Ministry of Transport, Building and Housing

National policy framework for implementation of the AFI Directive

8 February 2017

National policy framework for implementation of the AFI Directive

Issued by: Ministry of Transport, Building and Housing, Frederiksholms Kanal 27F 1220 Copenhagen K, Denmark

Drawn up by: ISBN of online edition:

Contents

Introduction

The Government's long-term goal for 2050 is for Denmark to be a low-emissions society that is independent of fossil fuels. It covers all sectors, and hence the transport sector. Transforming the transport sector is time-consuming, partly because the vehicle stock is replaced as and when old cars are replaced by new ones.

Denmark has adopted the EU's overall target of reducing CO_2 emissions in the sectors not subject to quotas by 30% in 2030 in comparison with 2005. This target applies to the EU as a whole, and the European Commission has proposed that Denmark should commit to a reduction of 39%.

If Denmark is to retain a transport system that provides high mobility at the same time as we as a society fulfil the objectives of climate and energy policy, there needs to be an ongoing transformation in transport energy consumption. Framework conditions for and access to alternative fuels in transport play an important role in this connection.

Chapter 2 reviews EU Directive 2014/94/EU on the deployment of alternative fuels infrastructure, which was adopted on 22 October 2014. Under the Directive, Denmark must establish a national policy framework outlining targets and objectives, and supporting actions for development of the market as regards alternative fuels, including deployment of the necessary infrastructure which is to be put in place. Denmark has complied with this obligation by forwarding the present report to the European Commission.

Chapter 3 reviews the framework for the transport sector in Denmark, including the historical trend in energy consumption and CO_2 emissions in the transport sector, as well as the anticipated trend in energy consumption in the sector.

Chapter 4 reviews the status of the current deployment of alternative fuels in the transport sector, including the infrastructure for the distribution of fuels.

Chapter 5 describes the Danish Government's policy concerning the availability of alternative fuels in road, public, maritime and air transport. This policy consists of an assessment of the current status and the Government's expectations and targets for the relevant alternative fuels in each form of transport.

Chapter 6 describes the current and future political options that have been considered in order to influence market development, including general measures and measures aimed at promoting infrastructure for alternative fuels in public transport.

1. Directive on the deployment of alternative fuels infrastructure (the AFI Directive)

The EU Directive on the deployment of alternative fuels infrastructure (the AFI Directive) was adopted on 22 October 2014.

The objective of the AFI Directive is to ensure infrastructure deployment for alternative fuels. This is ensured, among other ways, by the individual Member States preparing national policy frameworks with targets and objectives.

Targets and assessments take into account market development, and the national objectives may be revised on the basis of an assessment of national, regional and EU-wide demand for alternative fuels.

The Directive contains a number of minimum requirements (see below) on how the policy framework is to be formulated, but the Member States to some degree define for themselves what requirements they undertake to implement. The policy frameworks are to cover all parts of the transport sector, i.e. road transport, public transport and maritime transport, and consideration of the need to supply electricity to stationary aircraft.

The policy framework is to establish targets that ensure adequate infrastructure for these fuels, i.e. electrical recharging points, CNG refuelling points, LNG refuelling points and hydrogen refuelling points. The objectives for hydrogen are, however, voluntary. There is no focus on infrastructure for biofuels, because it is assumed that this can be included through conventional refuelling points either by blending directly with diesel and petrol or by setting up extra refuelling points, for example with a high blend of bioethanol.

In addition to national policy frameworks, the purpose of the AFI Directive is also to lay down requirements for technical specifications (standards) for recharging points and refuelling points and requirements for user information.

Electricity, gas, biofuels and hydrogen are identified by the Directive as currently the most important alternative fuels capable wholly or partially of replacing fossil oil products for transport. Gas comprises natural gas and biogas, which can be used either in compressed form (CNG) or in liquid form (LNG).

The Directive does not aim to impose further financial burdens on the Member States, but has the objective of setting an incentive framework of both a regulatory and non-regulatory nature.

The Directive is a major element of the European Commission’s strategy for alternative fuels, ‘Clean power for transport: A European alternative fuels strategy’, which was announced in January 2013. The strategy aims to facilitate the development of an internal market for alternative fuels and remove barriers to the deployment of infrastructure. In a broader context, the deployment of infrastructure for alternative fuels is an element in the EU's overall strategy, described in the Commission's White Paper from 2011.

The strategy contains an objective to reduce dependence on oil in the transport sector and to reduce greenhouse gases by 60% by 2050.

The AFI Directive can additionally help meet the EU's target for the reduction of greenhouse gases in the non-trading sectors in 2030 and to a limited extent in meeting the renewable energy sources requirement for transport and the objectives of the Fuel Quality Directive to reduce cradle-to-grave emissions of greenhouse gases in 2020.

1.1.1. Requirements of the Directive concerning road transport

Road transport accounts for around three-quarters of the total energy consumption for transport, and a large proportion of the requirements of the AFI Directive concerns the deployment of infrastructure for fuels to be used in road transport. Table 2.1 below shows the principal minimum requirements for road transport.

Table 2.1 | The most important minimum requirements of the AFI Directive for road transport.

Technology	Minimum requirements
Electricity	The Directive requires the Member States to ensure, through their policy frameworks, a sufficient number of accessible charging points by 2020, which ensures that electric vehicles as a minimum can be driven in urban/suburban agglomerations and other densely populated areas in a network determined by the Member States themselves. As an indication, a minimum target of one recharging point per 10 electric cars should be set. Recharging points installed from 18 November 2017 onwards have to fulfil the technical specification requirements of the AFI Directive.
Compressed natural gas (CNG)	The Directive requires the Member States to ensure a sufficient number of CNG refuelling points by 2020, so that gas-powered vehicles can be driven in urban/suburban agglomerations and other densely populated areas in a network determined by the Member States. It must also be ensured that CNG refuelling points are put in place along the TEN-T Core Network, so that CNG vehicles can be driven throughout the European Union by 2025. As an indication, CNG refuelling points should be set up at least every 150 km along the TEN-T Core Network. Gas refuelling points installed from 18 November 2017 onwards have to fulfil the technical specifications of the Directive.
Liquefied Natural Gas (LNG)	For the development of LNG infrastructure for road transport, each Member State has to ensure a sufficient number of refuelling points accessible to the public on roads along the TEN-T Core Network, if this is deemed to be financially advantageous. A target should ideally be set of LNG refuelling points being put in place every 400 km by 2025.
Hydrogen	Member States choosing to make a commitment to hydrogen vehicles and hydrogen infrastructure should put in place a sufficient number of publicly-available hydrogen refuelling points by 2025.

Source: AFI Directive (2014/94/EU)

As well as the requirements mentioned above, the AFI Directive also includes requirements to be complied with by operators of recharging points and electricity suppliers. These are as follows:

- All electrical recharging points should, if technically and financially reasonable, use intelligent metering systems.

- Operators of recharging points must be freely able to buy electricity from any electricity providers in the Union.

- It should be possible at all publicly-available recharging points to recharge on an *ad hoc* basis, i.e. without a contract.

- Distribution companies must not discriminate against persons who install publicly-available recharging points.

- For households, it should be possible to choose a different electricity supplier for a refuelling point than the one supplying electricity to the household.

