
On Alternative Fuels Development Plan 2017-2020

Summary

The Alternative Fuels Development Plan 2017-2020 (hereinafter - the Plan) has been developed in order to reduce the negative impact of transport on the environment, and also in order to transpose the requirements of Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure (hereinafter - Directive 2014/94/EU), and also to carry out the task specified in Paragraph 7.2 of Cabinet Meeting No. 45 52.§ TA -1907-IP of 13 September (restricted access information).

The Plan conforms to the objectives and tasks for the reduction of negative environmental impact and promotion of sustainable development laid down in the National Development Plan of Latvia for 2014-2020 (hereinafter - the NDP 2020), the Sustainable Development Strategy of Latvia until 2030, the Environmental Policy Guidelines 2014-2020, the Energy Development Guidelines for 2016-2020 (hereinafter - the Energy Guidelines), and also in the Transport Development Guidelines for 2014-2020 (hereinafter - the TDG 2020), and also it conforms to the objectives laid down in the White Paper of European Transport Policy - Roadmap to a Single European Transport Area - Towards a Competitive and Resource Efficient Transport System. Hitherto a comprehensive strategy has not been established in Latvia for the development of compressed natural gas, liquefied natural gas, and hydrogen as types of alternative fuels. Thus:

Objective of the Plan is to determine the necessary directions for the research and analysis as a result of which further action policy will be developed in respect of deployment of alternative fuels in certain transport sectors in order to reduce greenhouse gas emissions.

Task of the Plan is to become familiar with the current situation in the field of alternative fuels and to determine the measures to be taken for deployment of alternative fuels and promotion of their use in Latvia.

The Ministry of Transport established a cross-institutional working group for the development of the Plan in which representatives from the Ministry of Economics, the Ministry of Environmental Protection and Regional Development, the Ministry of Finance, the SJSC Road Traffic Safety Directorate, the SJSC Maritime Administration of Latvia, Hygen Ltd., the Automotive Association, Riga Technical University, the Latvian Fuel Traders Association, the Latvian Hydrogen Association, Zero Emission Mobility Support Society, Freeport of Riga Authority, Latvian Academy of Sciences, Liepāja Special Economic Zone Authority, Freeport of Ventspils Authority, and also experts invited to meetings of the working group for the provision of opinion in the field of alternative fuels take part.

The draft Plan was posted on the website of the Ministry of Transport on 2 September 2016 for participation of the public.

In conformity with that laid down in the law On Environmental Impact Assessment and Cabinet Regulation No. 157 of 23 March 2004, Procedures for Carrying out a Strategic Environmental Impact Assessment, the Ministry of Transport

has consulted with the Nature Conservation Agency, the Health Inspectorate, and the State Environmental Service regarding the Plan. As a result of the consultations carried out, the authorities have expressed their opinion that it is not necessary to carry out the strategic environmental impact assessment. It is also indicated in the decision of the State Environmental Bureau that it is not necessary to apply the procedure of strategic environmental impact.

The Plan shall apply to road transport, air and maritime transport with a view to reduce the greenhouse gas (hereinafter - the GHG) emissions in these sectors. The main attention of the Plan is paid to the types of alternative fuels the deployment of which or assessment of necessity for the deployment of which in certain transport sectors is determined as mandatory measures for the Member States in accordance with Directive 2014/94/EU, namely, electricity for road transport, maritime transport and aviation, compressed natural gas (CNG) for road transport, liquefied natural gas (LNG) for road transport and maritime transport, and also to the measures for promoting the use of such vehicles. Concurrently Directive 2014/94/EU provides for the requirements for promoting the development of hydrogen as fuel in cases when the Member States select to deploy also this type of fuel. Taking into account that the possibilities of use of hydrogen as a type of fuel have not been considered until now in Latvia, the assessment of its potential, and also possible contribution to emission reduction in road transport would be useful.

According to the official report of Latvia on GHG forecasts, policy and measures which was submitted to the European Commission in July 2015 for the time period until 2035, it may be concluded that total GHG emissions of non-ETS activities during the time period from 2005-2020 could increase up to the amount of 7 to 8 %, but during the period until 2030, upon implementing only those measures which have been already implemented, are being implemented now, or implementation of which is planned and financing for the implementation of these measures has been determined, the GHG emissions of non-ETS activities of Latvia will increase by 17.7 %.

