2018-2019 budget was taken up.

Eight policy measures in the Finnish NIR are financial incentives to support the deployment of electric recharging infrastructure.

Waterborne transport

The FI NIR reports the plan to pursue the implementation of the LNG operational programme prepared in 2016, which consists of: i) addressing issues for the refuelling of ships with gas in Finland; ii) financial incentives for the construction of LNG infrastructure and the procurement of LNG-powered ships; iii) active role of Finland at international level.

The number of LNG-fuelled vessels in Finland is supposed to increase in the next few years, due to more stringent emission controls. Liquefied natural gas is now an attractive option to help achieve the emissions limits for coming years, as availability of other alternative fuels is not sufficient to meet the needs of maritime transport. Finland notices recent international developments in the LNG distribution infrastructure, which supports the transition to LNG vessels.

The Finnish NIR speculates that the use of shore-side electricity supply could be promoted through lower taxation on shore-side electricity in accordance with Article 19 of Council Directive 2003/96/EC, which would result in its wider use.

Air transport

The Finnish NIR also presents policy measures on promotion of the use of biofuels in air transport and on promotion of alternative propulsion systems at ports and airports. The main goal is to explore and promptly adopt various financing models and/or other approaches to guarantee the availability of biofuels at Helsinki-Vantaa Airport. The FI NIR explains that the various actors have discussed possible models in 2016-2019, but no actual measures have been put in place yet. Progress is expected in the coming years and the target is to reach a 30% share for sustainable biofuels in air transport by 2030, by means of blending obligation.

5.1.4.2.2 Measures that can promote AFI in public transport services

Many of the policy measures described in the Finnish NIR, can be considered also as measures that can promote AFI in public transport services. These measures are such that they can impact also public transport on road, rail, air and waterborne. All these measures address a wide spectrum of uses (different alternative fuel/mode of transport combinations).

The measure addressing rail in the Finnish NIR consists of financial incentives to achieve the goal of 100% rail electrification. The state provided financial assistance for the following urban rail projects:

- Western extension of the Helsinki metro, phase 1 (entire project 1,186 million €, state contribution 200 million €);
- Western extension of the Helsinki metro, phase 2 (entire project 801 million €, state contribution 240 million €);
- Jokeri light rail (entire project 275 million €, state contribution 84 million €);
- Tampere tramway (entire project 245 million €, state contribution 30%)

For the future, the government of Finland plans an increase in rail investments, although it is unclear to what extent this covers alternative fuels.

5.1.4.2.3 Measures that can promote the deployment of private electro-mobility infrastructure

A measure for private recharging points reported in the Finnish NIR regards a grant for building recharging infrastructure in housing cooperatives, with a budget of 1.5 million € per annum for 2018-2021. The grant, which is available also for acquiring recharging equipment, is for 35% of actual costs, with a ceiling of €90,000. It requires the provision of at least five recharging points. It has been proposed that the budget for this grant is increased by 4 million € per annum as from 2020.

5.1.4.3 Deployment and manufacturing support

5.1.4.3.1 AFI deployment

The Finnish NIR contains seven AFI deployment support measures, which represents an increase compared to the three measures identified in the NPF. While all of them include budget information, four of them focus on electricity and the rest target a combination of alternative fuels.

In addition to the urban rail projects highlighted in Section 5.26.4.2.2 (thus dealing with passenger transport), the following development projects were in progress or have just been completed in Finland in 2016-2019, including electrification projects:

- The Seinäjoki-Oulu upgrade project (entire project 674 million €)
- The western rail track at Pasila (49 million €)
- The Riihimäki triangular junction (12 million €)
- Increased capacity between Helsinki and Riihimäki (150 million €)
- Improvements to the Helsinki rail yard (55 million €)
- The Luumäki-Imatra project (189 million €)
- The Pori-Mäntyluoto electrification project (7 million €)
- The electrification of the line at Uusikaupunki (21 million €)
- The Pännäinen-Pietarsaari electrification project (4 million €)