In addition, the AFI Directive contains a requirement for the Member States to deploy a suitable LNG distribution system capable of supplying LNG refuelling points both on the road network and at maritime ports.

1.1.2. Requirements of the Directive concerning maritime transport

The AFI Directive sets out a number of requirements to increase mobility options within maritime transport with alternative fuels, which involve targets for both shore-side electricity supply and LNG refuelling points at inland and maritime ports. Denmark does not have any inland ports, so no requirement in this regard need be included in the policy framework.

The requirements of the AFI Directive for maritime transport are summarised in Table 2.2 below.

Table 2.2 | Minimum requirements of the AFI Directive concerning maritime transport

Technology	Minimum requirements
Electricity	The need for shore-side electricity supply from land for maritime transport will be assessed and a supply established for ports in the TEN-T main network and other ports by 2025 at the latest if this is deemed to be financially and environmentally beneficial.
LNG	A sufficient number of LNG refuelling points will be put in place at maritime ports for LNG vessels for transport on inland waterways or seagoing LNG ships to be able to circulate throughout the TEN-T Core Network by 2025. The maritime ports which will provide access to LNG refuelling points are to be determined in the policy framework, taking account of current market needs.

Source: AFI Directive (2014/94/EU)

For maritime transport, it is particularly relevant to take into account the development of infrastructure for alternative fuels in surrounding countries. This development will be assessed in

connection with the regular reporting to the European Commission on the implementation of Denmark's national policy framework.

1.1.3. Requirements of the Directive concerning air transport

The Directive does not contain any specific requirements regarding air transport, but states that the policy framework of the Member States has to consider needs for electricity supply to be put in place at airports for stationary aircraft.

2. Rules for the transport sector in Denmark

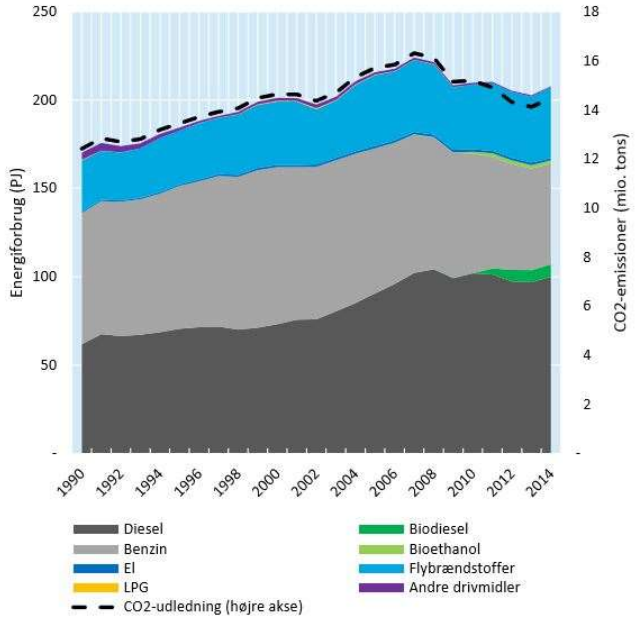
2.1. Historical trend in energy consumption and CO_2 emissions

Energy consumption and CO_2 emissions from transport in Denmark have historically been on the rise, but peaked in 2007, see Figure 4.1, and have since been decreasing. The decline is due in part to a decline in goods transport as a result of the financial crisis and in part to improved fuel economy for cars and goods vehicles. Finally, there has been a gradual phasing-in of biofuels from 2010 to 2012 to 5.75%, which has also contributed to reductions in CO_2.

Before 2007, energy consumption was directly linked to trends in the demand for transport, i.e. a 1% rise in transport demand was reflected in a 1% rise in energy consumption by transport. Energy consumption over the period 1990-2007 consisted almost exclusively of fossil oil products (diesel, petrol and fossil aviation fuel), and CO_2 emissions therefore rose at the same rate in that period.

Figure 3 1| Energy consumption and CO_2 emissions from transport, broken down by fuel.

Figur 3. 1| Energiforbrug og CO_2-udledning fra transport fordelt på drivmidler.



Source: Energistatistik 2014 (Energy statistics 2014) (Danish Energy Agency, 2014)

Key: Energiforbrug = energy consumption

Benzin = Petrol

El = Electricity

CO_2-udledning (højre akse) = CO_2 emissions (right axis)

Flybrændstoffer = Aviation fuels

Andre drivmedler = Other fuels

CO_2 emissions from transport fell by more than energy consumption over the period 2007-2014, because a larger share of energy consumption came from renewable energy sources. Renewable energy today accounts for around 5% of energy consumption for all transport when all biofuels and electricity come within this category. Of this, around two-thirds consists of biodiesel, while electricity and bioethanol account for the other third. Gas consumption today is so low that it is of no significance in relation to the other types. Blending of biofuels with conventional fuels followed a blending requirement of 5.75% of sales of petrol, diesel and gas for road and rail transport. The requirement was gradually phased in between 2010 and 2012. Today, biofuels are thus blended with all diesel, gas and petrol for road transport sold at refuelling points in Denmark. Diesel cars now run on the standard B7, in which 7% biodiesel is blended, and petrol cars run on the standard E5, in which there is a blend of 5% bioethanol.

Improved fuel economy for passenger cars and light goods vehicles has been driven by a combination of the EU's energy efficiency requirements for new vehicles and an environmentally-conscious restructuring of vehicle taxes in 2007 The combination of the two measures meant that energy consumption from passenger cars over the period 2007 to 2014 was almost unchanged, despite growth in the number of kilometres travelled.

The restructuring of vehicle taxes in 2007 introduced a deduction in registration tax based on the type-approved energy efficiency of the vehicle, measured in km/l. This provided a substantial incentive to choose more environmentally-friendly vehicles which can travel a long distance on one litre of fuel. The EU's energy efficiency targets are imposed on the vehicle manufacturers and hence new cars consume less energy per kilometre travelled.

In 2015, the requirement was that new cars on average should emit no more than 130 g CO_2/km (175 g CO_2/km for light goods vehicles), which is lowered to 95 g CO_2/km from 2021 (147 g CO_2/km for light goods vehicles). Improved fuel economy for new cars will be significant for many years ahead as new cars replace old ones.

2.2. Future developments

Future development in the area of transport will depend on developments in technology and the market, the need for transport and the political frameworks, including the AFI Directive. There are already both national and EU policy frameworks today that point in the direction of lower CO_2 emissions, more vehicles running on alternative fuels and higher energy efficiency.

For maritime transport, it is particularly relevant to take into account development in infrastructure deployment for alternative fuels in surrounding countries. This development will be assessed in connection with the regular reporting to the European Commission on the implementation of Denmark's national policy framework.

2.2.1. Other political objectives with significance for the deployment of alternative fuels in the transport sector

In the long term, Denmark’s vision is to be independent of fossil fuels by 2050. This would cover all sectors, and hence also the transport sector. Transforming the transport sector is time-consuming,

among other things because the vehicle fleet is replaced as and when old cars are replaced by new ones, and it will therefore be necessary to create the right framework conditions for alternative fuels before 2050.

The EU has an overall target of reducing CO_2 emissions in the non-trading sector by 30% by 2030 (in comparison with 2005) in the EU as a whole. The national objections may vary between 0 and 40%. Under the European Commission's proposal for burden-sharing, Denmark would reduce its emissions by 39% in 2030. The target has not yet been decided, but the proposal indicates that Denmark will be at the high end of the spectrum.