On 20 July 2016 the European Commission published a Proposal for a Regulation of the European Parliament and of the Council on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 for a resilient Energy Union and to meet commitments under the Paris Agreement and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change, in order to introduce conditions with a legal act of the European Union which were approved by the 2030 climate and energy framework (hereinafter - the CEF2030), and by which reduction in the amount of at least 6 % is determined for Latvia of the amount of the GHG emissions of non-ETS activities of 2005.

The Plan does not separately analyse the impact of the transport sector on the air quality that is especially essential in towns. Taking into account the impact of emissions caused by road transport on the air quality and the total contribution of the transport sector to the total amount of air pollution by nitrogen oxides, particles PM, it may be indirectly concluded that by implementing the measures provided for in the Plan, a positive impact on the air quality is possible. Particularly taking into account such types of alternative fuel discussed in the Plan as hydrogen fuel and electricity, the development of the charging infrastructure of which will promote more extensive use of such types of vehicles.

The current situation in the EU and Latvia in the field of alternative fuels is described in the Plan, mutual comparison of alternative fuels, including the aspect of CO₂ emissions, is carried out, the main obstacles for deployment of alternative fuels in Latvia, the measures taken and to be taken are analysed therein in order to develop the alternative fuels infrastructure in a balanced and efficient way. Concurrently apart from deployment of the alternative fuels infrastructure, other action directions within the context of reducing the negative environmental impact of the road transport are also provided for in the Plan - tax policy in the field of the road transport, establishment of environmentally friendly public transport infrastructure, renewing of vehicle fleet. It is worth mentioning that from the point of view of the transport sector the road transport constitutes 91.3 % of the total amount of transport GHG emissions, and 23.9 % - of the total amount of GHG emissions. In respect of the air pollution caused by the transport sector, nitrogen oxide emissions caused by the sector are the most significant. In 2013 the main source of NO_x emissions in Latvia was transport (49 %), especially road transport which caused 35 % of total emissions. It should also be mentioned that 92 % of the vehicle fleet consists of vehicles driven by fossil fuels (petrol and diesel fuel) and 7 % - driven by liquefied petroleum oil¹ which are the main source of GHG emissions. Being aware that as a result of the activities provided for in the Plan the spread of vehicles driven by alternative fuels could be promoted in the territory of

Latvia, the positive impact of such measure on the performance of the objectives binding to Latvia regarding reduction of GHG emissions during the next years must be noted.

The European Commission has emphasized the significant role of alternative fuels within the context of reducing transport emissions. Also, there is no need to hesitate with promoting the development of this sector in Latvia, taking into account that positive results of the measures taken cannot be expected within a short-term, but Latvia must meet the specified non-ETS GHG reduction objectives already starting from 2020.

On 18 December 2013 the European Commission presented the Clean Air Policy Package developed where one of the elements of this package is a proposal for a Directive of the European Parliament and of the Council on reduction of emission of certain atmospheric pollutants. The proposal for Directive has been developed taking into account the achievements of Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, as well as the new international commitments which were laid down after amendments to the Gothenburg Protocol made in 2012. In conformity with Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC, Latvia must, already starting from 2020, reduce emissions of pollutants included in the scope of Directive: including nitrogen oxide (NO_x), and particles PM_{2.5} (PM_{2.5}). The emission forecasts currently developed show that Latvia will not be able to ensure meeting the emission objectives specified for it without taking additional measures (including in the transport sector).

1.4. Connection with the Development Planning Documents of Latvia for Reduction of the GHG Emissions in the Field of Transport

The National Development Plan of Latvia for 2014-2020 is the main medium-term development planning document in Latvia. In respect of promoting a sustainable transport sector it is indicated therein that a sustainable transport infrastructure which ensures mobility inland and international reachability, is necessary for achieving the priority "Growth of the National Economy". With the purpose of ensuring highly productive and internationally competitive production and services the NDP 2020 provides for the necessity to support introduction of new technologies and rational use of resources, thus reducing emission of polluting substances in the energy, industry, transport and agricultural sector.