Besides electricity for rail, electricity for road features among the AFI deployment measures indicated in the NIR. Concerning publicly accessible recharging infrastructure, the NIR reports 4.8 million € in aid over 2017-2019, with an aid rate of 35% for fast recharging and 30% for

normal recharging points, granted only for smart charging systems. With regards to private AFI deployment, the policy measure mentioned in Section 5.26.4.2.3 resulted in 1,200 recharging points in 75 housing cooperatives in 2018, at an expense of 0.7 million €.

TEN-T grants are reported to be used where possible, in building the distribution network in Finland. In 2016-2019 multiple LNG/CNG large scale projects have been implemented in Finland and have received TEN-T financial support in 2016-2019 of almost 33 million €. In comparison to the NPF, the budget is lower (30 million € vs. 90 million € in NPF), but the projects seem to continuously run and this decrease is probably due to the market saturation.

In addition to the aforementioned budgets, the Finnish NIR reports an estimated budget of 41.5 million € for AFI deployment for the period 2018-2021. This includes infrastructure support programme for electric transport and the use of biogas in transport, and the aid for the construction of recharging points in apartment buildings.

5.1.4.3.2 Support of manufacturing plants for AF technologies

The Finnish NIR indicates slightly over 30 million € of aid between 2017 and 2019 to support the construction of a biogas production plant and/or the production of biogas.

5.1.4.3.3 Consideration of any particular needs during the initial phase of the deployment of alternative fuels infrastructures

Information is not available in the Finnish NIR.

5.1.4.4 Quantitative assessment of Policy and Deployment & Manufacturing measures

Table *5.1.4-1* presents an analysis of all the Policy and Deployment & Manufacturing measures, carried out according to the assessment methodology described in Section 2.2. As it can be seen, eleven clusters of measures have been identified, for as many pairs AF/transport mode, of which seven were assessable. The electricity/road, CNG/road, LNG/water (both maritime and inland) and electricity/rail pairs are the ones having a high score; the LNG/road and biofuels/road pairs get a medium score. All the others pairs score low or are not assessable. Five of the seven assessable clusters identified can be considered to be comprehensive. In terms of expected impact of these measures to support the realisation of the AFV/AFI objectives as presented in the NPF and revised in the NIR, the lack of future targets and estimates for several pairs does not facilitate the task of putting this assessment into perspective. Based on the impact seen during the implementation period, for the future it can be said that the measures for the pairs electricity/road, CNG/road and LNG/water have a high impact. Electricity/rail, LNG/road and biofuels/road result to have a medium impact. Hydrogen/road has a low impact. Finally, electricity/water, electricity/air, biofuels/water and biofuels/air could not be assessed as limited information and no allocation were given in relation to the 'Energy support programme'. Moreover, concerning this particular measure, aimed at "*(exploring) the possibility of promoting the use of alternative propulsion systems at Finnish ports and airports*", the Finnish NIR and NFP explain that only the most promising options could be adopted by the beginning of the 2020s at the latest.

Compared to the NPF, the level of ambition of the Policy and Deployment & Manufacturing support measures has increased for all pairs.

Table 5.1.4-1 Quantitative assessment of Policy and Deployment & Manufacturing support measures

AF	Transport mode	Score	Comprehensiveness		Impact		Ambition (NIR vs NPF)
Electricity	Road	H	C		**H**		+
CNG	Road	H	C		**H**		+
LNG	Road	M	C		**M**		+
	Water (M & I)*	H	C		**H**		+
Electricity	Water (M & I)*	X					
	Air	X					
	Rail	H	N		**M**		+
H2	Road	L	N		**L**		+
Biofuel**	Road	M	C		**M**		+
	Water (M & I)*	X					
	Air	X					

Legend: Score: H = high; M = medium; L = low; X = not assessable. Comprehensiveness: C = comprehensive; N = Not comprehensive. Ambition level: '+' means 'higher'; '=' means 'comparable'; '-' means 'lower'.