The CO_2 emissions of the transport sector in 2014 accounted for just under 40% of those of the non-trading sector.

In the short term, Denmark must fulfil a requirement of 10% renewable energy sources (RES) for transport in 2020, which is part of the Renewable Energy Directive adopted in 2009. The RES requirement covers only road and rail transport, in which Denmark has approximately 7.6% renewable energy sources when calculated according to the methods for the RES requirement. Of this, blending of biofuels accounts for around 5.6 percentage points and electricity for road and rail for around 2.0 percentage points, with a 70% share of RES in electricity (Danish Energy Agency, 2015). The methods of calculation reflect firstly an adjustment of energy efficiency and secondly a wish to promote particular fuels (e.g. second-generation biofuels). With effect from 2020, biofuels will be subject to stricter EU requirements, under which first-generation biofuels (food-based) can account for a maximum of 7% of the energy consumption of the transport sector and advanced biofuels are to account for 0.5%. Denmark has adopted a higher target for advanced biofuels with effect from 2020, and the limit on first-generation biofuels does not at present constitute a limitation, nor is it expected to do so in 2020.

On 30 November 2016, the European Commission presented a proposal for revision of the Renewable Energy Directive with the aim of adapting the frameworks for renewable energy in the EU Member States in the period up to 2030. The revised Directive sets out a binding target for the share of RES for the EU as a whole at a minimum of 27% in 2030, while the current national targets for the proportion of RES in 2020 are retained as national minimum shares after 2020. The Directive proposal means that the national requirements for 10% in the transport sector in 2020 will not continue beyond 2020, but will be replaced by blending requirements for the fuel suppliers. The most significant transport-related elements in the proposal are:

• A requirement is introduced for fuel suppliers to blend a proportion of at least 1.5% fuels from renewable energy sources as of 2021. This proportion is to rise to at least 6.8% in 2030 after a fixed gradual increase. Food-based biofuels (often referred to as first-generation biofuels) cannot contribute to meeting this target.

• The proportion of biofuels based on particular types of waste (e.g. animal fat waste and used frying fat) can account for a maximum of 1.7 percentage points out of the 6.8%.

• Advanced biofuels and biogas based on certain more closely-specified raw materials are to account for at least 0.5% in 2021, rising to at least 3.6% out of the 6.8% fuels from renewable energy sources in 2030 after a fixed staged increase.

- Electricity and electricity-based fuels (electrofuels) can also be counted towards the requirement.

In calculating the individual Member State's consumption of renewable energy, the contribution from biofuels produced from food crops or fodder crops (first-generation biofuels) can account for a maximum of 7% of energy consumption for road and rail transport in the Member State in 2021. The maximum limit will decrease to 3.8% in 2030 after a fixed staged reduction. In addition, the Directive sets out new minimum limits for greenhouse gas reduction for biofuels and biogas. The Government will look more closely in 2017 at how the RES requirement for 2020 can be met.

In an amendment to the Fuels Act of 15 December 2016, a requirement was adopted for blending 0.9% advanced biofuels for energy consumption in transport, which will support Danish production. In this way, Denmark will meet the requirement of 0.5% advanced biofuels under the RES requirement, while sales of advanced biofuels are ensured. The requirement applies to all suppliers of fuels for transport, i.e. diesel, petrol and gas.

Denmark is furthermore subject to the EU's Fuel Quality Directive, which requires EU Member States to reduce cradle-to-grave emissions of greenhouse gases in transport fuel by 6% per energy unit in 2020 in relation to 2010, measured in grams of CO_2/MJ. This requirement is substantially more stringent than the requirements contained in the Renewable Energy Directive, but some flexibility is provided for different ways of buying additional allowances.

Tightened sustainability requirements for fuels for shipping were introduced under the EU Sulphur Directive with effect from January 2015. Ships circulating in environmental zones, such as the Baltic Sea, the North Sea and the English Channel, and elsewhere, are subject to stricter requirements regarding how much sulphur may be emitted. The requirements can be met either by using fuels with a sulphur content of less than 0.1% or by installing flue gas treatment for sulphur dioxide. There will also be stricter requirements for ships outside the environmental zones, with a requirement at global level for the sulphur content not to exceed 0.5% as of 2020.

The tightened requirement for sulphur emissions increase the incentive for ship operators to switch to LNG or biofuels.

With the existing national and EU policy frameworks, it is thus expected that there will be a need for greater deployment of vehicles, and for vehicles that use alternative fuels. It may therefore become necessary for infrastructure to be rolled out so that no obstacles arise.

Technological development in future may shift the competition between conventional vehicles and new technologies, which is a crucial factor in determining how the need for alternative infrastructure will develop. This applies in particular to electrical technology for passenger transport, but improvements in engines for gas operation may be a significant factor in how the market develops.

Without taxes, electric cars today are, on average, more expensive per kilometre driven than conventional cars. This is mainly due to electric cars being more expensive to purchase because of the battery, while operating costs associated with the vehicle are typically lower. The price of batteries has fallen sharply in recent years, and it is expected that this trend will continue. Between 2007 and 2014, the cost of battery packs from leading manufacturers of battery-powered electric cars fell by around 8% annually, and in 2014 stood at around USD 300 per kWh. (Nilsson, 2015).

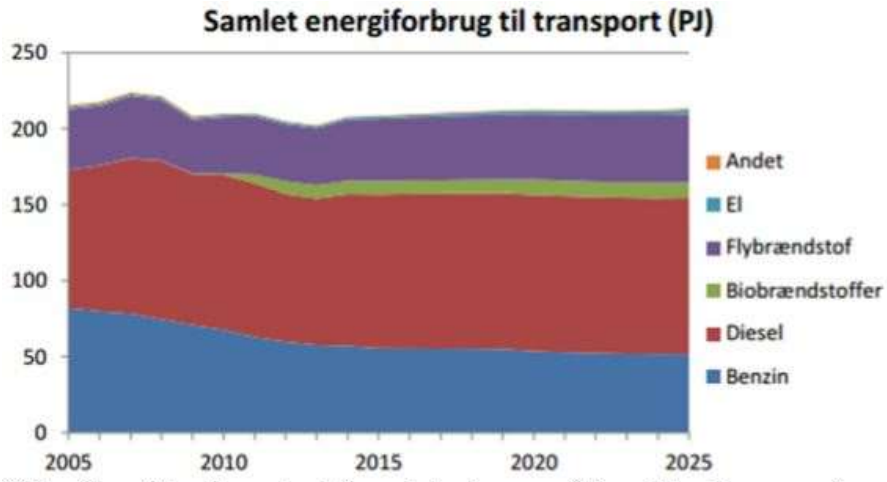
Future trends are by nature subject to substantial uncertainty. Several sources, including the US Department of Energy (DOE) expect battery prices to continue to fall. If the cost of batteries follows the expected downward trend, electric cars may, within a period of 10-15 years, be competitive compared with the average cost per kilometre of conventional cars. (Ea Energianalyse, 2016).

Engines for gas-powered vehicles are a known technology, and the same strong trend as seen for electric cars will probably not occur for gas vehicles. However, as gas vehicles become more widespread, both experience and production of them will increase, which may help in lowering prices and improving efficiency. Technological development may also be significant, meaning, for example, that electric cars become cheaper and better and that sales consequently increase.