One of the objectives of the NDP 2020 is to ensure sustainable use of energy resources necessary for national economy by promoting access to markets of resources, energy intensity of sectors, and reduction of emission intensity, and increase of the local RES proportion in the total amount consumed, focusing on competitive energy prices. In order to achieve this objective one of the tasks of action directions provides for the establishment of aid programmes for transition to renewable energy resources in the transport sector and for the provision of the necessary infrastructure by supporting only such alternative energy resources which are economically advantageous, and also by supporting innovations as a result of which the use of economically advantageous alternative energy resources is promoted.

The Energy Development Guidelines for 2016-2020 provide for the activities in respect of promoting sustainability of energy, including for increasing the proportion of "green energy" and more efficient use of the consumed energy. It is planned that the abovementioned activities will include arranging of the aid mechanism and its further development by ensuring its operation in conformity with the market principles in order to ensure increase in the proportion of renewable energy in the final energy consumption. It is also planned to work on the development of more efficient heating supply market and zero emission transport. Latvia, as well as other EU Member States, must ensure that in 2020 the proportion of energy produced from RES in transport is at least 10 % of the final consumption of energy in the field of transport (hereinafter - the RES 10 % target in transport). Although in Latvia there is the second highest RES proportion in consumption of energy resources in the EU and in 2014 RES proportion was 38.7 % in Latvia (EU - 16.0 % on average)⁷¹, the proportion of energy produced from RES in transport has not significantly changed during the last years in Latvia - in 2014 in comparison to 2013 it has increased by 0.1 % - from 3.1 % to 3.2 %. Accordingly, the proportion of biofuel has also increased - from 2.14 % in 2013 to 2.4 % in 2014. In its turn the proportion of energy produced from RES in transport in the EU was 5.9 % in 2014. In 2014 only two EU Member States reached the RES 10 % target in transport - Sweden and Finland where the proportion of energy produced from RES in transport formed 19.2 % and 21.6 % accordingly. For Latvia reaching of this target is mainly related to technological challenges (it is

influenced by the outdated vehicle fleet), and also the choice and use habits of vehicles by the public which has a direct influence on the energy consumption structure in the transport sector.

It is indicated in the Energy Guidelines that, taking into account the significantly lower emission intensity of natural gas in comparison to coal and petroleum products and the market development in the world, natural gas will retain a significant role in the balance sheet of primary energy resources of Latvia along with renewable energy resources.

It is also indicated therein that the energy sector cannot be imagined without innovative solutions in the future. One of examples is also the use of hydrogen that marks the beginning of a new technological era in the transport segment which is characterised by more efficient use of energy resources without causing GHG emissions. Also, the action directions of the Energy Guidelines include the assessment of possibilities for the production and use of second generation biofuel and other sustainable biofuel in Latvia, using hydrogen technologies, and also promoting the use of different fuel gas in national economy by developing regulation for the use of fuel gas.

The *Sustainable Development Strategy of Latvia until 2030* (hereinafter - the Strategy) includes very wide objectives - a qualitative and accessible life-long education; innovative and eco-efficient economy; nature as the future capital; spatial development perspective, etc.

Within the framework of the sustainable model the only possibility for successful response to global challenges is to shape such development policy where the necessity to promote economic growth, to improve the quality of life of every member of the society, the necessity to ensure social integration and safety, and also the necessity to safeguard ecological environment for the next generations are in balance. The establishment of an environmental education programme proposing changes and laid down in the Strategy should also be mentioned as a significant solution. Successful introduction of a sustainable policy is not possible without educating and raising of awareness of the public. Thus, it is also emphasised in the Strategy that the environmental education may become a significant promoter of sustainable lifestyle by educating the pupils and their parents regarding the necessity and possibilities to change their everyday practice, and also to promote their participation in activities of a sustainable lifestyle. It is strategically important to establish environmental education programmes where theoretical knowledge of pupils is supplemented with practical activities in tidying up the local environment and renovation of the nature capital. It must also be taken into account in promoting the development of the alternative fuels infrastructure upon informing and explaining the necessity of such choice to the public and its contribution for the environment.