*For some of the measures, it is unclear which ones correspond to maritime transport, which to inland and which cover both.
**For road transport, this includes renewable diesel.

5.1.4.5 Research, Technological Development & Demonstration

The Finnish NIR lists nine RTD&D research and pilot projects relating to alternative propulsion systems for transport carried out between 2016 and 2019: three addressing the field of biofuels, two on emissions measurements and financial mechanisms, and three on electric vehicles. In addition, an Action Plan for the Future of Mobility in Europe Mobility4EU, as well as the involvement in a project initiated by the European Commission to explore best practices for providing consumers with price comparison information on different propulsion systems were mentioned. The NIR does not provide specific details about each of these projects and this does not allow to either make direct comparisons with the projects listed in the NPF or to further analyse them. According to the information given in NIR, the majority of these projects focus on electricity and biofuels, to increase their cost-effectiveness. The indicated budget for RTD&D projects reported in the NIR amounts to 3.9 million € for the period 2016-2020. It includes both national funds and EU financial support to RTD&D activities on alternative fuels.

5.1.5 ***Additional information on alternative fuels infrastructure developments***

The FI NIR provides information on the fuel use in road transport only with reference to 2017 (see Table 5.1.5-1). No other past data, nor future expectations have been shared.

Concerning rail transport, the NIR reports that electric traction systems account for 95% of passenger transport and 78.3% of freight transport.

The FI NIR states that the main fuel used in aviation in Finland is kerosene. Total sales of kerosene in 2018 reached around 77,000 tonnes. More than 80% of kerosene was used in international transport.

Table 5.1.5-1 Changes in fuel use in transport sector (2016-2030)

MODE OF TRANSPORT	FUEL	Fuels use [%]			Estimated fuels use [%]		
		2016	2017	2018	2020	2025	2030
Road	Gasoline		32.20%				
	Diesel		57.10%				
	Electricity		0.50%				
	CNG		0.20%				
	LNG		0.00%				
	Hydrogen		0.00%				
	LPG		0.00%				
	Biofuels		10.10%				
	Total Road		**100.10%**				

5.1.6 *Summary of the assessment*

Tabular overview

Table 5.1.6-1 Overview of the NIR assessment

		Indicators	Alternative fuel / transport mode				
			Electricity / road	CNG / road	LNG / road	LNG / water (maritime)	E85/ road
AF Vehicles / Vessels		Past situation (2016)	3,472	2,184	8*	17*	3,650
		Situation (2018)	15,807	6,307	25**	4	4,132
		Estimate (2030)	382,790	52,788	NA	NA	NA
		Future share (2030) [%]	9.96%	1.37%			
		Estimate attainment (2018 vs 2030) [%]	4.13%	11.95%			
		Progress (2018)	adequate	adequate			
Publicly accessible AF Infrastructure		Past situation (2016)	684	24	2*	1*	100*
		Situation (2018)	2,399	40	6**	2	140
		Target (2030)	25,000*	NA	NA	NA	1,800
		Target attainment (2018 vs 2030) [%]	9.6%*				7.78%
		Progress (2018)	adequate	fast			2.35%
Sufficiency Index		2016	5.08	91.00			36.50*
		2018	6.59	157.68			29.51
		2020					
		2025		460.67*			
		2030	15.31*				
Measures	Legal measures	Ambition (NIR vs NPF)	+	+	+	+	+
	Policy measures + Deployment & manufacturing support	Score	H	H	M	H	M
		Comprehensiveness	C	C	C	C	C
		Impact	H	H	M	H	M
		Ambition (NIR vs NPF)	+	+	+	+	+
	RTD&D	Ambition (NIR vs NPF)	+				+

Legend:

	not applicable
	the value could not be computed
NA	no value/information provided/available in the NIR

* Value taken or calculated from FI NPF. ** Value taken from EAFO (absent in NIR).

