NATIONAL POLICY FRAMEWORK
ALTERNATIVE FUELS INFRASTRUCTURE FOR TRANSPORT IN MALTA 2018-2030

Table of Contents

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

This document presents the framework of actions for the development of alternative fuels in the transport sector in Malta and the required infrastructure in application of Directive 2014/94/EU of 22 October2014.

Improving the environmental sustainability of transport has been the goal of numerous EU measures and national plans. In line with Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, Member States should achieve a share of energy of the gross final consumption from renewable resources. As per Annex I of this Directive, Malta has the obligation to achieve a 10% target for the share of energy from renewable sources in the country. This gross final energy consumption includes energy consumed in transport, electricity, heating and cooling. A separate target of at least 10% RES (renewable energy sources) share in the final consumption of energy in transport is also applicable[1]. It is therefore of importance to coordinate this objective with the current National Policy Framework (NPF) as RES in all forms of transport contributes to the 2020 goal. Malta's National Renewable Energy Action Plan 2015-2020 sets out the RES mix that is expected to deliver a target of 10% renewables by 2020 with the contribution from transport being 2.11% (mainly through the use of biofuels (2.10%) – enabling to reach the 10% target for transport – and the remaining 0.01% from the use of renewable electricity in transport).

More recently, Malta has reaffirmed its commitment to achieve the decarbonisation of its transport sector through its transport strategy, which it launched early in 2017. The recently published **National Transport Strategy 2050** firmly places the encouraging of use of greener fuels and vehicles as a guiding and critical principle in achieving the strategic goals of 'Sustainable Urban and Rural Environments' and 'Working towards Public Health'. It recognises the importance of the commitment to support the use of greener technologies and the use of renewable energy for transport systems, both to reduce energy demand as well as to reduce green-house gas (GHG) emissions, improve air quality and reduce the negative impact of noise.

The measures to be taken to contribute to the decarbonisation of the transport sector are detailed in the **Transport Master Plan 2025**, which aims to achieve the goals set in the **National Transport Strategy 2050**. In line with the EU 2011 Transport White Paper, Malta has established indicative national decarbonisation targets in road transport which it will strive to achieve. In particular an ambitious national target has been set for shifting 50% of the urban transport away from conventionally fuelled cars by 2030, though full achievement of such target would likely be dependent on international market developments and advances in vehicle engine and battery technology. By 2020, Malta is

[1] In the denominator i.e. the total amount of energy consumed in transport only petrol, diesel, biofuels consumed in road and rail transport, and electricity shall be taken into account. For the calculation of the numerator i.e. the amount of energy from renewable sources consumed in transport all types of energy from renewable sources consumed in all forms of transport shall be taken into account.

obliged to limit the increase of its GHG emissions to just 5% compared to 2005 recorded levels, in line with the Effort Sharing Decision 406/2009/EC. Additional targets emanating from the Air Quality Framework Directive[2] and the Environmental Noise Directive[3] must also be addressed.

Transport in the EU still relies heavily on oil for about 94% of its energy needs. Through the European Strategy for low Emission Mobility, the Commission is looking into how to accelerate the use of low-emission alternative energy, such as advanced biofuels, electricity, hydrogen and renewable synthetic fuels by providing strong incentives to innovate. With such policy measures the share of low-emission energy could increase, providing about 15-17% of transport energy demand in 2030 and replacing oil products.

The main challenge is to break the transport system's dependence on oil without compromising efficiency and mobility. In line with the above EU targets, the Maltese Government is addressing the eventual changeover by gradually phasing in the new technology and has pledged to announce by the end of 2018 a cut-off date for the importation of all internal combustion engine (ICE) vehicles.

Related to this process of the phasing out of ICEs, government will be commissioning a study on alternative fuels in 2018 (the Alternative Fuels in Road Transport Study) to identify future alternative fuels, other than electricity, to determine the fuel or fuels most feasible for use by road transport in Malta and taking into consideration demand and supply, availability of technology and cost of infrastructure required, as well as environmental, regulatory, planning and safety issues. The study will commence in 2018.

[2] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

[3] Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise - Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise

2. ASSESSMENT OF THE CURRENT STATE OF ALTERNATIVE FUELS IN THE TRANSPORT SECTOR

2.1. INTRODUCTION

Malta covers just over 316 km^2 with a population of about 434,400 in 2016[4], projected to rise to 468,000 by 2050[5], making it one of the world's smallest and most densely populated countries. Malta is primarily composed of two islands, Malta and Gozo, heavily urbanised to the extent that DG Regio has stated "the whole territory of Malta constitutes a single urban region"[6]. Malta has no rail-based transport and the internal mobility of people and the national transportation of goods is carried out almost exclusively by road. Malta's National Strategic Reference Framework (2007-2013) had pointed out that "Malta's road network has been catering for an increasing motor vehicle population which has been contributing to a considerable increase in traffic congestion"[7]. Furthermore, while "private car ownership and usage is on the increase, public transport patronage has never assumed rising trends in consumption"[8]. However, following a major reform of the national bus service in 2011, annual public transport patronage did see a 30% increase in the last six years with bus patronage amounting to 43,3 million passengers in 2016. Despite a range of grants and subsidies having been made available by government for the purchase of electric vehicles by individuals, private companies, NGOs and local councils, Malta's percentage of hybrid and electric rolling stock still lags behind other European countries. The main reason for this is the fact that the cost of ownership of internal combustion engine vehicles remains significantly lower than the equivalent alternatively fuelled vehicle.

Road transport is a major source of pollution and greenhouse gas emissions in Malta, accounting for over 30% of the national GHG according to the National Greenhouse Gas Emissions Inventory in 2016. Over 41% of the greenhouse gas emissions fall within the scope of Decision No.406/2009/EC for 2016[9], under which Malta has a set target to limit its growth of GHG emissions to a maximum of 5% by 2020 above 2005 levels.

2.2. OVERVIEW OF THE CURRENT SITUATION IN THE TRANSPORT SECTOR

[4] http://ec.europa.eu/eurostat/statisticsexplained/index.php/File:Demographic_balance,_2015 _(thousands) YB16.png
[5] http://ec.europa.eu/eurostat/web/population-demography-migration-projections/statistics-illustrated

[6] http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/coheter/coheter_en.pdf
[7] NSRF 2007-2013, p24
[8] Ibid ft 4
[9] figures are indicative at this stage, based on 'provisional' data submitted to the European Commission in accordance with legal obligations. 'Final' data will be submitted in mid-March, though it is not expected that there will be substantial differences.

The transport sector is almost fully dependent on fossil fuels, equivalent to 74% of the fuel used in the inland market, excluding fuel used in international aviation and power generation. This accounts for the largest share of the total conventional energy consumed in Malta. For this reason, the National Renewable Energy Action Plan makes transport one of its priorities. The share of RES (renewable energy sources) in transport reached 5.8% in 2016.

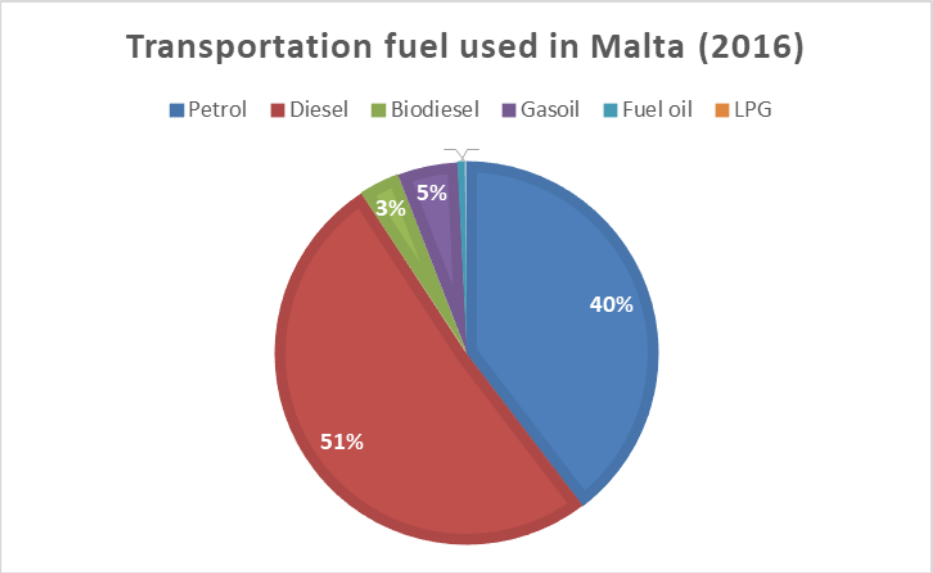


Figure 1: Fuel consumption for road and national navigation[10]

As can be seen from Figure 1, diesel accounted for the largest share of fuels used in transport, with more than half of the consumption of 2016. The use of electricity and gas remained negligible. Despite the predominance of diesel across the transport spectrum, petrol remained the most common fuel type in the car stock. In 2016, the bulk of the fuel mix used in transport was made up of EN228 petrol (40%), EN 590 automotive diesel (51.1%) and biodiesel (3.4%) as shown in table 1.

Table 1 Fuel use in domestic transport in 2016[11]

Fuel (metric tons)	Consumption for both Domestic Navigation and Road transport	%	Consumption in Road Transport	%
Petrol	75 705	40.0	75 371	42.5
Diesel	97 706	51.1	95 143	53.7
Biodiesel	6 511	3.4	6 409	3.6

[10] Source: NSO
[11] Source: NSO

Gasoil	9 657	5	-	-
Fuel Oil	1 130	0.6	-	-
LPG	392	negligible	392	negligible
Total	191 101	100	177 315	100

The figures for 2016 in Fig. 2 show that the total consumption of fuel for national navigation and road transport stayed stable between 2009 and 2014, but started to slowly increase in the last years up to 191,101 tons. In parallel, the share of biofuels also increased gradually.