2.2.2. Anticipated trend in energy consumption in the transport sector

The Danish Energy Agency's baseline projection anticipates that energy consumption for transport will be fairly constant up to 2025, with a marginal rise. The projection can be seen in Figure 3.2 below. Vehicles running on electricity, natural gas and hydrogen are not expected to make a major breakthrough according to the Danish Energy Agency's projection.

Figure 3 2. | Projection of energy consumption for transport from the Danish Energy Agency's baseline projection from 2015 (Danish Energy Agency, 2015). The trend is dependent on the assumptions concerning technological development for the various fuels.



Kilde: Energistyrelsens basisfremskrivning 2015 (Energistyrelsen, 2015)

Source: Energistatistik 2015 (Energy statistics 2015) (Danish Energy Agency, 2015)

3. Market and infrastructure for distribution of alternative fuels for transport

Samlet energiforbrug til transport (PJ) = Total energy consumption for transport (PJ)

Andet = Other

El = Electricity

Flybrændstoff = Aviation fuel

Biobrændstoffer = Biofuels

Benzin = Petrol

3. Market and infrastructure for distribution of alternative fuels for transport

This chapter presents an overview of the current status of the deployment of alternative fuels, including the infrastructure for their distribution. A systematic distinction is made between the situation in road transport, public transport, maritime transport and air transport. A status report is given for each of these segments for the development of the following alternative fuels to the extent relevant:

- Electricity
- Compressed natural gas (CNG)
- Liquefied Natural Gas (LNG)
- Hydrogen

Biofuels blended with diesel and petrol at present account for the majority of the renewable fuels used for transport. It is expected that the expansion of biofuels will use the existing refuelling infrastructure, and it will therefore not be separately described in this chapter.

3.1. Road transport

Conventional vehicles continue to predominate in road transport, with more than 99% of the total vehicle fleet. The fleet of vehicles using alternative fuels primarily consists of electrically-powered vehicles with 8,651 cars and light goods vehicles on the road in August 2016, see Table 3.1. Gas and hydrogen vehicles are not currently in common use in Denmark.

Table 3.1 | Vehicles on the road, August 2016

	Passenger cars	Vans	Buses[1]	Trucks
Petrol	1,701,888	45,650 519	519	292
Diesel	749,936	350,845	11,887	41,988
Electricity	8,043	609	4	8
Natural gas	84	79	73	91
Hydrogen	66	0	0	2
Liquefied petroleum gas	6	13	1	1
Total	2,460,023	397,196	12,484	42,383
1|				

Source: Danish Transport, Construction and Housing Authority 2016

3.1.1. Electricity

Electric cars were exempt from tax until 2015. The tax exemption, combined with a larger range of electric cars and lower prices, contributed to a rise in sales of electric vehicles over the period 2013-2015. In 2015, 4,500 electric cars were sold, equivalent to 2.2% of new car sales for passenger cars. Taxation of electric cars is being phased in over the period from 2016 to 2019, so that electric cars will be fully taxed in 2020, but with a deduction to reward the high energy efficiency of electric cars.

[1] 'Buses' includes both buses used in public transport and commercial coach companies.

The phasing-in of tax meant that a large number of electric cars were bought in the latter part of 2015, while sales in 2016 were lower than in the previous year.

To date, 866 recharging stations with 1,749 recharging points have been put in place in Denmark (Sept. 2016), see Table 3.2. This figure comprises 1,345 normal-power charging points, 340 high-power charging points and 64 Tesla supercharger stations. This is equivalent to there being approximately one charging point per five electric cars today, and therefore far more than the guideline target in the Directive. The recharging stations are offered by CleanCharge, E.ON, Clever and Tesla. In the near future (2016-2017), Clever plans to set up another approximately 60 new recharging points with around 120 recharging connectors, and Tesla plans another 40-50 supercharger stations (Danish Electric Car Alliance, 2016). Some of the recharging stations have been set up along the motorway network, sold by public tender procedures. Today, there are 23 motorway service areas with electric recharging stations, and it is expected that electric recharging stations will be put in place at another 10 motorway service areas in 2016. The locations of recharging stations are shown on the map in Figure 3.3.

Table 3.2 | Number of recharging points in Denmark, September 2016

	Recharging points at present	Planned recharging points	Total
Normal-power recharging points (AC level 1)	13		13
Normal-power recharging points (AC level 2)	1,332	120	1,452
Quick chargers	340		340
Tesla superchargers	64	40-50	104-114
Total	1,749	160 -170	1,909 -1,919

3.1.2. Compressed natural gas (CNG)

Gas vehicles at present account for less than one-thousandth of the total number of vehicles on the road. As can be seen in Table 4.1, there are 84 passenger cars, 79 light goods vehicles, 73 buses and 91 heavy goods vehicles powered by gas in Denmark. The total number has been rising slightly, as a result of increasing purchases of fleet vehicles by public or local players. Gas-powered heavy goods vehicles include, for example, refuse vehicles, which are used in several cities to collect waste.

Gas energy consumption for transport is estimated by the Dansk Gasteknisk Center at around 1-200 TJ today, and from 2017 it will double, because bus routes in Copenhagen and Sønderborg, among other places, are being converted to gas.

The gas companies estimate that gas operation is associated with a 2-10% higher price, and it is therefore not attractive for commercial players to switch to gas at present. The challenges in switching from conventional to gas-powered vehicles consist primarily in more expensive vehicles, higher fuel consumption and the limitations in mobility with the present-day infrastructure. In addition, gas-powered vehicles in principle have a somewhat shorter range than diesel vehicles, because the pressurised store is more expensive and heavier than a fuel tank for liquid fuel. Natural

gas is, however, cheaper than diesel in the terms of fuel cost and has lower CO_2 emissions per unit of energy.

In a perspective in which the whole transport sector is to be switched from fossil fuels to alternative fuels, biogas offers potential in heavy goods transport. For the light commercial vehicle sector, electricity in the longer term will probably be the cheapest solution for switching from fossil energy to renewable energy sources, while in heavy goods transport it is not expected that it will be possible achieve to sufficient scope for electricity to represent a cost-effective solution. Biogas therefore represents a cost-effective solution for heavy goods transport.

At present there are 14 natural gas refuelling points spread across the country, and a further six gas refuelling stations are planned in the near future. Their deployment can be seen in Figure 3.3.

Gas refuelling points have typically been put in place when a large number of gas vehicles have been purchased through a public tender procedure or as part of a demonstration project. The roll-out of gas infrastructure has been supported under the 'agreement on green transport policy' from 2009, in which DKK 200 million of funding was earmarked. The energy agreement from 2012 earmarked a sum of just under DKK 20 million dedicated to gas infrastructure.

3.1.3. Liquefied Natural Gas (LNG)

No refuelling points have yet been established for LNG along the TEN-T road network, and it is therefore not possible to refuel vehicles with LNG.

3.1.4. Hydrogen

There are 66 cars and two heavy goods vehicles powered by hydrogen, and development is thus only in a trial phase. Ten hydrogen refuelling points have been put in place in Denmark to support hydrogen vehicles, all of which meet the technical specifications of the AFI Directive. The refuelling points are spread across the country and are located close to major cities and transport hubs (Partnership for Hydrogen and Fuel Cells, 2016).