The NIR describes Finland's efforts to increase the use of alternative fuels in transport, including waterborne transport. For instance, the information provided in the Finnish NIR is that Finland is committed to an ambitious (climate) target under the IMO's provisional Greenhouse Gas Strategy for reducing emissions from shipping, and is aiming at similar emission cuts both in international navigation and for maritime transport in Finnish waters. An objective for boating activities is that they should become virtually emission-free in Finland by 2050, and all new boats should be able to be used with an alternative propulsion system by 2030.

In principle, the Finnish NIR covers the whole AFID period (2016-2030), but the quantitative analysis is not always possible. It almost fully addresses the requirements of Annex I of the Directive. In particular, the FI NIR offers quantitative objectives for electric vehicles and infrastructure, for E85 infrastructure and for CNG vehicles. The FI NIR does not provide information on the methodology applied to take account of the charging efficiency of high power recharging points and does not provide considerations on any particular needs during the initial phase of AFI deployment.

The main outcomes of the technical assessment of the Finnish NIR on vehicles/vessels estimates and infrastructure targets can be summarised as follows:

Road transport

- **Electricity** – With 15,807 electric vehicles and 2,399 publicly accessible recharging points in 2018, Finland is progressing adequately towards reaching both the envisaged EV estimate and AFI target for 2030. The targeted numbers of publicly accessible recharging points in 2020 and 2030 remain the same as in the NPF, but since the number of electric vehicles in Finland has grown more rapidly than expected, this might need to be revised. The infrastructure target for 2020 has been reached already in 2018. Electric HCVs constitute the smallest share in the Finnish EV market (two in 2018), but are foreseen to increase up to 2,046 by 2030. Also the number given for buses and coaches is expected to increase to 1,000 in 2030. The targeted number of electric vehicles in 2025 and 2030 is more ambitious in the NIR than in the NPF (+51.64% for 2025 and +45.55% for 2030). As for the sufficiency index, it is currently adequate, but according to the available data it might become inadequate in 2030.
- **CNG** – According to the Finnish NIR, the number of CNG vehicles will be growing from 6,307 reported for 2018 up to 52,788 in 2030. The number of HDVs reported in 2018 is of 133 HCVs and 47 buses and coaches. The expected number of HCVs and buses and coaches in 2030 is respectively 1,719 and 147. The estimated number of LCVs in 2030 is 7,177. The 2018 progress for CNG vehicles is adequate. Regarding CNG infrastructure, 40 publicly accessible refuelling points have been recorded in 2018 and no targets for 2025 and 2030 are given. The 2020 target provided in the NIR (50 refuelling points) is 9.09% lower than in the NPF. The 2018 state of play corresponds to a fast progress towards reaching the envisaged targets, while the sufficiency index is always below the reference value of 600.
- **LNG** – The FI NIR only briefly mentions long-distance lorries using LNG and LBG, but no quantitative information is provided on LNG vehicles market. Data on 25 LNG vehicles and 6 publicly accessible refuelling points in 2018 come from EAFO. For Finland the objective is to have a network of LNG refuelling stations nationwide for heavy-duty vehicles on the highway by 2030. The NPF had reported a target of 9 LNG stations in 2020 and 11 in 2025, but this has not been confirmed in the FI NIR.
- **Hydrogen** – The Finnish NIR does not include hydrogen infrastructure provisions. Despite a target in the NPF to have 21 hydrogen refuelling stations in the main urban centres by 2030, the number of hydrogen refuelling stations in Finland dropped from two in 2016, to zero in 2019. In 2018, there was just one hydrogen passenger car on the road in Finland and this number did not change between 2016 and 2018. The FI NIR states that it is unlikely that the network of hydrogen stations will grow in line with the targets set in 2016. Anyway, financial support for hydrogen vehicles, infrastructure and other hydrogen projects is foreseen within the 'Energy support programme', as well as within the taxation system.
- **Biofuels** – The fastest growing alternative fuels in Finland are biofuels. Liquid biofuels (including high blend ethanol E85 or ethanol diesel ED95) are planned to account for 30% of the total road fuels in 2030 (the share was 10% in 2018), the objective being laid down in legislation[4]. The NIR indicates that new flex-fuel vehicles (E85), no longer being commercially available in Finland, resulted in zero registrations in 2019. The country