In respect of transport it is specified in the Strategy that, taking into account the global trends, the demand on easy, quick, cheap, environmentally friendly and safe transport connections between countries and within them will increase significantly in the future. Thus, the Strategy emphasizes the planning and development of the transport infrastructure, and also the public transport. It is specified in the Sustainable Development Strategy of Latvia until 2030, Latvia 2030, that the use of biofuel in the public transport and agriculture should be promoted in Latvia. Also, in order to reduce environmental pollution and consumption of fossil energy resources, transition of the public transport and private road transport to electric drive, biogas, and cars equipped with engines driven by biofuel and hybrid engines should be promoted.

In 2014 the *Environmental Policy Guidelines for 2014-2020* were approved in Latvia which bring forward measures in order to achieve the overarching objective - to ensure the possibility for the inhabitants to live in a clean and arranged environment by implementing the activities performed for sustainable development, preserving the environmental quality and biodiversity, ensuring sustainable use of natural resources, and also participation of the public in decision-making and awareness regarding the environmental situation. In order to achieve higher national and international objectives of environmental quality, new actions must be taken and new performance indicators must be achieved until 2020. Also such sustainable development measures as saving and more efficient use of resources, green procurement, introduction of a deposit system, etc. must be emphasised amongst national interests in the new policy period.

The *Transport Development Guidelines for 2014-2020* bring forward an objective to ensure a competitive, sustainable, co-modal transport system which guarantees mobility of high quality by using the resources efficiently - including the EU funds. A range of priorities is defined in this document until 2020 which is directly or indirectly related to the settings of the energy policy. These priorities are: railway electrification (to increase the length of electrified

railway lines by 20 %), and also aid to sustainable transport (for example, electromobility). The TAP2020 includes the setting that sustainable transport must be as non-polluting as possible. In accordance with the Law on Public Transport Services, in planning routes of a regional route network of inter-urban significance with large passenger flow, the routes along railway tracks should be created at first. They clearly identify already that in respect of road transport we should be aware that termination of the use of "traditional fuel" vehicles (vehicles with petrol or diesel engines) should be compensated with a wider use of environmentally friendly vehicles of another type (EV, hybrid vehicles, FCEV, vehicles driven by compressed air). However, now and during the following years purchase of such "green" vehicles will be significantly more expensive than purchase of traditional vehicles. Whereas the objective is closely related to the financial possibilities of the public, the State holds less instruments to make any effect on it or they are less efficient. However, such measures for reducing emissions as energy efficiency of vehicles and reduction of fuel consumption are implemented to a greater extent, and they often are friendly measures in terms of money.

It should be noted that the transport policy already implemented by Latvia is mostly directed towards the establishment of competitive and resource efficient transport system. However, the planned measures are always assessed from the point of view of commensurability of environmental and economic needs and possibilities.

1.5. Characterisation of the Situation in Latvia in the Context of Alternative Fuels

The spread of vehicles driven by alternative fuel is not large in Latvia, and it may be mainly explained by the lack of alternative fuels regulations and aid, thus not promoting their wider use. The assessment carried out by the local government of Riga City for promoting alternative fuels in its territory may be mentioned as a positive example. Thus, for example, one of the priorities in Riga planning region development documents "RPR Sustainable Development Strategy for 2014-2030" and "RPR Development Programme for 2014-2020" is the development of internal transport of towns and their connections in relation to the development of electric transport and use of alternative fuel types (biodiesel, hydrogen, ethanol, liquefied natural gas, etc.) in the transport sector. However, unfortunately it must be concluded that no strategic documents have been developed in other local governments for promoting deployment of alternative fuels, except the local government of Limbaži municipality and the local government of Riga already mentioned⁷².

In respect of liquefied petroleum oil, there are approximately 7 % of vehicles driven by such fuel in Latvia. The liquefied petroleum oil refuelling infrastructure is sufficiently developed in Latvia. Now more than 30 refuelling stations are available which covers the entire territory of Latvia (figure No. 6).