Figure 3.3 | Map showing the deployment of infrastructure for electricity, natural gas (CNG), hydrogen and liquefied natural gas (LNG) in Denmark.

Source: Danish Road Directorate, Partnership for Hydrogen and Fuel Cells, Danish Electric Car Alliance, Tesla, E.on and Clever

Electricity recharging points

Natural gas refuelling point

Planned natural gas refuelling point

Hydrogen refuelling point

Planned hydrogen refuelling point

LNG terminal at port

Planned LNG terminal at port

3.2. Public transport

Public transport primarily consists of buses and trains.

3.2.1. Buses

There are six transport companies that each administer public transport in their own area of Denmark. The way it works in practice is that the municipalities request bus and train routes from the transport companies, which tender for bus and rail services. Tendering procedures may emphasise various parameters, including environmental considerations, which are increasingly included in the assessment of new bus routes.

The transport companies currently have 57 gas-powered buses, 3 electric buses, 21 hybrid buses and 2 biofuel buses (100% HVO), see Table 5.3. It is planned that a further 72 gas-powered buses and 28 biofuel-powered buses (100 % HVO) will enter service in 2017. This means that there will be a total of 183 buses wholly or partially using alternative fuels from 2017, equivalent to 5-6% of the total number of buses used for public transport. There is currently development in gas-powered buses in particular, while operation of electric buses is still at a trial stage, because the economic conditions are still somewhat more difficult than for other bus operations.

Table 4.4 Number of buses running on alternative fuels

Number of buses	Gas	Electricity	Hybrid	100% biofuel	Total
In operation today	57	3	21	2	83
Planned 2017	72			28	100
In operation + planned	129	3	21	30	183

Source: Danish Public Transport Authorities, 2016

Buses for scheduled services are typically refuelled at special bus refuelling points, and infrastructure for this purpose is therefore put in place more or less independently of infrastructure for private transport needs. Public access to the gas refuelling points has, however, been established in the deployment of gas-powered buses, and these refuelling points have contributed to the general deployment of infrastructure in gas for transport. One recharging station has been set up at each terminus for the existing electric buses running in Copenhagen. In addition, a number of depot chargers have been established for night-time charging to balance the battery.

3.2.2. Trains

Train operation in Denmark covers long-distance and regional trains, local railways, light rail systems, suburban trains and the metro. In addition, goods trains run on the Danish state railways, which are not part of public transport but are included here in the combined overview of train operations. Train operation in Denmark is an area in which there is already an ambitious plan for switching from fossil fuel to renewable energy sources.

Energy consumption for trains in 2013 broke down into around 60% diesel and 40% electricity. Electricity is primarily used in suburban trains (S trains) and the metro, while long-distance and regional trains, as well as local railways, mainly run on diesel.

3.3. Maritime transport

For maritime transport, it is relevant to take stock of shore-side electricity supply and opportunities to use LNG for maritime transport.

3.3.1. Shore-side electricity supply

Electricity tax on shore-side electricity supply been reduced since 2015, so that only a tax of DKK 0.004 per kWh is paid, corresponding to the EU minimum tax. The tax relief has also been in effect for only a brief period, and it may therefore be difficult to assess whether it is attractive with the lowered tax. The deployment of a shore-side electricity supply was included in considerations in connection with the expansion of the Port of Copenhagen around Nordhavn, but the investment was not deemed to be profitable. This happened despite considerations of a lower electricity tax on short-side electricity supply being included in the assessment.

In addition, it is essential from the point of view of a port to discover whether there is sufficient capacity in the electricity network for use in short-side electricity supply.

3.3.2. Liquefied natural gas (LNG) for shipping

LNG installations are in place or have been decided upon at three ports in Denmark. None of these is in the TEN-T Core Network. The ports concerned are those of Hirtshals, Frederikshavn and Hou (solely for the use of the Samsø ferry), the first two of which are on the combined TEN-T network. In addition, there are a number of ports that have prepared a financial sustainability analysis prior to investment in LNG installations. These include the following ports: Aarhus, Copenhagen, Esbjerg, Fredericia, Rønne and Orehoved. The ports of Aarhus and Copenhagen have received EU aid for the sustainability analysis.

In order to promote the establishment of LNG refuelling points, Denmark stresses that development is market-driven. The current options for applying for EU aid for financial sustainability analyses and EU CEF funds for the deployment of actual installations appear to be worth retaining in the future, and it should therefore also be a priority for the European Community to assist in ensuring a switch in this area.

The EU Sulphur Directive has led to demand from shipping for more sustainable fuels, including LNG. However, LNG can only be used on new ships, and a switch to LNG can therefore only take place as and when existing ships are replaced by new ones.

LNG for Danish ships at present is imported from large LNG terminals abroad. LNG is distributed through large terminals, where all LNG production is collected and sold on. There are a number of LNG terminals in Europe, including in Norway, Belgium and the United Kingdom. Some of the LNG that is imported at present comes from Norway, but some also comes through the terminal in Zeebrugge in Belgium, which receives production from many different countries. (Näslund, 2013). Most world production of LNG takes place outside the EU, with Qatar, Malaysia and Indonesia being the largest producers. (International Gas Union, 2011). In future Denmark itself will produce alternative fuels at port facilities in Frederikshavn, and a production facility for LNG is also planned at

the Port of Hirtshals. This is a way of making use of the well-established gas infrastructure in Denmark.

The LNG terminal in Hirtshals opened in 2015, and has a storage tank with a capacity of 500 cubic metres and a bunkering capacity of 200 tonnes or 500 cubic metres of LNG. The tank installation is primarily intended to supply the two cruise ferries of Fjord Lines, but is also intended to allow other LNG-powered ships to be supplied. There are plans to expand the terminal, so that capacity of 10,000 cubic metres can be obtained for its LNG tank facility, and it expected that an LNG production facility will also be established at the port. The terminal has received EU aid totalling EUR 1,305,374 through TEN-T, meeting 50% of the combined costs.

Production and bunkering facilities for sustainable fuels will also be established in connection with the expansion of the Port of Frederikshavn. It is also to be possible to use the facility for the production of LNG and for bunkering of LNG for ships. It is anticipated that the facility will open at the end of 2017. It is expected that 150 tonnes/300 cubic metres of LNG will be produced daily at maximum operation. The Port of Frederikshavn, like the Port of Hirtshals, has a highly strategic location, with around 100 000 ships passing through the strait at Skagen every year. The project has received EU aid totalling EUR 2,904,140 from the EU's Connecting Europe Facility Fund, meeting 20% of the total costs of the project.

The gas ferry MF Samsø, which entered service in November 2014, has a 'dual-fuel' engine and can sail on both LNG and conventional marine diesel. The Municipality of Samsø has entered into an agreement with Q8 on supply of gas for the first Danish domestic LNG ferry. Q8 is responsible for a complete supply chain solution including a mobile LNG bunkering unit on the ship side in Hou, Jutland.

3.4. Air transport

The policy framework, according to the AFI Directive, must include consideration of the need to install electricity supply at airports for the use of stationary aircraft. The three largest airports, Copenhagen Airport, Billund Airport and Aalborg, which account for more than 97% of all passenger flights, have already established an electricity supply for stationary aircraft. Denmark is therefore well advanced in this area.