[4] The rest is planned to be achieved through the increased use of (hydrogen), electricity and gas.

instead relies on conversions of conventional vehicles. Finland recorded 140 E85 refuelling stations in 2018. While for 2020 and 2025, both the NPF and the NIR indicate no targets, for 2030 the FI NIR has a new target of 1,800 refuelling points offering biofuels (and synthetic fuels, see next), which constitutes an increase of 620% compared to the NPF target of 250 refuelling points.

- **LPG** – LPG is not taken into consideration in the Finnish NIR.
- **Synthetic and paraffinic fuels** – Finland recorded 20 renewable paraffinic diesel (HVO) refuelling points for heavy-duty vehicles and 34 for all vehicles in mid-2019. In the infrastructure targets mentioned above for liquid biofuels (1,800 in 2030), the NIR also includes the availability of 100% renewable diesel, similarly to E85 and ED95.

Rail transport

- **Electricity** – One objective of the Finnish national distribution infrastructure programme for alternative propulsion systems in transport is that rail should be nearly 100% electrified by 2050.

Waterborne transport (maritime)

- **Electricity** – Finland did not provide numerical objectives in their NIR, instead the situation up to 2019 was described. Traficom's register of boats reports 184 vessels[5] in Finland with an electric motor, which accounts for 0.09% of all boats in September 2019. According to the FI NIR, development plans for shore-side electric supply over the next years vary from port to port, and no numerical data has been provided. The Finnish NIR indicates challenges with the supply of shore-side electricity, as individual cruisers need up to 15 MW for large vessels.
- **LNG** – In 2018, LNG was the fuel used by four vessels under Finnish flag. The NPF had indicated 17 LNG seagoing ships in 2016. Sixteen vessels with a gas motor were reported for September 2019 in Finland. Although 2025 and 2030 estimates are not provided, the NIR expects the number of LNG-fuelled vessels to increase in the next years. Bunkering operations are reported in the ports of Helsinki and Pori. The FI NIR confirms the 2025 target of 6 refuelling points provided in the NPF. In its NIR, Finland states that the increase of LNG-fuelled ships used for domestic and international transport will support the development of the LNG infrastructure and that low oil prices might slow down the investments.
- **Biofuels** – Biofuels accounted for around 10% of MDO (marine diesel oil) or MGO (marine gas oil) fuels in 2018. The FI NIR does not provide numerical estimates for the future, but informs about four vessels flying under Finnish flag using biofuels. Bio-oil manufactured in Finland from vegetable fat and fish gut waste is explicitly mentioned here. Finland reports the intention to increase the ship use of VG Marine EcoFuel, produced in Finland, by four or five times the current volume of 450 tonnes a year by the end of 2021. The Act on the Promotion of Biofuels in Transport implies that the use of biofuels will increase on boats that use the same fuels as road transport.

Air transport

[5] Register includes watercraft over 5.5 metres long or with motors in excess of 15kW.

The FI NIR does not give any numerical data on airplanes and infrastructure, but the objective for air transport is to reach a 40% share of renewables or of other solutions to cut emissions by 2050, and airport terminals traffic emission-free by 2050.