Figure 6. Liquefied Petroleum Oil Refuelling Stations in Latvia. Source: Latvijas propāna gāze Ltd.
<http://www.lpg.lv/lv/autogaze/interaktiva-karte/?full=1>

1.5.1. Electricity

By now several measures for promoting electric mobility have been implemented in Latvia. On 26 March 2014 by Cabinet Order No. 129, On the Electromobility Development Plan 2014-2016 (hereinafter - Cabinet Order No. 129), the Electromobility Development Plan 2014-2016 (hereinafter - the EMDP) was approved which provides for specific aid policy directions in respect of its most significant elements: spread of EV, construction of a charging station network, aid for the development of innovative products, and also educating of the public and ensuring of access to the information regarding electromobility. The EMDP was established on the basis of technical development and situation on the market at that time. It must be indicated that since the development and approval of the EMDP changes in the electromobility process have occurred - more than 200 EV have been registered in Latvia which gives a possibility to summarize the use habits thereof. During this time period new technologies have been introduced which may be used for the establishment of the EV charging infrastructure, and also new future oriented projects are implemented in the world.

According to the abovementioned order the SJSC Road Traffic Safety Directorate (RTSD) established the Electromobility Management and Co-ordination Division (EMCD) the main tasks of which are to ensure introduction of electromobility in Latvia, to develop proposals for determination of future directions of development and the necessary amendments to laws and regulations, to ensure acquiring the experience of European and other countries, to ensure availability of the information regarding current events, to participate in measures promoting electromobility, and to keep track of the latest trends and technology development in this field, and also other tasks in accordance with Cabinet Order No. 129. Since the time of establishment the EMCD ensures the functions of introducing electromobility and implements the tasks related thereto, and also provides reports to the Ministry of Transport on the works carried out.

On 3 November 2015 Cabinet Regulation No. 637, Regulations Regarding Implementation of the Specific Aid Objective 4.4.1 "To Develop an EV Charging Infrastructure in Latvia" of the Operational Programme "Growth and Employment", (hereinafter - Cabinet Regulation No. 637) were adopted the objective of which is to ensure introduction of the specific aid objective of the Operational Programme "Growth and Employment" and to provide for aid of the

European Regional Development Fund (hereinafter - the ERDF) for the establishment of the EV charging infrastructure on national level by ensuring the use of EV in the entire territory of Latvia and thus preventing the restriction of EV driving distance. The Central Finance and Contracting Agency invited the RTSD to prepare and submit the application for the project co-financed by the ERDF, and on 11 April 2016 an agreement on implementation of the project "Establishment of the Electric Vehicle Charging Infrastructure" was entered into.

By implementing the specific aid objective in conformity with the EMDP, the establishment of the national EV charging infrastructure is planned in two stages: in the first stage charging stations will be deployed on TEN-T roads in Latvia. In this stage when selecting a particular place for a charging station, priority shall be given to the location of charging stations in order to ensure the possibility for EV to move in the entire territory of the country on TEN-T roads. In the second stage charging stations will be established on regional roads connecting TEN-T roads and populated areas with the number of inhabitants above 5000. Before installation of charging stations it is intended to carry out research by developing a plan for deployment of the charging infrastructure. Cabinet Regulation No. 637 provides for a specific aid which must be implemented by 31 December 2023, reaching the following indicators for the objective:

- ✓ outcome indicator - the number of installed EV charging stations - 235⁷³;
- ✓ performance-based result - the number of registered EV in Latvia - 747;
- ✓ financial indicator - certified expenditure in the amount of EUR 3,490,000 until 31 December 2018. The total financing applicable to the specific aid is EUR 8,344,235, including the ERDF financing - EUR 7,092,599 and the State budget financing - EUR 1,251,636.

The interim assessment of the EMDP was carried out in July 2015 where the results achieved by the measures for promotion of electromobility and practical results to be implemented in the nearest future were indicated:

- ✓ from 1 January 2016 EV are granted special State vehicle registration number plates;
- ✓ from 1 January 2016 EV which are equipped with State vehicle registration number plates of special significance, are permitted to drive along the lanes intended for public transport.