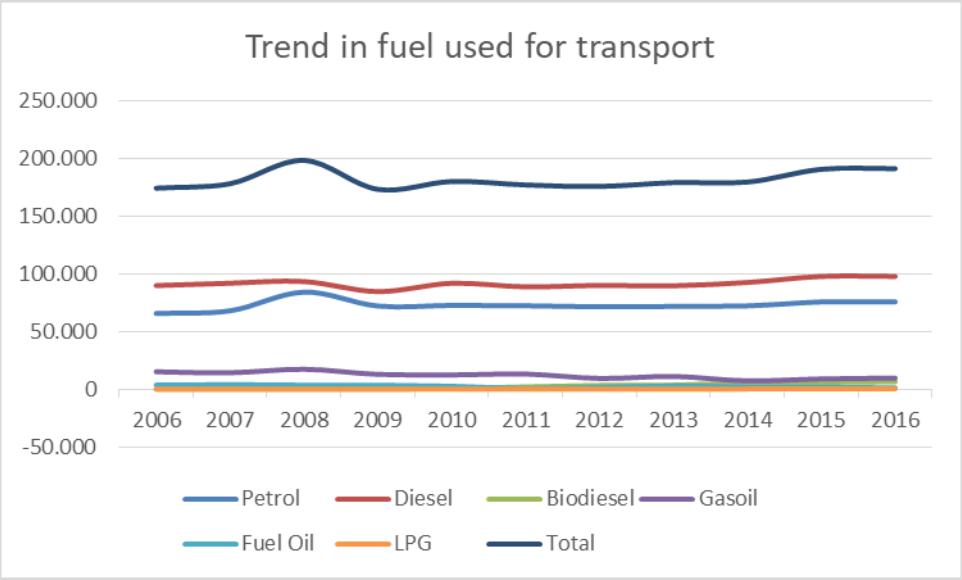


Figure 2 Fuel used in transport in metric tons (road and national navigation) in the last 10 years[12]

As already underlined before, mobility in Malta is heavily reliant on personal cars and the modal share is heavily biased towards private vehicles. "The number of newly licensed motor vehicles increased circa 2.5% between 2010 and 2013. This number indicates that the process of renewal of licensed vehicles is rather constant through the years. In 2011, there was a significant increase of vehicles registered for the first time in Malta: +18.5% compared to 2010, reaching 19,000 licences"[13]. While this increase was exceptional for 2011, trends over the past three years have exceeded "3.4 per cent each year, representing an increase of 12,000 vehicles on our roads every year"[14] .

[12] Source: NSO
[13] Transport Malta (2015), *Existing Conditions Data Diagnostic Report, 2014*, p. 70
[14] Budget Speech 2017, MFIN, p.79

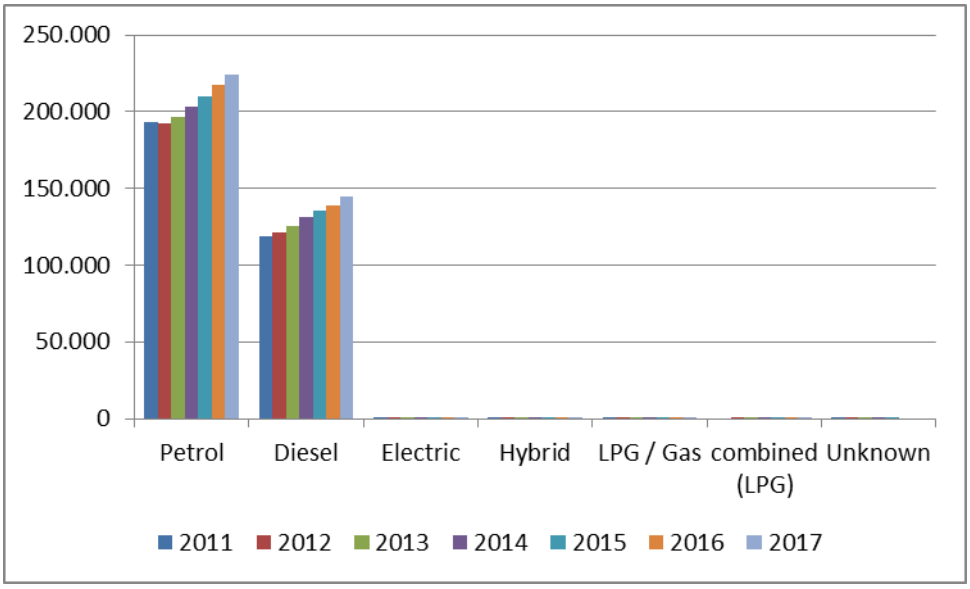


Figure 3 Stock of licensed motor vehicles and type of fuel used[15]

As shown in the table above, the number of petrol and diesel vehicles in Malta increased over the years. Over the last six years, the number of licensed petrol engine vehicles has been consistently higher than diesel engine vehicles; in 2017 petrol vehicles accounted for approximately 224,500 vehicles, compared with 145,000 diesel vehicles. The share of alternative fuel vehicles in the fleet is still low, representing only 0,7% of the total fleet.

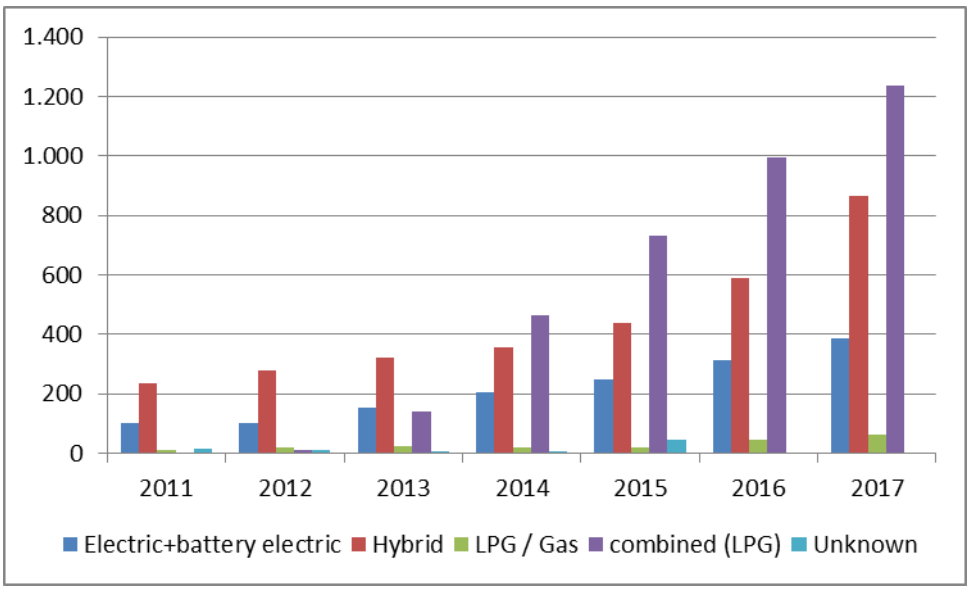


Figure 4 Stock of licensed motor vehicles by alternative fuel[16]

[15] Source: formulated based on statistics provided by NSO
[16] Ibid.

Alternative fuel vehicles are predominantly passenger cars, with some motorcycles (70 electric motorcycles), goods vehicles and special purpose vehicles (both LPG and electric, respectively 56 and 116) in 2017 see Table 5.

Although very short distances make up for most movements in Malta, cycling is not yet considered as an alternative means of transportation for daily mobility. In fact, cycling shared an estimated 0.27% of the modal split of transport at national level in 2014, and Malta ranks last in European rankings in terms of cycle usage (this modal share may have increased slightly due to initiatives to foster cycling). Walking fares better with 7.6% share of the modal split. However, opportunities for walking remain limited: "Typically the existing traditional urban fabric is often made up of narrow roads with limited space. The tendency is that this limited space is allocated for parking rather than appropriate footpaths"[17].

Meeting the GHG reduction target not only means focusing on the cleanest possible technology and on low-carbon fuels, but also on using the most efficient transport modes and getting rid of economic inefficiencies stemming from uncovered external costs, amongst others. The figures reported in the Transport and Environment Reporting Mechanism (TERM) 2011 show that some efficiency gains have been made following the introduction of mandatory CO_2 emissions limits for new passenger cars. In 2010, new cars were approximately a fifth more efficient than in 2000. With regulation on CO_2 emissions from cars and vans until up to 2020[18] now agreed, the way has been paved for progress towards a fleet of low emission vehicles. New cars are becoming significantly more energy efficient each year and the auto industry as a whole is well on track to meet emission targets. Unfortunately, due to the very low scrapping rate of the cars in Malta, which are kept and continue to be used despite the registration of new cars, the positive effects of emission improvements are delayed.

Malta's coastline presents several bays, but in reality only few of them are or can be used as structured natural harbours or established ports with adequate facilities for scheduled (or organised) internal maritime transport services[19]. Cross harbour ferry services were introduced across the Grand Harbour, connecting the three cities to Valletta. The Sliema-Valletta route was re-introduced in 2012. Although, during the first few years of the introduction of these services these were primarily considered to be addressing tourist demand, rather than an alternative mode of commute, this seems to not be the case. The latest data compiled clearly shows that overall patronage of the service has been increasing over the years, starting from 454,338 passenger crossings in 2013 to 1,088,044 in 2016. This suggests that the use of the ferry service for commuting has increased drastically in popularity among residents.

[17] Transport Malta (2016) *National Transport Strategy, 2050* p.88

[18] Regulation (EU) No 333/2014 amending Regulation (EC) No 443/2009, Regulation (EU) NO 253/2014 amending Regulation (EU) No 510/2011, Regulation (EC) No 443/2009 and Regulation (EU) No 510/2011

[19] Transport Malta (2016), *National Transport Strategy, 2050* p.211

International marine bunkering is also showing a growing trend with an increase in fuel bunkered of 9% in gasoil and 30% for fuel oil between 2010 and 2016, as shown in Table 2.

Year	International Marine Bunkering Metric tonnes	
	Gasoil	Fuel oil
2010	239,852	1,191,376
2011	222,418	1,157,907
2012	220,674	1,003,113
2013	173,791	1,045,077
2014	185,215	1,071,044
2015	259,762	1,330,268
2016	261,048	1,552,385

Table 2 Fuel used by marine bunkering[20]

Malta has one international airport that also caters for military activity in Malta, primarily search and rescue. The aviation business is predominantly composed of commercial aviation but also of a growing volume of business (or general) aviation. The number of passengers at Malta International Airport (MIA) nearly doubled within a decade. Passenger volumes increased from 2.7 million in 2004 to 4.3 million in 2014, which equates to an annual growth rate of 4.6%[21]. In 2014 over 32,000 aircraft movements were registered at MIA, with increases expected in line with passenger movement increases. By 2017, MIA recorded 6 million passengers. The current jet fuel consumption has also been drastically increasing for international and domestic aviation as shown in Table 3.

Table 3 Fuel used by Aviation and International Marine Bunkering[22]

Year	Jet fuel (metric tonnes)	
	International aviation	Domestic aviation
2010	99,000	373
2011	103,000	1,381
2012	99,000	1,460
2013	103,000	1,596
2014	109,000	1,413
2015	113,778	1,769
2016	120,517	1,874

Malta is at the southernmost end of the Scandinavian-Mediterranean Corridor of the TEN-T Core network. In Malta the Core network, includes the core sea ports of Valletta

[20] Source: NSO
[21] Source: National Transport Strategy, 2050
[22] Source: National Transport Strategy, 2050

and Marsaxlokk, as well as the core airport in Luqa interconnected by a 22km road network. In recent years, there has been significant investment in infrastructure and traffic management to remove traffic bottlenecks in the TEN-T Core network.