- **Electricity** – Finavia predicts that Finland will have pure electric passenger aircraft on domestic routes by the end of the 2030s at the earliest. The FI NIR speculates that it is more probable that hybrid aircraft (combustion engine plus electric power) will come onto the market first. There are at present dynamic efforts to develop hybrid and electric aircraft by start-ups and the world's largest aircraft manufacturers. The number of electricity recharging infrastructure for stationary airplanes is expected to increase in the next years, but no numerical data for 2020/2025/2030 were provided.
- **Biofuels** – The NIR provides very limited information on biofuels use in air transport. The objective is that the blending obligation would allow for sustainable biofuels to reach a 30% share of aviation fuels by 2030. No measures have yet been put in place to achieve the objective.

As in the NPF, the Finnish NIR contains an extensive and detailed description of **measures**. They cover a wide variety of AFs and transport modes.
Considering all the legal measures, they show an overall increase in ambition compared to the NPF and appear, if fully implemented, to be fit to support the realisation of the AFV/AFI objectives as described in the NPF and revised in the NIR.
With reference to the Policy and Deployment & Manufacturing measures, although the lack of future targets and estimates for several pairs does not facilitate the task of putting this assessment into perspective, the applied assessment methodology provides very positive scores, which are based on the results obtained during the implementation period. The measures for the pairs electricity/road, CNG/road and LNG/water (both maritime and inland) have a high impact. Electricity/rail, LNG/road and biofuels/road pairs result to have a medium impact. In addition, shore-side electricity supply infrastructure for ships was addressed in the NIR and LNG refuelling infrastructure constitutes a strong point in both the Finnish NPF and NIR. Concerning rail transport, the NIR indicates that 3.7 billion € were spent in Finland on rail development projects, including electrification, in 2016-2019 and reports on planned further increase in rail investments. The focus on biofuels development for aviation, road and maritime transport is strong in Finland and measures continue to support further development. In particular, a biofuels quota obligation is being planned for air transport. The level of ambition for all support measures has increased from the NPF to the NIR. Only for hydrogen there is lower ambition in the NIR compared to the NPF, explained as the result of an actual market request lower than foreseen when designing the NPF. Nonetheless, financial support for hydrogen is still possible, even if the market does not seem to follow yet. Noteworthy is the successful implementation of the measures supporting ambitious climate targets and provision of sufficient financial means to implement the Directive.
As for RTD&D measures, they are focused principally on biofuels and electricity.

5.1.7 *Final remarks*

The Finnish NIR provides a comprehensive report on the efforts made to implement the Directive, which is largely in line with the provisions of Annex I to the Directive. However, no information is provided on targets for recharging points in 2025, and for CNG and LNG refuelling points for vehicles for 2030. Furthermore, no estimates are provided for LNG vehicles and vessels by 2020, 2025 and 2030. Nevertheless, the NIR reports that there is a small fleet of LNG vessels in Finland and their number is expected to increase in the next years. Biofuels and electricity will play a major role in the decarbonisation of transport in Finland. The Finnish NIR contains an extensive and detailed description of measures covering all fuels and transport modes.

As regards electricity, the NIR estimates that about 380,000 electric vehicles could be on the roads by 2030, representing about 10% of the future fleet. Taking into account the current situation and expected trends, this level of ambition does not appear to be fully compatible with the pace of deployment of electric vehicles considered necessary for a full transition to carbon neutrality by 2050. While current infrastructure deployment is in line with the current vehicle uptake, Finland should provide information on estimated targets for 2025 and 2030 that will be in line with the expected vehicle uptake. No information on charging efficiency is provided. In 2019, shore-side electricity supply was available in three ports and projects are ongoing in the remaining two ports of the TEN-T Core Network. In addition, several electric powered vessels are already in operation, but further information on fleet development would be helpful. Finland should provide clarifications on the installation of electricity supply to stationary aircraft in its airports. The NIR predicts to have some electric passenger aircraft by 2030. No information is provided on the current share of electrified rail network. However, Finland aims to electrify nearly 100% of its railways by 2050.