4. Availability of alternative fuels in transport

Petrol and diesel today are by far the most commonly used fuels in road transport. Availability of petrol and diesel is high, with reliable supply at all times of day and night almost throughout the country. There is relatively limited use of the alternatives to petrol and diesel at present, and the availability of these fuels is still limited.

Known alternative fuels comprise electricity, hydrogen, biofuels, compressed natural gas (CNG) and liquefied natural gas (LNG). There is a wish for a primarily marked-driven switch in transport energy consumption, which contributes towards preserving a transport system that provides high mobility while enabling us as a society to fulfil the objectives of climate and energy policy.

A switch in transport energy consumption necessitates there being demand for the alternatives to petrol and diesel, which requires prices to be competitive, quality to be acceptable and alternative fuels to be available when there is a need for them.

In practice, it is therefore essential that alternative fuels are available to enable a switch decided upon politically to take place. If users find that the gas refuelling point is too far away, if the refuelling station uses an incorrect type of connector or if there is a queue, this may act as a barrier to the switch in transport energy consumption taking place.

Government policy for access to alternative fuels in transport is described below. Government policy is aimed at road transport, public transport, maritime transport and air transport. This policy consists in an assessment of the current status and the Government's expectations and targets for the deployment of the relevant alternative fuels in each forms of transport.

It is emphasised that increased access to alternative fuels for transport is primarily driven by the market players. This means that, in principle, no further State aid should be paid for the development of infrastructure.

It is assumed that the present-day infrastructure for the distribution of petrol and diesel can be used directly for biofuels. It is further assumed that the infrastructure for distribution of compressed natural gas can be used directly for biogas, through a certificate scheme if appropriate. Biofuels, including biogas, therefore do not have any independent role in Government policy on access to alternative fuels.

4.1. Road transport

4.1.1. Electricity for road transport

There was a big increase in sales of electric cars in Denmark in 2015. However, the market for electric cars has still not reached maturity. This is shown, for instance, by the fact that it is dependent on preferential taxation. Based on the Danish Energy Agency's baseline projection, a total number of around 30,000 electric cars is expected in Denmark in 2020. This figure is expected to rise to around 65,000 in 2025. The estimate is based in part on calculations by the Ministry of Taxation of how many electric cars will be sold in connection with the phasing-in of taxes on electric cars, and is subject to great uncertainty.

The first concern in building up the recharging infrastructure for electric cars has been to achieve geographical spread of publicly available recharging points. The second concern has been that there should be sufficient capacity at the individual recharging points. The number of cars per charging point will therefore initially be relatively low.

The charging infrastructure is already fairly well developed. Approximately one charging point per five electric cars has been put in place. This roll-out has been primarily implemented by the market players, and emphasis is put on the fact that development continues to be market-driven. Build-up is expected in future to be based only to a limited extent on State incentives.

It is expected that the deployment of recharging infrastructure will continue in future to follow the trend in sales of electric cars.

More specifically, it is expected that it will be possible to ensure continued supply with at least one publicly available recharging point per 10 electric cars through the primarily market-driven deployment of recharging points for electric cars. This is equivalent to around 3,000 publicly available recharging points in Denmark around 2020.

If it is found in 2019 that the ratio between the number of electric cars and deployment of recharging infrastructure results in the number of cars per recharging point being above the benchmark of 10 electric cars per recharging point, the Government will examine whether there is a need for measures that can further support the market.

It is additionally expected that as a result of market-driven deployment of recharging points a supply can be established in urban/suburban agglomerations around the largest cities in Denmark (Copenhagen, Aarhus, Odense, Aalborg and Esbjerg) that meets the objective of the availability of recharging points not significantly restricting the mobility of users.

The recharging infrastructure around the major cities in Denmark is well established today with more than 200 publicly available recharging stations in Copenhagen, 35 in Aarhus, 7 in Odense, 9 in Aalborg and 9 in Esbjerg. As sales of electric cars rise, it is expected that the market will drive development and ensure the necessary number of recharging points and capacity at these points.

- *If it is found in 2019 that the deployment of recharging points does not need the objective of availability of recharging points not significantly limiting the mobility of users in urban/suburban agglomerations around the largest cities, the Government will examine why supply has become inadequate, and on this basis assess whether there is a need for supportive measures.*

4.1.2. Compressed natural gas (CNG) for road transport

There are a very limited number of vehicles in Denmark that can use compressed natural gas as their fuel. No significant commercial sales to private individuals of vehicles of this type are expected in the period up to 2020 and 2025.

The expectations for the sale of cars capable of using compressed natural gas as fuel are due to these vehicles, in comparison with conventional vehicles, being expected to continue to be relatively expensive to purchase and operate. This situation is further reinforced by the fact that there is no tradition of using compressed natural gas as a fuel for transport in Denmark.

Addition of gas vehicles to the vehicles on the road is, however, expected through public procurement and tenders. These are buses in public transport and specially equipped vehicles, for example for refuse collection.

Denmark has a well deployed infrastructure for distribution of gas, but because of the limited demand for compressed natural gas for transport there are relatively few gas refuelling points. There are 14 gas refuelling points in Denmark at present, and a further six are planned. It will be possible to establish gas refuelling points without having to invest large sums in deployment of the gas infrastructure. The costs for deployment of a network of gas refuelling stations are therefore expected to be limited. There are, however, individual areas that do not have natural gas networks, where alternative solutions will be needed.

Users of gas vehicles in urban/suburban agglomerations in Copenhagen, Odense, Aalborg and the 'Triangle Region' of Jutland are deemed to have basic access to gas refuelling points. The trend in the number of gas refuelling stations is expected to follow the demand for gas, including the demand created by operation of the vehicles purchased through public procurement and tender procedures. The Government expects that in 2020 a network of gas refuelling stations will be established in Copenhagen and the surrounding urban/suburban agglomerations.

One of the reasons for public procurement of gas vehicles is that they can run on biogas. This contributes towards reducing CO_2 emissions from transport and towards Denmark being able to fulfil its obligations to use renewable energy sources in transport energy consumption.

- *It will be analysed more closely whether, in connection with fulfilling Denmark's 2030 target for CO_2 reduction in the non-trading sector, it will be cost-effective to create demand for compressed gas for transport and to support the establishment of a network of gas refuelling stations linked to the TEN-T Core Network in Denmark.*

4.1.3. Liquefied natural gas (LNG) for road transport

LNG is not used at present for road transport in Denmark. In consideration of possible users of LNG vehicles from other countries travelling to somewhere in Denmark, or who are transiting through Denmark, it may be desirable in the longer term for a basic refuelling infrastructure for LNG to be deployed along the TEN-T road network in Denmark.

Basic availability could be provided, for example, by locating LNG refuelling facilities in Aalborg, the Triangle Region and Copenhagen. The Government does not expect that market-based development in which LNG refuelling facilities are located along the TEN-T road network in Denmark will arise in the period up to 2025.

When there is experience of suitable deployments in other EU Member States, the Government will analyse more closely whether, and if so how, initiatives can be taken to support development.

4.1.4. Hydrogen for road transport

There is a small fleet of hydrogen vehicles in Denmark. There are also a limited number of refuelling facilities for hydrogen which are, however, very well deployed in relation to the number of vehicles. These hydrogen vehicles are primarily purchased through public procurement and tender procedures.