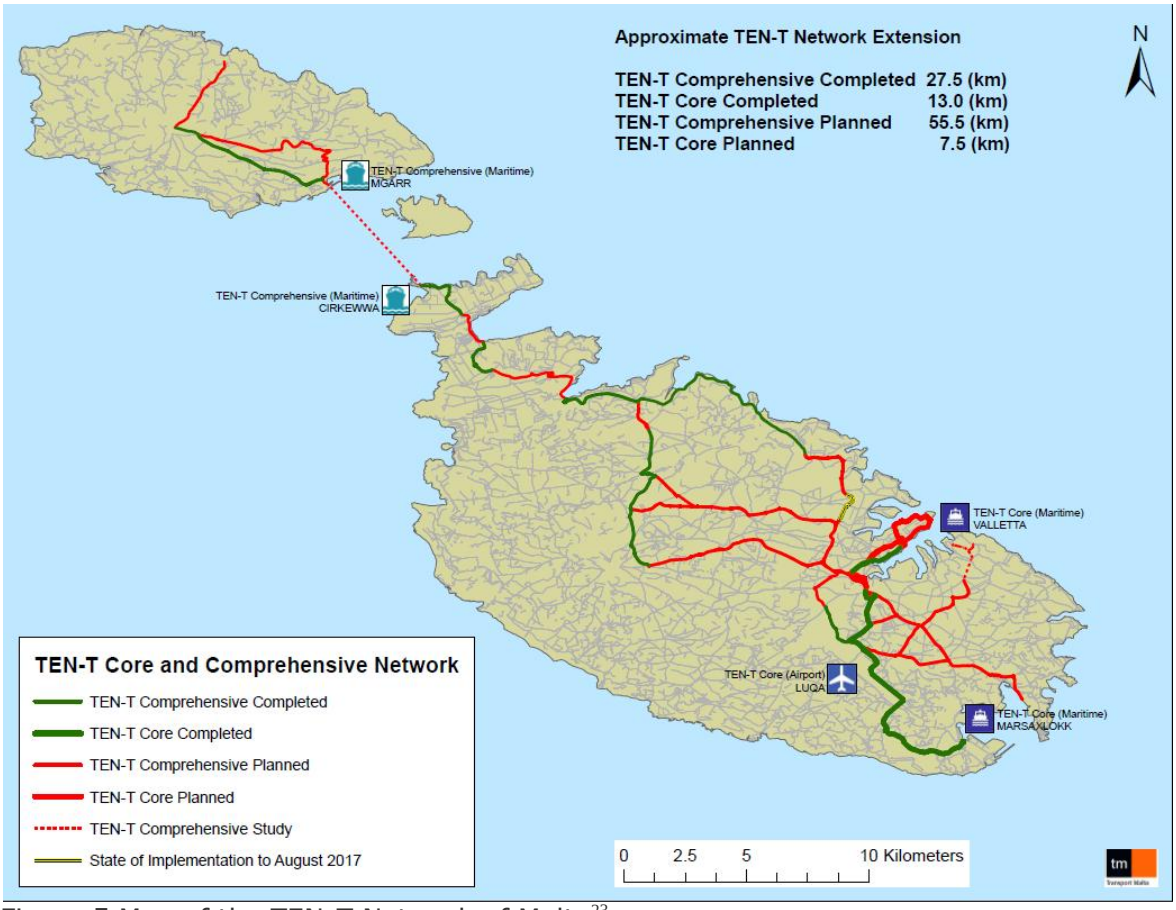


Figure 5 Map of the TEN-T Network of Malta[23]

2.3. CURRENT STATE: ELECTRICITY

2.3.1. Context

Electric transport for road vehicles is considered to be a suitable option for personal mobility in Malta, as distances travelled are short. In fact, efforts for the electrification of transport in Malta started in 2008 and have been increasing year by year. The launch of the Malta National Electromobility Platform (MNEP) in 2013 was a first step in government policy to encourage electrification of transport. The MNEP has the function to create visibility of the potential of electro mobility and to assuage fears on reliability. The Malta National Electromobility Action Plan (MNEAP) lists a number of projects, programmes and measures which will contribute to meet Malta's European and international environmental obligations. An important point to secure the environmental benefit of electro mobility is the CO_2 content of electricity when considering well-to-

[23] Source: TENtec

wheel (WtW) emissions. The projected CO_2 emission factor for the electricity mix at the consumer end is, as shown in Table 4, expected to remain stable from 2020 onwards. This is below the electricity CO_2 content of several other European Member States, and should ensure a reduction of GHG emissions of around 40% WTW (own calculation based on an average middle size car with Malta electricity CO_2 content, without considering the entire life cycle analysis i.e. battery and vehicle) compared with ICE vehicles. Nevertheless, it remains a priority for the government's energy policy to develop renewable energy sources, which would be an added bonus to traffic related emissions, both from the air pollution and GHG emissions perspective.

Table 4 Projected CO_2 emission factor for electricity mix at the consumer end

	2018	2019	2020 2021	2022	2023 2024	2025 2026	2027 2028	2029 2030
Tonnes CO_{2e} per MWh at consumer end	0.391	0.384	0.381	0.382	0.383	0.384	0.385	0.386

As of 16 January 2018

Sources, assumptions and other notes:

- *Renewable electricity generation up till 2020 is based on NREAP 2017 projections and has been assumed to remain constant post-2020*
- *Source of electricity generation mix projections is TYNDP 2017*
- *Distribution losses were assumed fixed as at 2015 levels, and have been applied to electricity generated by power plants and interconnector*
- *Percentage of fuel used in station for power plants was assumed fixed as at 2015 levels*
- *Percentage of electricity losses between Ragusa and Maghtab points for electricity imported through the interconnector was assumed to be as at 2015 levels*
- *The emission factor for natural gas was sourced from the IPCC 2006 report.*
- *The emission factor for the electricity imported through the interconnector is based on estimates provided by Enemalta for 2015 and has been assumed fixed until 2030. The emission factor provided is 0.319 tonnes CO_2 per MWh and most likely includes renewable electricity generation.*

2.3.1.1. Electro-mobility in the road sector

Although by the end of 2016 there were 842 vehicles (and 1194 in 2017) which were fully electric, range extenders and hybrids, only 238 vehicles out of the 330,588 licensed passenger cars and light goods vehicles were Battery Electric Vehicles (BEVs) equivalent to 0.075% of the corresponding fleet. Despite the availability of government grants, electric vehicles have made a slow entry into the market, as the main issue remains the limited number of models on the market and the high cost for these vehicles when compared to ICE vehicles. Moreover, as the average lifetime of passenger cars in Malta

exceeds 10 years, the uncertainty concerning the longevity of the battery may remain a barrier for consumers in Malta to invest in a technology which would not fit their needs. Replacing the battery after some years, at current market prices, would significantly increase the incremental cost of electric cars over the lifetime of the vehicle. The option of leasing e-cars may be an offer from resellers and manufacturers, which could trigger a higher penetration.

A LIFE+ funded project and a demonstration project DEMO EV 2013/2016 and PORT-PVEV 2015/2016 Projects aimed at testing the usage of electric mobility in the Maltese urban and topographic context. Although the Maltese islands are very small, with short distance travelled, the project also needed to address range anxiety issues. The projects resulted in the first modern EVs, however small, and the establishment of the National EV Charging Network. By the end of 2016, the Maltese government was offering various incentive schemes as developed in the last chapter on the measures to be implemented.

In 2016, the government introduced grants for private companies to invest in charging points: a €2,000 grant (up to a maximum of €10,000) per charging pillar for commercial companies interested in changing their current vehicle fleet to an electric one. But this opportunity was not seized. There may be several reasons for this: the companies owning their own charging facilities had already purchased charging points from their own funds or use the national EV charging network or their EV fleet not large enough to justify such an investment in their facilities. In 2017, the EV grant scheme was amended to enable companies to invest in a larger EV fleet. This was a success with a take up of €101,000 resulting in 16 EVs registered by companies. The government is also offering grants of €25,000 to car importers to assist them in upgrading their service garages. The 2018 scheme will provide grants for individuals, local councils, NGOs as well as registered commercial entities.

Table 5 Electric and hybrid vehicles on the road 2013-2017[24]

HYBRID & ELECTRIC VEHICLES	2013	2014	2015	2016	2017
Total	475	563	685	901	1255
Electric Light Duty Vehicles	59	87	136	169	232
Electric goods-carrying and special purpose vehicles	50	57	63	79	86
Hybrid electric diesel vehicles	0	6	14	13	25
Hybrid electric vehicles	322	352	425	575	842
Electric buses	0	0	0	0	0
Electric motorbike	44	61	47	65	70

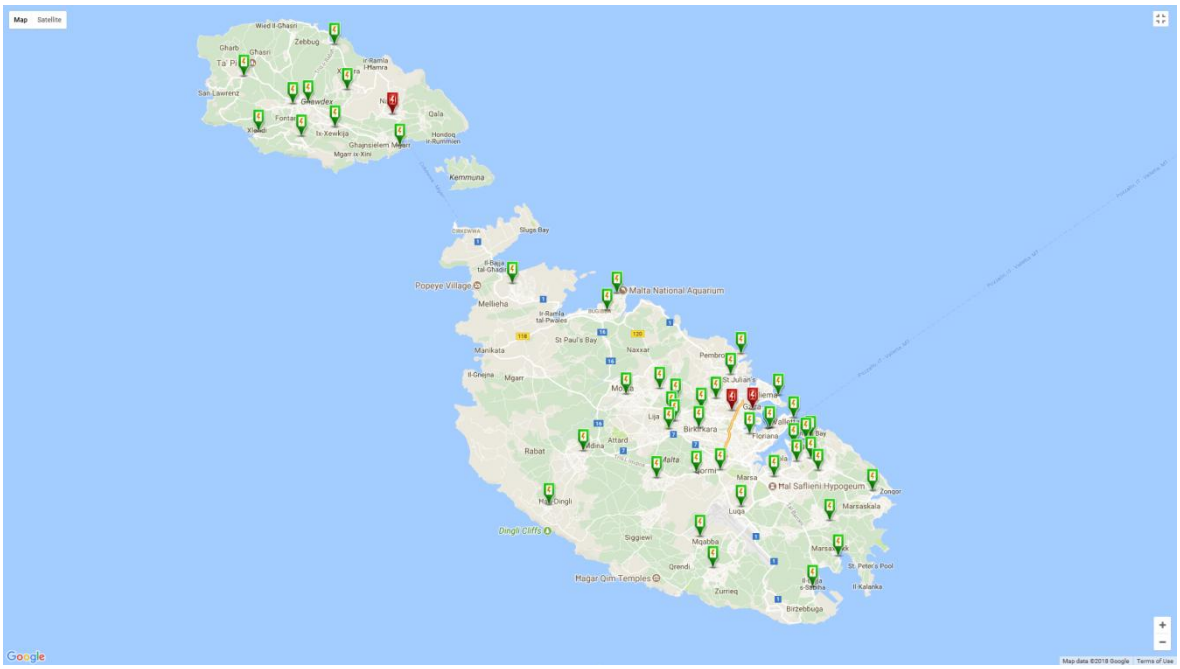
[24] Source: National Statistics Office

Transport Malta is currently extending and updating the National Electric Vehicle Charging Network which will now also include fast chargers. Although currently the 114 charging points are publicly available, the current upgrade will ensure that public charging points available are spread also to further areas to improve the convenience of charging.