Concerning hydrogen for road transport, the NIR does not include targets for the number of future hydrogen refuelling stations. While some financial support for FCHVs and infrastructure is foreseen, further effort is needed to address the uptake of FCHVs and infrastructure in Finland. It would be relevant that Finland provides more information on how to ensure EU-wide connectivity for HCEV.

Regarding natural gas, according to the Finnish estimates, CNG vehicles will represent about 1.5% of the vehicle fleet by 2030. No targets are provided in the NIR for CNG refuelling points in 2025 and 2030, while the NPF foresaw 55 refuelling points for 2025. The NPF had presented a target of 11 LNG refuelling points by 2025. This seems to be sufficient considering the length of the Finnish TEN-T Core Network, provided that the refuelling stations are distributed widely along the network. The NIR does not provide any information on the current number of LNG vehicles or any future estimates. LNG bunkering operations are currently carried out in the TEN-T Core port of Helsinki and it is planned that six ports (there are five ports in the TEN-T Core Network) will supply LNG for vessels by 2025. Although future estimates are not provided, the NIR expects the number of LNG-fuelled vessels to increase in the next years compared to the 16 existing in 2019.

No information is provided on LPG vehicles or infrastructure.

While the ambition for zero emission fuels and natural gas are relatively low, Finland's transport decarbonisation strategy focusses on biofuels and to a lesser extent on synthetic fuels.

Legislation is in place that foresees that liquid biofuels (including high blend ethanol E85 or ethanol diesel ED95) will account for 30% of the total road fuels in 2030. Finland recorded 140 E85 refuelling stations in 2018 and plans to have 1,800 refuelling points offering biofuels and synthetic fuels. In order to create demand for such fuels, Finland provides financial incentives to retrofit existing vehicles for the use of high biofuel blends. In waterborne transport, biofuels accounted for around 10% of MDO (marine diesel oil) or MGO (marine gas oil) fuels in 2018. Finland reports the intention to increase the ship use of VG Marine EcoFuel, produced in Finland, by four or five times the current volume of 450 tonnes a year by the end of 2021. As for the use of renewable fuels in aviation, Finland sets itself the very ambitious target to have a biofuel blending obligation of 30% in aviation fuels by 2030.

5.1.8 *ANNEX - Description of the Member State*

On a surface area of 338,400 km², Finland has a population of 5.513 million people in 2018, which makes up for a population density of 16 inhabitants/km².

Number of main urban agglomerations

- 9 urban agglomerations > 50,000 inhabitants

In 2018, Finland achieves a per capita gross domestic product at market prices of €42,490, which represents a per capita gross domestic product in purchasing power standards of 111 if expressed in relation to the EU-28 average set to equal 100.

Length of the road networks

The length of the road TEN-T Core Network in Finland is 1,071 km. The total road network length is 26,952 km, of which 926 km are motorways.

The following lengths of the TEN-T Road Corridors are present in Finland: 5% (348 km) of the Scandinavian – Mediterranean Corridor.

Through the TEN-T Road Corridors, Finland is connected with the following Member States:
- Sweden (through the Scandinavian – Mediterranean Corridor)

Number of registered road vehicles

At the end of 2018, Finland accounts for 4,728,980 registered road vehicles of which 3,470,507 are categorized as passenger cars, 465,024 as light goods vehicles, 171,182 as heavy goods vehicles and 18,467 as buses and coaches. The motorisation rate is 629 passenger cars per 1,000 inhabitants.

Number of ports in the TEN-T Core Network

- 5 maritime ports in the TEN-T Core Network (Hamina, Helsinki, Kotka, Naantali, Turku)
- 12 maritime ports in the TEN-T Comprehensive Network
- No inland ports

Number of airports in the TEN-T Core Network

- 2 airports in the TEN-T Core Network (Helsinki-Vantaa, Turku)

18 airports in the TEN-T Comprehensive Network