The costs of hydrogen vehicles and infrastructure for refuelling of hydrogen vehicles are higher at present than the costs of the other alternative fuels. As it is not deemed possible to reduce costs to a reasonable level before 2025, hydrogen is not currently included in Government policy on the availability of alternative fuels.

4.2. Public transport

Development in the use of alternative fuels in public transport can, to a large extent, be determined politically. The Government does not have any specific objectives for the deployment of infrastructure for alternative fuels for public transport. Decisions on this are typically taken as and when investments are made in new trains and buses.

4.2.1. Buses

Several public transport companies have policy objectives to switch bus operation from fossil energy to making greater use of alternative fuels. Movia, which operates on Zealand, has an objective of being fossil-free in 2020, while BAT, which is responsible for public transport on Bornholm, expects that most of its bus operations will have already switched to being powered by alternative energy sources as of 2025.

The public transport companies in general attach increasing importance to environmental requirements when bus routes are put out to tender. Several public transport companies expect that buses that use compressed natural gas as a fuel will gain a foothold in particular on regional routes, while urban bus routes in the longer term have potential to switch to electrical operation. The long bus routes are more difficult to switch to alternative fuels, because the buses run less frequently and distances are longer.

The switching of public transport buses from conventional fuels to alternative fuels is typically governed by local political choices. The transport companies are responsible for the political choices being converted to procurement of more environmentally friendly buses, which is typically achieved by putting greater emphasis on environmental aspects in public tenders.

Refuelling or recharging facilities, which are necessary to enable alternative fuels to be used, are often covered by the invitation to tender. That is to say, deployment of infrastructure naturally follows the trend for buses running on alternative fuels. The infrastructure provider is also assured in that way of minimum sales, which support the investment. Both HMN and Naturgas Fyn, which are commercial providers of gas, consider there to be a need for public support for the deployment of gas refuelling points.

With the existing organisation of tendering, the Government does not see any need for further policy measures to ensure deployment of infrastructure to support the operation of buses in public transport on alternative fuels.

4.2.2. Trains

Electrification of the railway network in Denmark has increased. This applies to electrification of the sections of track between Copenhagen and Ringsted, Ringsted and Holeby (Femern), Køge N. and Næstved and between Esbjerg and Lunderskov. Funds have been reserved in the 2017 Finance Act

pending a decision on further electrification of the railway network in East Jutland (Fredericia-Aarhus-Aalborg) and on the North-West line (Roskilde-Kalundborg).

It can be reported that electrification has already been carried on the suburban railway (S trains) and on the Copenhagen-Odense-Fredericia-Padborg route.

Hence it is ensured that all trains on the main network can be operated electrically. It is expected that 85% of train operation in 2030 will be based on electricity. Electrification is expected to reduce CO_2 emissions by around 170,000 tonnes.

The Government thus does not see any need for further measures to ensure that train operation is switched from diesel to electricity on the railway network.

4.3. Maritime transport

4.3.1. Shore-side electricity supply

An initiative has already been taken to lower the electricity tax on shore-side electricity supply. The framework conditions for establishing shore-side electricity supply have thus recently improved. No further initiatives will therefore be taken, and shore-side electricity supply will only be established if private investors judge that it should be implemented.

The Government does not see any current need for further political measures to ensure deployment of infrastructure for shore-side electricity supply.

4.3.2. Liquefied natural gas (LNG) for shipping

Denmark stresses the importance of ensuring that the maritime dimension of the TEN-T Core Network is developed with LNG-powered ships and with bunker facilities, including the possibility of refuelling in Denmark at a sufficient number of LNG refuelling points.

Denmark will therefore continuously monitor development of the market for the deployment of infrastructure for alternative fuels with regard to putting in pace LNG refuelling facilities in close cooperation with relevant players.

Denmark judges that the Port of Hirtshals and the Port of Frederikshavn, despite not being designated as TEN-T Core Network ports, can in principle be responsible for supplying LNG vessels, particularly in view of the geographical size of Denmark.

Denmark stresses the importance of the number of LNG facilities having to be market-driven and thus based on supply and demand. It should be advantageous for the Danish ports to deploy such facilities, but the supply should ensure at the same time that it is genuinely possible for ships to use LNG. In the longer term, it should be made possible to bunker LNG at the present-day bunker hubs in Danish waters. This will be essential if LNG is to be extended to ships not in scheduled service.

There are three different ways of managing LNG bunkering:

1. Ship-to-ship tied up at the quayside or at sea

2. LNG from a truck either at the quayside or on a landing stage.

3. LNG to ship from an LNG terminal

The three solutions have different challenges and require careful consideration. One of the issues to be examined is how long LNG bunkering takes, the economic basis, safety risks, etc. Ship-to-ship is the most popular and flexible solution in the long term, as the bunkering operation can take place with the recipient is both at the quayside and at sea, while LNG from a truck may be an economically sensible solution in the short term.

If it is found that a sufficient number of LNG refuelling facilities has not been established at Danish sea ports with LNG refuelling facilities in Hirtshals and Frederikshavn for LNG ships to be able to sail on the TEN-T Core Network, and if this is a market need for this, the Government will examine how mobility on the TEN-T Core Network can be strengthened.

4.4. Air transport

As Denmark has electricity supply to stationary aircraft at airports that account for 97% of all air passenger transport, there is no need for further measures to promote installations for electricity supply to stationary aircraft in Denmark.

4.5. Follow-up of implementation of Government policy in 2019

Directive 2014/94/EU on alternative fuels infrastructure deployment was adopted on 22 October 2014. Under the Directive, Denmark has to establish a national policy framework outlining targets and objectives, and supporting actions for development of the market as regards alternative fuels, including deployment of the necessary infrastructure which is to be put in place. Denmark has complied with this obligation by forwarding the present report to the European Commission. Denmark will follow up implementation of the policy framework in 2019.

5. Current and future policy options

This chapter contains a description of the various political options that have been considered in order to influence market development. General measures which are either part of the existing frameworks or that are planned are first examined. In addition, measures are described that are aimed at promoting infrastructure for alternative fuels in public transport.

It is emphasised that allocation systems for alternative fuels for transport are market-driven, and to the extent that incentives are provided by the State, this is to be done on the basis of considerations of cost-effectiveness. This means that no further State aid should, in principle, be granted for the development of infrastructure that will put a greater strain on public finances than is the case today.

5.1. Current legislation facilitating the development of alternative fuels

Energy and CO_2 taxes

Energy and CO_2 taxes are currently levied on diesel and petrol, see Table 6.1. A rate of DKK 3.11/l is charged for diesel and DKK 4.57/l for petrol, to which 25% VAT is added. This means that the market price is almost twice as high as the product price due to taxes. Energy and CO_2 taxes mean there is therefore already a powerful incentive today to choose energy-efficient vehicles and less CO_2-intensive fuels. Both passenger transport and goods transport are subject to payment of energy and CO_2 tax, and the incentive therefore applies to both. Biofuels are exempt from CO_2 tax, while full energy tax is payable on the fuels they replace. Electricity for electric cars is typically taxed at a reduced rate.