Table 6 Number of current Recharging Points

ELECTRICITY	Recharging Points
	2016
Normal power recharging points (Public)	102
High power recharging points (Public)	0
Normal power recharging points (Private)	4
High power recharging points (Private)	1

Figure 6 Current Public Charging Infrastructure Locations for Electric Road Vehicle excluding the three solar charging pillars[25]



[25] Source: http://www.electricvehiclesmalta.eu/chargingstations

2.3.2. Electricity at shore-side for ports

Currently no shore-side electricity is provided in the ports of Malta, including the two international sea ports located on the TEN-T core network: the port of Valetta and the port of Marsaxlokk. Malta does not have any inland ports.

2.3.3. Electricity supply at airports

There is one international airport in Malta, the aerodrome is operated by Malta International Airport plc, a privately listed company. Commercial aviation flights use parking slots away from the terminal and do not use aerobridges to board aircraft. Combined with the need for regular reconfiguration of aircraft parking arrangements to be able to manage the limited space available, utilisation of alternative fuel systems such as ground electricity supply is not available.

2.4. CURRENT STATE: LIQUIFIED NATURAL GAS (LNG) AND COMPRESSED NATURAL GAS (CNG)

2.4.1. Context

The use of natural gas and bio methane in passenger road vehicles has not been widely adopted in Europe and is currently representing only around 0.4% of the registered cars[26]. Different models exist: converted from petrol vehicles, manufactured as bi-fuel vehicles, with two fuel tanks. Diesel engines for heavy trucks and buses can be run on a blend of diesel and natural gas, with the primary fuel being natural gas and a small amount of diesel fuel being used as an ignition source.

Despite its advantages, the use of natural gas vehicles faces several limitations such as fuel storage and infrastructure requirements, since CNG must be stored in high pressure vessels, and LNG must be stored in cryogenic vessels. The potential for such gas is studied further in this report within the national plan and objectives chapters.

2.4.2. LNG for heavy duty vehicles

Liquefied Natural Gas (LNG) for heavy-duty vehicles can enable emission reduction of air pollutants such as particulate matter (PM) and CO_2-emissions, but compared to modern Euro VI diesel trucks the advantage remains low[27]. However, the incremental costs for LNG trucks are currently much higher (~35,000 €) than for new diesel trucks and the high level of uncertain oil and gas price development underlies any potential fuel cost savings[28]. Currently there are no LNG refuelling facilities for vehicles in Malta and there

[26] NGVA statistics http://www.ngvaeurope.eu/cars
[27] See TNO 2017, Emissions testing of two Euro VI LNG heavy-duty vehicles in the Netherlands: tank-to-wheel emissions
[28] Lischke et al, 2015: Identifizierung von Hemmnissen der Nutzung von LNG und CNG im schweren Lkw-Verkehr sowie Möglichkeiten zu deren Überwindung

are no LNG vehicles licensed for road use. Malta only receives LNG directly to Delimara power plant.

2.4.3. Context of LNG bunkering

Malta is a maritime island nation and has been historically dependent on shipping for foreign trade. Therefore, it is important that the sea routes surrounding the Maltese islands are reliable, environmentally friendly and safe. Good maritime connections are important for Malta's competitiveness. Malta has two TEN-T core ports, the Port of Valletta and the port of Marsaxlokk, and another two TEN-T comprehensive network ports, the port of Mgarr in Gozo and the port of Cirkewwa in Malta.

Maritime transport is one of the most efficient methods to move cargo on a global scale. However, due to the types of fuel used, while international shipping accounts for approximately 2.6% of the global carbon dioxide (CO_2) emitted into the atmosphere, it produces about 12% of the global sulphur oxides (SOx) pollution[29].

The international community is increasingly concerned with the impact of this human activity on the environment. As a result, the maritime transport sector is being encouraged to adopt alternative fuels/energy sources including natural gas for both vessel propulsion and on-board electricity generation.

The use of natural gas as a fuel is one of the methods that the maritime industry may adopt to satisfy the tightening of emission limits of gases associated with climate change. Liquefied Natural Gas (LNG) is a clean fossil fuel with extremely low sulphur content. It is formed by liquefying natural gas (NG) and kept in liquid form at approximately -160°C. In this form, LNG occupies approximately 1/600 the volume of the gas at atmospheric pressure. Therefore, the fuel can be economically stored and transported. The flame characteristics of such a fuel result in a clean combustion and close to zero emissions of sulphur dioxide, a large reduction in the emission of particulates and oxides of nitrogen and a reduction of carbon dioxide emissions by 20-25% tank-to-wheel. However, taking into account additional GHG emissions from methane (CH_4) slip and for the supply of LNG the life cycle GHG emissions saving (well-to-wheel) can be much lower[30]. EU Directive 2012/33/EU stipulates fuel with a maximum sulphur content of 0.5% m/m outside the European ECAs. Fuels exceeding this sulphur content limit cannot be used in the territorial waters, exclusive economic zones and pollution control zones of EU member countries from year 2020 onwards. For the period up to 2020, the directive stipulates that the fuel sulphur content of fuel used by passenger ships travelling regularly between EU ports and in the territorial waters and exclusive economic zones of EU member countries shall not exceed 1.5% outside the designated emission control areas (ECAs). Furthermore, Directive 2005/33/EC also sets a maximum sulphur content of 0.1% for fuels used at berth in EU ports since 2010. Ships at berth for less than two hours and ships using an onshore

[29] Source: Third IMO Greenhouse Gas Study 2014

[30] See Wurster et al, 2014: LNG as an alternative fuel for the operation of ships and heavy-duty vehicles

power supply are exempted. Furthermore, the International Maritime Organisation (IMO) has set a global limit for sulphur in fuel oil used on board ships of 0.50% m/m (mass by mass) from 1 January 2020. LNG is one of the solutions to help achieve these targets.

2.4.4. Current status of LNG bunkering in Malta

Malta has been a centre for the bunkering of fuel on board vessels and has a flourishing industry. According to statistics compiled by Transport Malta, the total demand for maritime bunkering fuel in 2015 amounted to 1,597,561 metric tonnes of which approximately 81% was Heavy Fuel Oil. Currently there are no LNG refuelling facilities in Malta. The present Floating Storage Unit that has been contracted to supply fuel to Delimara Power Station cannot be used as of today for the supply of LNG for bunkering. This is due to security of supply issues in order to dedicate all the fuel on the vessel for the sole purpose of the generation of electricity. In order to preserve its flourishing bunkering market, Malta will have to take adequate measures to continue to operate in this sector. In this context LNG as a marine and bunker fuel would provide a solution to such a forthcoming situation in order for the Maltese industry to maintain its competitive edge.

2.5. CURRENT STATE: CNG

Currently, there are no CNG refuelling facilities for vehicles in Malta and there are no CNG vehicles licensed to be used on the roads. At the time of this report, Malta was not supplied with CNG or compressed bio methane for motor vehicles.

CNG cars can be cheaper than electric vehicles depending on the model of the car and energy prices. Incremental costs (compared to their ICE counterparts) are moderate. Therefore in several countries CNG car owners benefit from the lower price of the fuel, and recover their incremental investment in some years[31]. Nevertheless, the penetration of CNG vehicles is often dependent on the adoption of new technologies and the development of the infrastructure. At present there is no demand for the provision of CNG and should there be such a demand it would be a challenge to supply refuelling stations with CNG. Compression is an energy-intensive process, the energy consumption being strongly dependent on the outlet to inlet pressure ratio. The advantages of CNG vary greatly based on its source (compressed based on LNG with vaporisation at terminal for example or directly from EU CNG mix supply). This can lead to an approximate reduction of 13 to 20% of the GHG emissions compared with ICE vehicles (based on a WTW analysis-own calculation based on EU CNG mix and middle size car).

[31] In Germany the return of investment can be achieved within 4 years to petrol or diesel cars, based on fuel price at refuelling stations (including national tax exemptions), see Heidt, et al. 2013: On the road to sustainable energy supply in road transport – potentials of CNG and LPG as transportation fuels

2.6. CURRENT STATE: HYDROGEN

Currently there is no supply of hydrogen for transport in Malta.

2.7. CURRENT STATE: OTHER ALTERNATIVE FUELS (BIOFUELS AND LPG)

2.7.1. Liquified Petroleum Gas (LPG)

Compared to conventional fuel vehicles, LPG cars could, theoretically, help reduce GHG emissions by approximately 12 to 20% and it is also an effective measure to reduce NOx emissions but has little impact on PM or CO emissions[32]. Nevertheless other alternative fuels such as electricity, have higher environmental benefits.

2.7.1.1. Number of vehicles

There are currently almost 1,000 LPG vehicles in Malta. The main reason for the recent penetration is largely attributed to the fiscal incentive schemes for vehicle owners in the form of a Government grant of 200€ to vehicle owners for the conversion of a conventional fuel motor vehicle to run on auto gas. The main aim of the measure is to reduce local air pollution. This scheme was first launched in 2013 and continued on an annual basis. In 2015, the LPG conversion scheme was extended to include commercial vehicles. During 2015, 2016 and 2017, 700 vehicles were converted to gas.

Table 7 Number of current LPG vehicles in 2016[33]

Type of vehicle	Number of vehicle
LPG passenger vehicles (incl. diesel or petrol combined)	967
LPG goods-carrying, special purpose vehicles and road tractor (LPG and diesel or petrol combined)	71

Although this has been a successful scheme which has resulted in the growth of the fleet of LPG vehicles which addressed GHG emissions attributed to road transport and partly air quality issues, the reliance on LPG in the long term is not sustainable due to the poor environmental performance when compared to other alternative fuels that can be used in transport. The incentive scheme will need to be reviewed.

32 Own calculation based on (EU) 2015/652 and JEC WELL-TO-WHEEL Report Version 4.a. Technical Report for the European Commission, Joint Research Centre (JRC),EUCAR, Concawe.

33 Source Transport Malta

2.7.1.2. Refuelling stations

As of 2016, there were five LPG refuelling stations in Malta. This infrastructure is considered as sufficient given the short distances on the island, although no specific goal is required in directive 2014/94/EU.

Table 8 Current LPG refuelling stations in 2018 [34]

Other Alternative fuels	Other Alternative Fuels Refuelling stations
LPG Refuelling Stations (public)	6
LPG Refuelling Stations (private)	nil

2.7.2. Biofuels

Since the introduction of biofuels in Malta in 2003, biodiesel consumption steadily increased until 2007, mainly due to the higher availability at fuel stations and its lower price at the pump. Between 2007 and 2010, its consumption declined notwithstanding the increase in the prices of petroleum products compared to biodiesel. In a report published by the Malta Resources Authority, the factors which could have led to this decline in consumption include the difficulty in accessing pre-blended biofuel and concerns relating to the quality of biofuel. During this period, fuel stations were only allowed to store and sell B100 biodiesel (100% Biodiesel) with the fuel being effectively blended during refuelling. In order to reverse this trend, legal notice 68/2011 was published in 2011 to boost the use of biofuels. This legal notice introduced a substitution obligation for importers and wholesalers of automotive fuels whereby market players were obliged to place on the market a minimum amount of biofuel content calculated as a percentage of the total EN228 petrol and EN590 diesel placed on the market. The percentage was set at 1.5% for 2011, and is expected to reach 10% by 2020. These figures may be reviewed to reflect market availabilities and technical progress. As of 2014, local importers and wholesalers of petrol and diesel are meeting the substitution obligations by blending biofuel or HVO with EN590 diesel prior to supplying the fuel stations. Although, the blend ratio varies from one supplier to another depending on the fuel mix placed on the market, the minimum percentage substitution obligation target has to be met.

The biofuels currently used in Malta are biodiesel FAME (Fatty Acid Methyl Esther) and HVO (Hydrotreated Vegetable Oil).Biodiesel (FAME) has to meet the quality standard requirements of EN 14214 and HVO has to meet the quality standard requirements of MS

[34] Source: Regulator for Energy and Water Servicese

EN 15940. In 2017, UCO (Used cooking oil)-showing low emission factors- was already used as feedstock for biodiesel and partly for HVO. The other feedstock for HVO was palm oil (process not specified). The type of feedstock might vary from year to year.

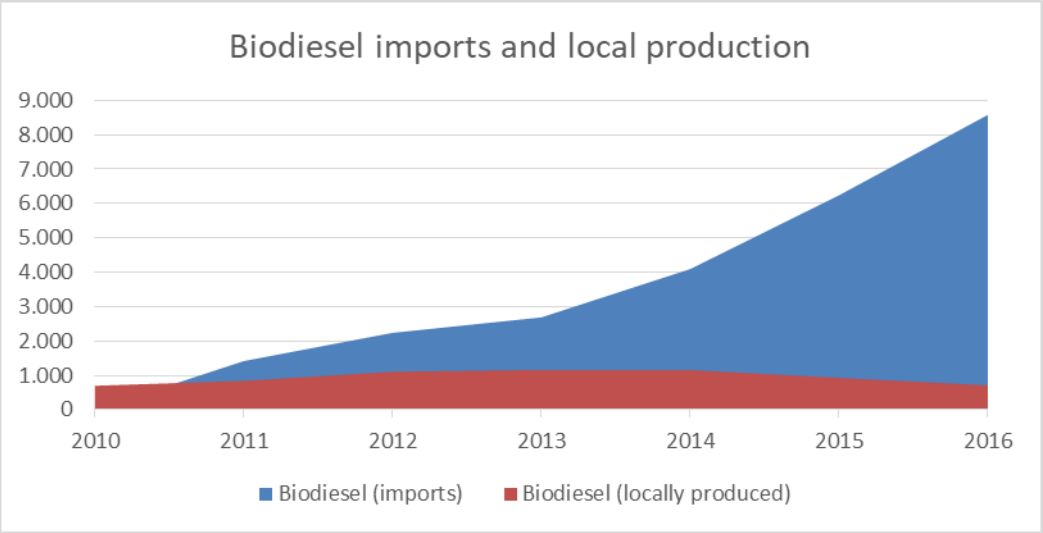


Figure 7 Importation and local production of biodiesel (2010-2016) in tons[35].

[35] The data for 2015 and 2016 includes Hydrotreated Vegetable Oil

3. NATIONAL PLANS AND OBJECTIVES

The Malta Transport Master Plan, 2025 sets an ambitious target of 20% of the national vehicle fleet should be composed of non-conventionally fuelled vehicles by 2025 in order to reach the EU wide gradual phasing out of 'conventionally fuelled' vehicles in urban areas by 50% in 2030[36]. These objectives are not categorised by fuel type and are therefore not presented below. The Government plans to study further this issue and provide more detailed projections after 2020 once the national household travel survey planned to be carried out in 2019 delivers updated data to forecast transport behaviour and modal share.

3.8. ELECTRICITY

3.8.1. Electricity for road

Based on the environmental advantages and the potential to reduce the CO_2 content of electricity in Malta further (for example by extending solar energy production), e-mobility is considered as the most promising fuel for future transport systems in Malta. Nevertheless, the price differential for electric vehicles will still challenge the penetration of this new technology for the years to come. Still, Malta remains committed to put 5,000 electric vehicles (include Plug-in Hybrid Electric Vehicles and Range Extender Electric vehicles) on the road by 2020. It is to be noted that electric quadricycles, electric scooters and electric bikes are also included in the target. A road map to achieve this target is set out in the Malta National Electro-mobility Action Plan, which however is in the process of being updated.

Table 9 Electric vehicle target by 2020 and non-conventional fuelled vehicles goals by 2030[37]

ALTERNATIVE FUEL VEHICLES	Forecast number of vehicles		
	2020	2025	2030
Electric Vehicles	5000	-	-
Non-conventional fuelled vehicles	-	20%	50%

[36] The term 'conventionally-fuelled' referes to vehicles using non-hybrid combustion engines (ICE), 2011 White Paper Roadmap to a Single European Transport Area-Towards a competitive and resource efficient transport system.

[37] Source: Transport Master Plan, 2025

According to Directive 2014/94/EU, the charging infrastructure should enable electric vehicles to circulate at least in urban/suburban agglomerations and other densely populated areas by 2020 (Art. 4.1). The National Electric Vehicle Charging Network provides electric car users with the possibility to charge using publicly accessible charging points in specific and prominent public parking spaces across Malta and Gozo. The current charging infrastructure is owned by government but managed by the private sector. At the moment there is one operator who was selected through an open tender procedure.

Furthermore, EV owners who do not have access to a private garage have the possibility to charge their vehicle at 4-hour slot intervals at publicly available charging stations which can be pre-booked through a web-based interface. The charging pillars are equipped with intelligent metering system in line with Article 2 of Directive 2012/27/EU, which provide users with information on the time of use in line with Article 9 of same directive.
Furthermore, there are currently three solar electric car charging points and these are available free of charge.

Currently it is planned that 590 charging points will be available by 2020, all complying with the norm Type 2 and Combo 2, including 10 high power points. Based on the projection of the number of vehicles, this would mean an average of 1 charging point per 8.5 cars – fulfilling the requirement of the Directive.

Table 10 Goals on available charging points

ELECTRICITY	Charging points		
	2020	2025	2030
Normal power recharging points (Public)	580	Not available	Not available
High power recharging points (Public)	10	Not available	Not available
Normal power recharging points (Private)	Not available	Not available	Not available
High power recharging points (Private)	Not available	Not available	Not available

The current deployment of a nationwide Intelligent Traffic Management System will also enable Electric Vehicle owners to have full real time traffic congestion updates and, in parallel with GPS based navigation systems drivers will be able to make changes to a journey by accessing real time information on less congested road sections. This is expected to reassure EV drivers on the issue of recharging.

It must be mentioned that the capacity of the network is considered as sufficient to handle the number of electric vehicles expected in the next years but a working group (concept developed in the last chapter of this report on follow-up and review process)

should be put in place to follow up on the upgrade of the electricity network and the development of an intelligent electricity network.

3.8.2. Electricity at shore side for ports

A study into the possibility of shore side electrical supply for berthing vessels within Maltese harbours undertaken in 2014[38] had the specific objective of assessing the financial and economic feasibility of an onshore power supply facility at the Port of Valletta. The study provided a demand analysis derived from information on the type and number of vessels that berth within the Port of Valletta. The conclusion of the five scenarios for on-shore electricity supply is that all provide an overall positive net economic benefit but the economic and financial viability of investment in OPS infrastructure is highly dependent on the undertaking of similar investment in other ports which are visited by vessels calling at the Port of Valletta. The highest economic rate of return of 36.3% is given by option 2: 24 MW shore supply for the Pinto and Deep Water quays. Such investments can only be viable through sufficient demand by visiting ships which hence need to be mandated by regulations or industry-set standard. It is planned that an action plan for implementation of shore side electricity at the ports of Valetta and Marsaxlokk will be finalised by the end of 2018.

Table 11 Shore Side Electricity installation in Sea Ports – TEN-T Core Network

PORT NAME	**2020**	**2025**	**2030**
Valletta	nil	To be defined	To be defined
Marsaxlokk	nil	To be defined	To be defined

Shore side electricity supply for the maritime ports on the TEN-T comprehensive network are not foreseen for the moment.

3.8.3. Electricity supply at airports

As noted in 2.3.3 before, the opportunities for stable aircraft parking configuration on the aerodrome at the Malta International Airport are limited. Currently, there is no aerobridge infrastructure and hence aircraft configuration and parking places are fluctuating. It would therefore be at the present time economically not sound to invest in a ground fixed infrastructure supply requiring long time investments. Therefore, for the time being, no infrastructure for electricity supply at the airport is planned in Malta. If using the auxiliary power unit (APU) of aircraft is limited or even forbidden in the future in Malta airport in the context of the EU regulation 598/2014[39] due to noise at airport, ground supply for aircraft may become economically more viable as aircraft will be

[38] https://electromobility.gov.mt/en/Documents/PORT-PVEV%20Feasibility%20Study.pdf

[39] Regulation (EU) No 598/2014 of the European Parliament and of the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC

obliged to use it[8]. Currently, ground power units (GPU) are available on the ground and give the possibility to airlines to switch off their APU. The exact type of GPU and the rate of utilisation by the airlines cannot be communicated for the moment as they are sensitive data.