Table 5.1 Energy and CO_2 taxes for diesel and petrol, September 2016

DKK/l	Energy tax	CO_2 tax	Total	Total incl. VAT
Diesel	2.69	0.42	3.11	3.89
Petrol	4.18	0.39	4.57	5.71

Passenger car taxation

Passenger cars today are subject to a registration tax and a green tax in addition to energy and CO_2 taxes on fuels. Registration tax is payable on purchasing a vehicle and in principle is based on value. Current legislation is to a large extent focused on encouraging car buyers to choose cars that have less impact on the climate than others. The annual tax which was previously calculated on the basis of the vehicle's weight was replaced for new cars in 1997 by a tax that reflects fuel consumption (fuel consumption tax). In 2007, a reduction in registration tax was introduced for cars with low fuel consumption and a supplement for cars with high fuel consumption. The initiatives mentioned may be assumed to be part of the explanation why the new cars registered in Denmark in 2014 had approximately 31% lower emissions of CO_2 per km than cars registered in 2007. The reduction for the same period for the EU15 including Denmark was around 23% (EEA, 2015).

The scales and deductions that are intended to encourage car buyers to choose energy-efficient cars are broadly technology-neutral. This means, among other things, that the technology which currently

makes best use of the fuel, all other things being equal, is encouraged most. As diesel-powered cars at present utilise the fuel better than petrol technologies, the purchase of cars powered by diesel, all other things being equal, will also be the car purchases that are most encouraged.

Technology neutrality is, however, only approximate. A regular particle emission supplement has, for example, been implemented for diesel-powered cars that do not comply with Euronorm 5 or better.

Diesel oil is taxed lower than petrol. The direct incentive to purchase a diesel-powered car that this provides is offset through a compensatory tax. The compensatory tax is calculated as the saving from using diesel rather than petrol, given an annual mileage of 22,000 km. An annual mileage of 22,000 km is the average total mileage recorded in new cars. The compensatory tax was previously set according to the average mileage for the whole number of vehicles on the road (14 - 15,000 km). The changed principle for setting the compensatory tax was implemented with the tax reform agreement of 2012. The part of the agreement concerning compensatory tax reads: 'The parties are agreed that the compensatory tax on new and existing diesel-powered passenger cars and light goods vehicles will be raised to offset the tax advantage for diesel over petrol and reduce emissions of harmful particles from diesel vehicles. The compensatory tax is raised by just under 52% from 2012 to 2013 on the basis of an average mileage for new passenger cars and light goods vehicles of around 22,000 km.'

5.1.2. New taxation of electric cars

With regard to the future taxation of electric cars, a political agreement was entered into on 9 October 2015 on a gradual transition to full registration tax. The agreement results in significantly more lenient taxation of electric cars than the loss of the exemption from registration tax that would otherwise be the case. In addition, a further discount on the registration tax of up to DKK 10,000 per electric car is being granted in 2016 and 2017. When the registration tax has been fully phased in in 2020, electric cars will continue to enjoy a significant discount on the registration tax. This is due to the fact that electric cars have very low calculated energy consumption, and that they will therefore also receive significant calculation-related benefits after the general registration tax has been fully phased in.

Overall, it is expected that the gradual transition of electric cars to full registration tax will follow an anticipated decline in the price of electric cars, in such a way that electric cars will also account for an increased proportion of vehicles on the road in the future.

Electric cars have had a shore of new registrations in the past year of around 1.4%. The political agreement of October 2015 includes a provision that if the conditions on which the agreement is based change markedly during the course of the phasing-in period, the parties will discuss phase-in.

5.1.3. Removal of PSO tax

A political agreement was entered into in November 2016 that the PSO tax on electricity would be gradually abolished over the period 2017 to 2022 and that other funding would be introduced in the future. The abolition of the PSO tax means that electricity becomes relatively more attractive in comparison with other fuels. This may thus help to facilitate both the sale of electric cars and roll-out of recharging infrastructure.

5.1.4. Fulfilment of the sustainable energy requirement

As described earlier, Denmark has to comply with the requirement in the Renewable Energy Directive of 10% renewable energy for transport in 2020. The use of alternative fuels will necessarily be increased in 2020 to fulfil this requirement. The energy agreement of 2012 prepared the ground for the renewable energy requirement to have to be met by increased blending of biofuels in diesel and petrol.

The Government will look more closely in 2017 at how the RES requirement for 2020 can be met.

The renewable energy sources requirement of 10% renewable energy for transport is not continued in the draft Renewable Energy Directive applicable after 2020 (presented in November 2016). On the other hand, new 2030 targets are set for particular types of biofuels, focusing in particular on blending of advanced biofuels.

5.1.5. Blending requirement of 0.9% for advanced biofuels

In an amendment to the Fuels Act of 15 December 2016, a requirement was adopted for blending of 0.9% advanced biofuels for energy consumption in transport.

The blending requirement will, in general, help to promote alternative fuels. The requirement is technology-neutral and thus covers both gaseous and liquid biofuels. It is expected that it will mainly be fulfilled by blending second-generation bioethanol with petrol, but it may also be fulfilled by increased consumption of biogas for transport. The requirement may consequently help to set the limits for further gas infrastructure deployment.

5.1.5. Aid for biogas

More biogas is available in Denmark than is used for transport, even with increasing gas consumption for transport. Biogas production is expected to grow, and in the future biogas will increasingly be upgraded to the gas network. Biogas can therefore easily be allocated to transport with certificate schemes.

5.1.6. Funding to support infrastructure deployment

The deployment of infrastructure has been supported directly or indirectly through both Danish and EU aid.

The development of infrastructure for electricity, gas and hydrogen has been supported by the infrastructure funding under the Ministry of Climate. Energy and Utilities. Over the period 2013-2015, approximately DKK 70 million of support was provided in a partnership arrangement, of which DKK 20 million was targeted at gas infrastructure, DKK 10 million at hydrogen and DKK 40 million at electricity. The support has been targeted at heavy vehicles and infrastructure, while support for hydrogen has gone solely to infrastructure. A total of DKK 50 million was additionally earmarked for trials with electric cars during the period. In 2015, a smaller subsidy was also granted for electric buses.

Over the period 2010-2013, DKK 129 million was allocated to trial projects with the aim of trying out the options for creating energy-efficient transport solutions. The resources were allocated under the

transport agreement ‘A green transport policy’ from 2009. Some of the funding was used to support electricity, gas and hydrogen projects.

The Energy Technology Development and Demonstration Project (Energiteknologisk Udviklings og Demonstrations Program, EUDP) over the years has supported research and development, particularly in hydrogen and second-generation biofuels. In addition, there are several demonstration projects for electric cars that have obtained international support, such as Green Region for Electrification and Alternatives fuels for Transport (GREAT), Multimodal e-mobility connectivity for the Oresund Region (MECOR), Platform for E-mobility in ÖKS Region and the Nikola Research Project. The GREAT, MECOR and ÖKS projects have supported the deployment of charging infrastructure in the Nordic countries. The Nikola Research Project has supported demonstration projects showing how the electrical recharging infrastructure can be integrated into the Danish electricity distribution network.

DKK 8 million was earmarked in 2016 for development and demonstration projects for clean-tech solutions in the area of transport.

Ministry of Transport and Housing

Frederiksholms Kanal 27F 1220 Copenhagen K

Telephone 41 71 27 00

trm@trm.dk

www.trm.dk