There is no current demand for drop-in alternative fuels. However, as Malta will be taking part in the pilot part of ICAO's CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation), there is potential for the initial demand for drop-in alternative fuels such as biofuels. It is expected that by the time of the implementation of the second phase of CORSIA (full-scope) starting in 2027, sufficiently reliable data will start being available in order to assess the demand and carry out relevant cost/benefit analysis.

Other opportunities for electrical powered vehicles for ground handling, airside operations and similar activities carried out by the private sector have yet to be considered as economically viable. As the technology becomes more cost-effective in the future, an economic analysis will need to be carried out in order to determine the potential for such airside operations.

Other operations on the airport, such as air traffic control, already primarily use grid electricity as a source of power and therefore will benefit from any improvement in the power generation mix across the island.

3.9. LNG

3.9.1. LNG for heavy duty vehicles

According to Directive 2014/94/EU, an appropriate number of refuelling stations should be provided along the core TEN-T network for heavy duty vehicles by 2025, unless the costs exceed the benefits, including the environmental benefits. The directive gives as orientation one refuelling station every 400 km.

It is important to specify that Malta has no road connection to the TEN-T core network in Europe so that the demand for this fuel will be limited to domestic transport, the same applies to CNG. The government aims at studying if LNG could contribute to achieving the national environmental targets. As already mentioned above, the government will commission a study on alternative fuels (CNG, LNG and possibly hydrogen). This should therefore consider the deployment of LNG infrastructure for road transportation to determine current and future demand in Malta for LNG fuelling facilities, associated costs and calculation of economic, financial and environmental benefits that would result from this investment.

[8] Information provided by Head Airport Operations, Malta International Airport plc.

3.9.2. LNG Bunkering

According to Directive 2014/94, a core network of refuelling points for LNG at maritime and inland ports should be available at least by the end of 2025 and 2030, respectively. It is recognised that LNG is an attractive fuel alternative for vessels to meet the requirements for decreasing the sulphur content in marine fuels in the SOx Emission Control Areas. Refuelling points for LNG include, inter alia, LNG terminals, tanks, mobile containers, bunker vessels and barges. Different Member States in the Mediterranean Sea have started activities to assess the demand for LNG bunkering and in the perspective of developing the infrastructure, e.g. in the EU project POSEIDON med (http://www.poseidonmedii.eu/) and it is the intention of the Government of Malta to maintain its fair share in the bunkering market in the region as the marine sector shifts from oil to gas.

The Government of Malta commissioned a TEN-E co-funded preliminary study regarding the feasibility of a gas pipeline interconnection between Malta and the Trans-European gas network and this study included a very preliminary analysis of the LNG bunkering market in Malta. This analysis was one of the inputs used to determine the required pipeline capacity. A more detailed study for the development of LNG bunkering in Malta is currently underway. This study is being EU co-financed as an action under 2016 CEF Synergy call. The expected output of the Action is a study and a cost benefit analysis, which aims at providing recommendations regarding the development of LNG as a marine fuel for the island. The study is expected to be completed in 2018, this shall not prevent the installation of more LNG refuelling points should market demand structure necessitate such infrastructure.

Table 12 Goals for number of LNG bunkering stations

PORT NAME	**2020**	**2025**	**2030**
Port Name Port of Valletta	0	0	0
Port Name Marsaxlokk Port	0	tbd[40]	tbd

3.9.2.1. Studies already undertaken

3.9.2.1.1. Costa Study [41]

The EU funded COSTA study, carried out between 2012 and 2014, examined short-sea shipping in the Mediterranean and the eastern area of the Atlantic Ocean. This study

[40] Waiting for the results of the CEF study expected for 2018 on the supply of LNG bunkering in Malta
[41] https://www.scribd.com/document/215232407/The-COSTA-Project-The-Financials-of-LNG-as-Fuel

estimates that the maximum annual LNG bunkering potential market for short-sea shipping within the area of study is 11 million m^3 of LNG. Malta's share lies in the range of 150,000 and 500,000$m^{3,}$ representing between 1.3% and 4.2% of this annual estimated value. It is to be noted that such a scenario depends on a large number of factors, including the price differential between LNG, marine gasoil and heavy fuel oil, age of the vessels, vessel construction and retrofitting programmes, economic development etc.

3.9.2.1.2. Sicily/ Malta Gas Pipeline feasibility study

As a part of the 2015 Malta-Italy gas connection feasibility study and CBA, financed by the European Union under the TEN-E programme, a preliminary bunkering demand analysis was carried out by the Maltese governement. It estimated the total Maltese LNG bunkering potential at 44,000m^3 LNG in 2021, and increasing to 2,700,000m^3 LNG in 2054. This is shown in Figure 9. A revised analysis of the bunkering demand market potential for Malta is being conducted as part of the CEF-funded technical study and cost-benefit analysis study referred to hereunder.

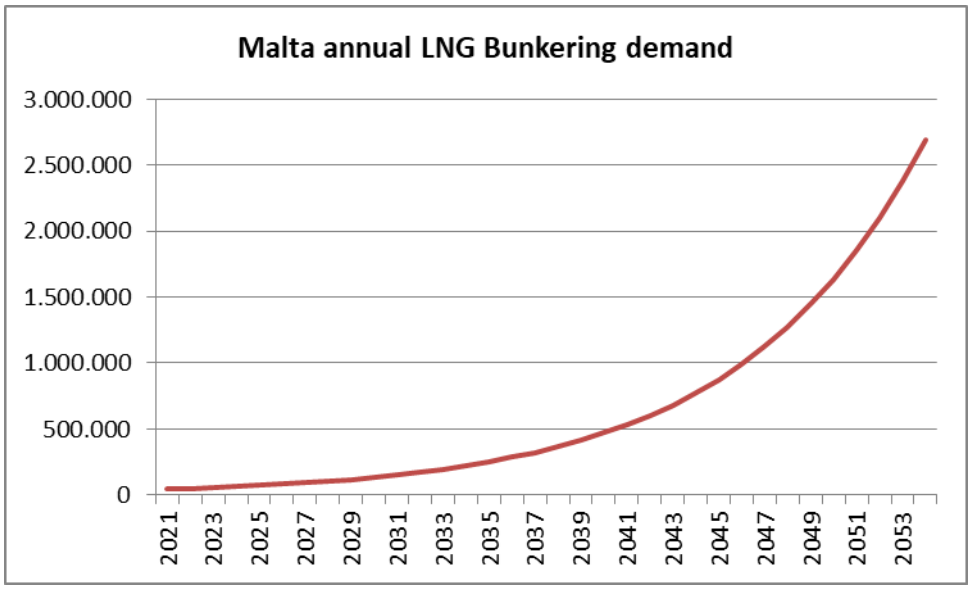


Figure 8 Malta annual LNG bunkering demand (m^3)

3.9.2.2. Methods of maritime LNG Bunkering being considered:

In devising the national LNG bunkering policy, the government is considering the following methods for bunkering ships with LNG fuel:

- *Truck to Ship Method* (TTS): This method of bunkering transfers LNG from the road tanker to a vessel that is moored to a jetty.
- *Terminal to Ship via Pipeline Method* (TPS): This method involves the transfer of LNG from a fixed onshore storage facility to a vessel moored nearby on the jetty or dock.

- *Barge to Ship Method (BTS):* This method involves the transfer of the fuel from a shuttle or bunker barge to another ship for use as fuel. This method can take place both within harbours as well as offshore
- *Ship to Ship Method (STS): This m*ethod is the same as the BTS method above however, the bunker vessel is a ship rather than a barge.
- *Removable Container to Ship (RCS),* also known as *Portable Tank Transfer(PTT):* In this method, a pre-filled portable tank, usually an iso-container, is transferred from the shore or road vehicle onto the vessel. The portable tank shall be used as the fuel tank on board the vessel. Normally such a transfer also involves empty portable tank transfer from the vessel to the shore for refilling.

The decision on the best solution including the location, size and type of the LNG refuelling points shall be based on the outcome of the aforementioned technical study and cost-benefit analysis under CEF-Synergy call of 2016. All LNG bunkering infrastructure shall be subject to applicable safety, security and emergency arrangements and shall comply with designs and procedures, applicable legislative and classification requirements and Best Available Technologies, as well as with procedures by the relevant authorities.

Part of this study involves an examination of the commonality and complementarity of the LNG bunkering industry with the Sicily/Malta gas pipeline (Phase 1) PCI as well as the offshore FSRU (Phase 2) where the PCI infrastructure can be used to supply the LNG fuel for bunkering purposes. One of the main deliverables of the study will be a series of recommendations for applicable legal and policy measures which shall be used as a decision-making tool by the Government of Malta to ensure that the defined national targets are met.

3.10. CNG

In line with this Directive, Malta will be required to ensure that there are a number of refuelling points accessible to the public for the supply of CNG at least in urban/suburban agglomerations and other densely populated areas (Art. 6.7) by 2020 and along the TEN-T core network by 2025 (Art. 6.8). This requirement represents a challenge for Malta as there is no natural gas currently available for the transport sector on the national territory. Moreover, given that there are no CNG fuelled vehicles licensed for road use in Malta, there is currently no demand for CNG as an alternative fuel. Considering the fact that the development of electro-mobility is quite advanced and more environmentally beneficial than CNG, it is questionable if Malta would stand to benefit from investing in the development of CNG infrastructure. In view that Malta is an island state, with no fixed road link to other Member States, very few foreign registered vehicles powered by CNG could be expected to circulate on Maltese territory in the future. Currently the opportunity of introducing CNG as an alternative fuel for heavy duty vehicles fleet at present seems limited:

- CNG may be an interesting option for captive fleets. However, the largest fleet is the public bus transport operator, with 414 vehicles, but at this stage the focus is on electric vehicles and the entire fleet is already Euro 5 and 6 (approximately half-half) with the new Euro 6 still covered by warrantees.
- Heavy vehicles may be an interesting target for CNG but the fleet is very small and they represented only 6% of the kilometres driven on the island in 2014, moreover LNG may be another alternative.

The potential for promoting CNG for cars and light vehicles could provide the economies of scale for market interest in the provision of the necessary infrastructure. The Alternative Fuels in road Transport Study will take into account the expected demand, the different solution for CNG supply to the Maltese islands and the corresponding costs. It should also compare the advantages of CNG to other alternative fuels such as LNG or hydrogen in order to convey investments in the best suited alternative fuel and optimize the limited financial capabilities of Malta. It must also be noted that at this point the 159km gas pipeline connecting Malta to Sicily is the best option known for Malta to be supplied with CNG. The earliest commercial operation of the pipeline is targeted for 2024.

Table 13 Number of targeted Natural Gas refuelling stations

NATURAL GAS	Refuelling Stations		
	2020	2025	2030
CNG refuelling stations (public)	tbd[42]	tbd	tbd
CNG refuelling stations (private)	tbd	tbd	tbd

3.11. HYDROGEN

The targets of hydrogen refuelling stations in the NPF are at the discretion of the Member States. Malta has no immediate plans to establish a hydrogen refuelling network, as the cost of the infrastructure is greatly disproportionate to current demand and considering the limited range on the island as well as the highest energy efficiency of battery electric vehicles, electro mobility is considered as a better option in the near future.

[42] Expected result of the study commissioned by the government on alternative fuels (CNG, LNG and possibly hydrogen). The result should be known early enough to enable to start building the minimum infrastructure before 2020. Based on first estimations, this should not exceed 2 refuelling points for the island.

4. MEASURES NECESSARY TO ENSURE NATIONAL TARGETS AND OBJECTIVES ARE REACHED

This chapter provides an overview of the measures planned – taking as a basis the National Transport Master Plan, 2025 – and the measures already in place to foster the introduction of alternative fuel infrastructure and vehicles in Malta. The focus in the short term is on e-mobility for road (no other alternative fuel is currently available in Malta). The Alternative Fuels in Road Transport Study commencing in 2018 will explore other possibilities while the other LNG study currently underway (see 3.9.2) will provide recommendations for maritime LNG bunkering. The details of the implemented measures can be found in the table in the Annex.

4.12. OVERVIEW AND TIMELINE OF POLICY MEASURES TO BE IMPLEMENTED AND CONSIDERED

The measures shown below are detailed in Malta Transport Master Plan 2025

Table 14

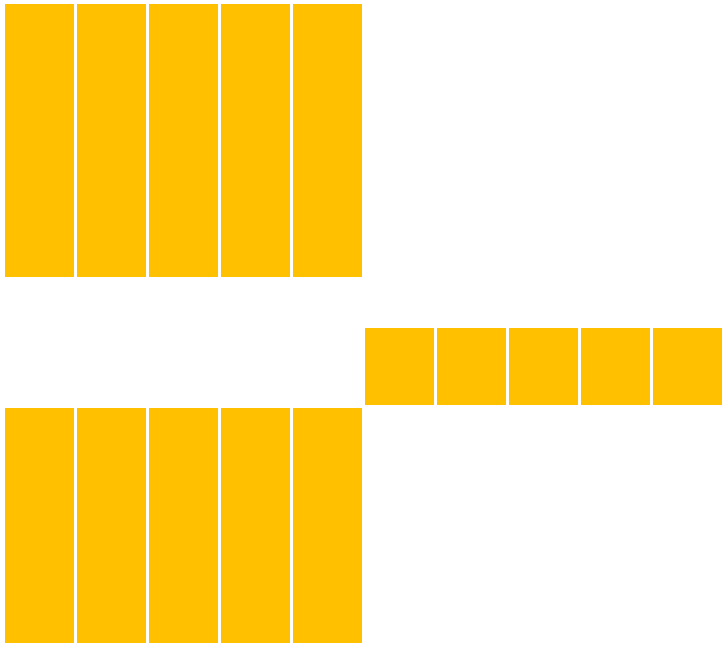
NPF Ref	TMP Ref	Measure	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
1.1	2.2.1.8	Carry out a national household travel survey by 2020											
1.2	2.2.2.6	Develop a national bicycle / e-bicycle sharing scheme											
1.3	2.2.4.1	Study the potential to Introduce low emission zones in dense and polluted urban areas											
1.4	2.2.4.2	Study the potential to introduce further financial differential incentives to reduce the average age of vehicles											
1.5	2.2.4.3	Introduce further fiscal measures and incentives to favour the purchase and use of clean fuel vehicles											
1.6	2.2.4.4	Continue implementing the electro-mobility action plan											

NPF Ref	TMP Ref	Measure	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
1.7	2.2.4.5	If feasible, implement LNG refuelling stations for land transport by 2025 along the Ten-T core network											
1.8	2.2.4.6	Implement CNG refuelling stations for land transport [43]											
1.9	2.2.5.3	Introduction of electric Buses											
1.10	2.2.6.3	Develop an action plan for the management and regulation of freight transport and 'last mile' urban logistics											
1.11	2.2.12.4	Increase roadside checks and roadworthiness testing											
1.12	2.2.12.5	Review enforcement fine levels											
2.1	2.6.2.1	Develop 10-year port master plan designating future land uses – TEN-T Core port of Valletta											

[43] This will depend on the outcome of the Alternative Fuels for Road Transport Study

NPF Ref	TMP Ref	Measure	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
2.2	2.6.2.2	Develop 10-year port master plan designating future land uses – TEN-T Core port of Marsaxlokk											
2.3	2.6.6.2	Implement new pollution mitigation measures											
2.4	2.6.6.3	Support the use of less polluting equipment											
2.5	2.6.7.1	Develop an LNG deployment action plan for the TEN-T Core ports											
2.6	2.6.7.2	Develop a shore supply action plan for the TEN-T ports.											
3.1	2.7.9.1	Develop a deployment action plan for the TEN-T Core airport for current and alternative fuels											
3.2	2.7.9.2	Develop a ground supply action plan for the TEN-T Core airport											
3.3	2.8.1.2	Create direct links between revenue generation from transport and transport investment											

NPF Ref	TMP Ref	Measure	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
4.1	2.8.2.1	Establish the share of Greenhouse Gases from transport that would fairly contribute to climate change targets and monitor progress of this **master** plan in line with these targets											
5.1	2.8.3.3	Use of transport infrastructure for energy generation											
5.2	2.8.3.6	Develop Transport Malta in-house capability for data analytics to better support internal decision making and information available to external stakeholders											



4.13. POLICY MEASURES AND INVESTMENTS

One main step towards the introduction of alternative fuel is currently addressed by the Maltese Government, pledging to announce by the end of 2018 a cut-off date for the importation of all internal combustion engine (ICE) vehicles. The eCAR Working Group has been set up for this purpose. It is chaired by the Environment and Resources Authority and brings together representatives from the Ministry for Transport, Infrastructure and Capital Projects, the Ministry for the Environment, Sustainable Development and Climate Change and the Authority for Transport in Malta. The working group will launch a consultation document for public consultation in third quarter of 2018. After conducting close consultations with the policy makers and relevant stakeholders and analysing the feedback, recommendations will be made to Cabinet.

4.13.1. Electricity

4.13.1.1. Electricity for road

The study on the National Electric Vehicle Charging Network, which includes an implementation plan, is in its final stage of completion. This study, which is funded under the Horizon 2020 programme *GrowSmarter* project, includes a cost benefit analysis for electric vehicle charging infrastructure in Malta. It will also provide the GIS location of planned charging points, the budgeting plans for this infrastructure and an action plan for its roll out.

There are a number of projects currently taking place in order to promote and support the development of electric mobility in Malta, which fall under the headline “continue implementing the electro-mobility action plan” measures number 1.6 in table 14.Subject to availability of EU funding the deployment of eight electric buses will be introduced into the public transport fleet (instead of Gozo as initially planned). It will be coupled with the purchase and installation of ten medium -fast EV charging pillars to be used by public transport electric buses and third party BEV owners. This pilot project will gauge the energy efficiency and the technology of both the fast charging infrastructure for buses serving the route network as well as the on board electric bus technology. During the course of 2018, as part of the DESTINATIONS project funded through CIVITAS, insight into the use of EVs for the last mile delivery of goods will be provided (referred in the table of measures under 1.10). This pilot project will comprise a light goods EV for delivery in the capital city of Valletta. In collaboration with partners in the Ener Net Mob Interreg Med project, fast charging points will be installed during 2019 at both ends of the Malta/Sicily ferry service, thereby promoting electro-mobility by specifically providing for fast charging infrastructure for commuters. The Authority for Transport itself will also be purchasing six EVs and six e-motorcycles, with the specific goal of increasing carbon free enforcement and to further promote electric vehicles.

In line with the broader transport goal of encouraging multimodality, three measures will be specifically addressed to cycling. Standard bicycle racks and pedelec racks will be

placed in no less than 45 locations, including hubs. Two safe cycling routes will be created as part of the upgrade of 22km of urban streets. These, together with a third project which is intended to pilot E-bike sharing (referred under 1.2) in and around Valletta should address, at least some of, the current safety concerns and intermodal limitations experienced by cyclists or persons considering cycling as an option. The roll out of these measures will commence in 2018 and should be completed before 2021.

The integration of the Intelligent Transport Systems (ITS) Platform at the National Transport Control Centre, which is targeted for completion by the end of 2019, should also positively contribute to national EV charging network, facilitating the interface between vehicles and infrastructure. A privately run e-Car Sharing Project starting in 2018 will be introducing e-car sharing on a national level and will include the purchase and operation of 150 new electric vehicles as well as the purchase and installation of 225 medium charging pillars. Besides promoting the sharing economy and addressing congestion, the project will make it possible for drivers to experience the use of an electric car without having to purchase one.

As in many other Member States, grants for electric vehicles are planned to foster their penetration and trigger the development of the charging infrastructure. These two grants are described below.

The first grants are intended for the purchase of BEVs, to incentivise the purchase of electric Category M1 and N1 vehicles, electric quadricycles, pedelecs, electric motorcycles, electric mopeds and electric tricycles falling under categories L1e, L2e, L3e, L5e, while at the same time reducing the number of older conventional ICE motor vehicles from the road. This year, the incentives are also being extended to include electric motorbikes, electric motor scooters and pedal electric cycle bicycles (pedelec). It is designed as follows:

a. €7,000 upon registering a new electric category M1 or N1 vehicle when scrapping a used vehicle;
b. €6,000 upon registering a new electric category M1 or N1 vehicle (without scrapping another vehicle);
c. €4000 upon registering an imported second hand electric M1 or N1 vehicle
d. €2,500 upon registering a new or used electric quadricycle (without scrapping another vehicle);
e. €400 when purchasing a new pedelec;
f. €400 upon registering a new electric motorcycle/moped/tricycle falling under categories L1e, L2e, L3e or L5e.

The grant above for (a) applies only in conjunction with the de-registration/scrapping of another internal combustion engine-propelled vehicle of category M1 or N1 which is at least 10 years old from the year of manufacture. For (d), the second-hand vehicle must not be older than 24 months and must not have a mileage exceeding 12,000 km. For (c), the second hand vehicle must not be older than 36 months and must not have clocked

more than 15,000 km on the odometer. Range extender electric vehicles are also being considered for this scheme and must have a minimum of 80km range on pure electricity to qualify for the grants. In 2017, €450,000 were allocated to the scrappage scheme when purchasing an electric car, and by the end of December 73 such applications were received.

Private individuals are entitled to purchase one vehicle/quadricycle/pedelec/motocycle/moped/tricycle under this scheme. A registered company, partnership, cooperative society or a registered self-employed, as defined in Government Notice of 15th January 2016, is entitled to a maximum grant of €200,000, which can be in the form of a combination of different types of vehicles. Local councils, NGOs and businesses are entitled to purchase a maximum of ten new pedelecs and ten new electric motorcycles/mopeds/tricycle under this scheme. The amount of €500,000 has been budgeted for 2018 and this should translate to 71 EV's on the National Road Network during the year the entire budget is used.

The second governmental grant focuses on upgrading electric vehicles and new plug-in electric service garages of vehicle importers and vehicle leasing operators and staff training. This scheme is another incentive towards the provision of supporting services and financial assistance to promote the introduction of new Plug-In Electric Vehicles in the Maltese islands, for the upgrading of facilities of electric vehicle service garages established within EV car importers and vehicle leasing operators. The scheme will thus target as eligible beneficiaries commercial undertakings. Next to upgrading of these garages, the scheme will also be for staff training and re-training.
With the sum of €80,000 budgeted for the current year it is expected that at least three garages would receive the training (€25,000 each), and resulting the introduction of three new EV models on the national market.

4.13.1.2. Electricity supply at shore side for ports

By the end of 2018, an action plan for implementation for both ports of Valetta and Marsaxlokk will be finalised.

4.13.2. LNG Bunkering

As part of its commitment to investigate the potential of LNG as a marine fuel, the Government has launched a detailed technical study and cost-benefit analysis for development of LNG as a marine fuel in Malta. The study commenced in November 2017 and is expected to be completed by the end of 2018 and is being co-financed by 60% under the Connecting Europe Facility Synergy call of 2016. This call which had a total budget of €40 million, was the first ever synergy call under the CEF programme which aims at supporting synergy actions between the transport and energy sector for the deployment of sustainable and efficient transport and energy infrastructure. The study will identify the optimal infrastructure solutions for the development of maritime LNG

bunkering in Malta, taking into account the future market demand, attractiveness, economic, environmental, geographical, safety and risk aspects. It shall also be looking into the possible synergies and infrastructure coupling with the planned Malta-Italy gas pipeline interconnector and shall include a socio-economic cost-benefit analysis, a preliminary risk assessment and the identification of the regulatory and legislative gaps for the implementation and operation of such infrastructure.

A proposed list of measures and possible initiatives to enable the take up of LNG bunkering on the island shall also be identified through the study and shall consider possible sustainable financial incentives, fiscal regimes and/or other plans or programmes intended to facilitate private investments towards the business of LNG bunkering in Maltese territorial waters. Such suggested measures and initiatives are to be designed to match the expected market demand, provide a high degree of stability, and be adequate so as to maximise both the benefits issuing from EU programmes as well as the environmental advantages offered through the adoption of LNG fuel for maritime purposes.

The overall objective of the study shall support the Government in setting up a national policy for the implementation of the required LNG bunkering facilities for the island with the aim of stimulating the LNG uptake as a marine fuel and attract potential investors in this sector. It may also support other similar initiatives and projects (e.g. GAINN, Poseidon-Med) in the Med. area and will support Malta's effort to expand the adoption of LNG as a shipping fuel in order to turn transport by sea to a more competitive, efficient and greener operation in the long-term for the Mediterranean and European Union.

4.13.3. Other alternative fuels

As stated previously, the Alternative Fuels in Road Transport Study to be commissioned by the government in 2018 will look into the advantages and challenges for all the alternative fuels available in the road transport sector. This should enable to channel the resources of the island on the best alternative fuel options.

4.14. FOLLOW-UP AND REVIEW PROCESS

The challenges which were encountered in the drafting of this NPF have led to the conclusion that implementing a formal, inter-ministerial governance structure will be beneficial and help to address many of those challenges going forward. Agreement has been reached on a technical level and relevant plans will be discussed internally and submitted to national cabinets as soon as possible. The aim will be to have a systematic governance structure in place in time to manage the updating process of this NPF ahead of the November 2019 deadline.

Plans are to establish a stakeholder group which will involve relevant stakeholders broadly. The main objectives will be 1) the monitoring and implementation of this Directive; 2) the creation of a forum of discussion and exchange on national ambitions in

the alternative fuels sector; 3) the monitoring and exchange on best practices and the latest developments in the sector and 4) the creation of one single point of contact and a coherent discourse on policy ambitions.

The stakeholder group (e.g. including representative of the private sector, NGOs, ministries and public entities) will be headed by a Chair who will be the main point of contact for Cabinet and the European Commission. He or she will be assisted by a Project Management Office (PMO) which will be responsible for the coordination and organisation of the governance processes, as well as for the drafting of the updated NPF and will be the interface for coordination of all communication. Working groups will be established on an ad-hoc basis to address specific issues and will report to the Stakeholders Group.

Moreover Malta is intending to attend the Alternative Fuels 2nd Committee meeting on 26 February 2018 and the Sustainable Transport Forum to benefit from synergies and peer-learning and take active part in the implementation of alternative fuel infrastructure in Europe.

5. ANNEX

Section A Measure Characteristics Section B: Implementation and Results	Measure Title	BEV's and electric motorcycles for the enforcement of public transport
	Measure Category	ERDF part funded project
	Description	Purchase of 6 EV's and 6 e-motorcycles
	Main targets and objectives	Increase carbon free enforcement and promotion of electric vehicles
	Infrastructure	6 EV's and 6 e-motorcycles
	Transport means	Operational
	Responsible	Transport Malta
	Steps for application/ implementation	Drafting of tenders
	Direct impacts (1, low; - 5, high)	3- medium
	Effectiveness	Increase EV's for public transport
	Cost for application/ implementation	€360,000.00

Section A Measure Characteristics	Measure Title	Introduction of 2 safe cycling routes
	Measure Category	ERDF part funded project
	Description	22km of upgraded urban streets to provide safe cycling
	Main targets and objectives	Provide safe cycling routes to promote the use of bicycles and electric bicycles
	Infrastructure	Road

	Transport means	Road Transport
	Responsible	Transport Malta
Section B: Implementation and Results	Steps for application/ implementation	Drafting of tenders
	Direct impacts (1, low; - 5, high)	2- high
	Effectiveness	Contribute to the promotion of pedelec use
	Cost for application/ implementation	€6,268,874.51
Section A Measure Characteristics	Measure Title	Pedelec, bicycle racks
	Measure Category	ERDF part funded project
	Description	Standard bicycle racks and pedelec racks for third party cycle owners at Hubs
	Main targets and objectives	Cycle users and increase the use bicycle and pedelec
	Infrastructure	Standard cycle racks in 45 locations
	Transport means	Road Transport
	Responsible	Transport Malta
Section B: Implementation and Results	Steps for application/ implementation	Drafting of tenders
	Direct impacts (1, low; - 5, high)	2- high
	Effectiveness	Promoting use of electric bicycles- pedelecs
	Cost for application/ implementation	€6,000.00

Section A	Measure Title	Integration of ITS Platform

Measure Characteristics	Measure Category	ERDF part funded project
	Description	Purchase and Installation of ITS platform at the NTCC
	Main targets and objectives	TM officials to monitor EV charging network
	Infrastructure	Software
	Transport means	Road Transport
	Responsible	Transport Malta
Section B: Implementation and Results	Steps for application/ implementation	Tenders to be published
	Direct impacts (1, low; - 5, high)	3- medium
	Effectiveness	Better maintaining of national EV charging network
	Cost for application/ implementation	€450,000

Section A Measure Characteristics	Measure Title	E-Car Sharing Project
	Measure Category	Concession agreement
	Description	Introduction of e-car sharing on a national level operated by a private operator after awarding of tender. The Project will include the purchase and operation of 150 new electric vehicles as well as the purchase and installation of 225 medium charging pillars. These pillars will also be open for third party users when the pillars will not be occupied by a car sharing vehicle
	Main targets and objectives	- Reduce congestion

		- Encourage intermediately - Contribution to the achievement of EU targets for the reduction of GHG emission - Promote sharing economy - Increase of electric vehicles in the national fleet
	Infrastructure	- Deployment and implementation of 225 Charing pillars - Deployment of the car sharing vehicles fleet
	Transport means	Road transport
	Responsible	Car2go Israel
Section B: Implementation and Results	Steps for application/ implementation	Deployment and implantation of infrastructure by contractor
	Direct impacts (1, low; - 5, high)	5- high
	Effectiveness (in contribution to ALT. Fuel Infrastructure)	Promotion of e-car sharing and electric vehicles. Increase of EV charging network offered to the general public
	Cost for application/ implementation	Private investment

Section A Measure Characteristics	Measure Title	Pilot project on last mile delivery
	Measure Category	CIVITAS funded project (as part of the DESTINATIONS

		project)
	Description	Purchase of one light goods electric vehicle to test last mile delivery of goods in Valletta and charging pillar .
	Main targets and objectives	Commercial Sector
	Infrastructure	Charging pillar and one electric light goods vehicle
	Transport means	Road Transport
	Responsible	Transport Malta
Section B: Implementation and Results	Steps for application/ implementation	Tendering stage
	Direct impacts (1, low; - 5, high)	2- low
	Effectiveness	Will give insight on the use of EV's for the last mile delivery of goods.
	Cost for application/ implementation	€121,250

Section A Measure Characteristics	Measure Title	Pilot project for E-bike sharing in Valletta
	Measure Category	Private financing
	Description	Pilot project to install e-bike sharing stations and pedelecs in and around Valletta
	Main targets and objectives	Cycle users Promotion of e-bike sharing and use of pedelecs
	Infrastructure	7 e-bike sharing stations
	Transport means	Road

	Responsible	Malta Public Transport
Section B: Implementation and Results	Steps for application/ implementation	Implementation
	Direct impacts (1, low; - 5, high)	2- Medium
	Effectiveness	Promotion of e-bike sharing and the use of pedelecs
	Cost for application/ implementation	Private Investment

Section A Measure Characteristics	Measure Title	Fast charging station at port area
	Measure Category	Interreg Med part funded project (part of the Ener Net Mob project)
	Description	Purchase of fast charger in port area
	Main targets and objectives	EV users Provide charging for vehicles a board Malta- Italy ferry service
	Infrastructure	Fast charger
	Transport means	Road Transport
	Responsible	Transport Malta
Section B: Implementation and Results	Steps for application/ implementation	Just approved for EU funding
	Direct impacts (1, low; - 5, high)	2- low
	Effectiveness	Promotion of Fast charging Infrastructure

	Cost for application/ implementation	€70,000