Also several tax reliefs are determined for the owners of EV in Latvia:

- the vehicle operation tax is not applied to EV;
- EV has a reduced company car tax rate - EUR 10.00 per month;
- the first-time registration of EV, registration by receiving the State vehicle registration number plate of special significance for the first time, and the first set of such number plates are free of charge;
- free-of-charge parking lots are established for the support of EV users, and also reliefs have been determined for driving in paid areas;
- from March 2015 EV can be parked free of charge on parking lots under the management of the local government of Liepāja;
- from 1 July 2016 EV may be parked free of charge on parking lots under the management of Rīgas satiksme, the company of the local government of Riga;
- the possibilities to use EV free of charge in the paid area in the territory of the local government of Jūrmala have been implemented.

It was concluded in the interim assessment that the development of technologies related to electromobility is rapid and the technologies to be used in the development of EV charging infrastructure must be as efficient, progressive and innovative as possible. Now the main aid measure of electromobility development is the establishment of the EV charging infrastructure because without suitable and freely accessible EV charging infrastructure a rapid growth in the number of registered EV is not possible. The planned national charging infrastructure will help to reduce concerns of the potential EV buyers regarding the negative factors of this mobility solution. Direct aid for the purchase of EV is also a significant aid measure for the development of electromobility and, as one of the ways of implementing direct aid, is within the framework of the new State budget programme that should be implemented after completing the first stage of the EV charging station network of national level. In Latvia it is necessary to determine aid for the purchase of electric vehicles on the basis of the following basic principles:

1) Aid covers the difference of current economic expenditure, and also the deficiencies incurred to their users the main of which is insufficient charging infrastructure which currently is at the stage of development. With the aid of the European Regional Development Fund it is intended to establish a charging station network of national level for electric vehicles in the following years, ensuring a possibility to use electric vehicles in the entire territory of Latvia and eliminating the driving distance limitation, thus promoting the use of environmentally friendly vehicles.

2) Aid is provided to electric vehicles which are completely driven by electric motor and for charging of which external source of electricity is necessary (Battery Electric Vehicle or BEV).

3) Taking into account the development of technologies and reduction in prices, it is intended that during the following years the difference in prices between electric vehicles and internal combustion vehicles could reduce, thus the aid is also reduced each year proportionally.

According to European experience and previous attitude of car manufacturers, increase in the number of electric vehicles could begin in the country (and as a result - aid is also provided) only if a clear State policy is defined in the country, the charging infrastructure is established, and the necessary informative measures are carried out for introduction of electric vehicles on the market. In accordance with the Electromobility Development Plan for 2014-2016 the abovementioned criteria are reached in 2016. Therefore, concurrently Latvia should start the provision of aid for the purchase of electric vehicles by determining the actual amount of aid according to the purchase prices of electric vehicles, and also the costs of electricity and fossil fuel.

In 2017 the financial difference according to the current difference of the total life cycle costs between electric vehicles and internal combustion vehicle at the average run in Latvia of approximately 15,000 km a year is EUR 7000. Aid should be gradually reduced, taking into account that prices for electric vehicles and internal combustion vehicles are gradually equalized. Thus, in 2018 the aid rate for one vehicle is EUR 7000 (the total amount necessary for aid EUR 1,504,000, electric vehicles form 1.2 % of the new car market), in 2019 - EUR 5000 (the total amount necessary for aid EUR 1,056,000, electric vehicles form 1.5 % of the new car market), and in 2020 - EUR 3000 (the total amount necessary for aid EUR 640,000, electric vehicles form 2.5 % of the new car market).

The investments made hitherto for establishing the infrastructure of EV fast charging stations in Latvia are applicable to implementation of the open tender of project applications "Reduction of Greenhouse Gas Emissions in Transport Sector, Aid for EV and Deployment of Their Infrastructure" of the Climate Change Financial Instrument (CCFI) within the framework of which 12 charging stations were installed - seven in Riga and one in Sigulda, Ogre, Gulbene, Tērvete, and Talsi Municipality. Establishment of the EV charging infrastructure is one of the most important tasks to be performed in order for the development of electromobility to be possible.

In relation to establishment of the national EV charging infrastructure research was carried out in 2015 regarding development of the placement of 60 fast charging stations on TEN-T roads where optimal placement sites were found for the placement of recharge stations of the first stage on TEN-T roads. In order to determine the placement of charging stations on regional roads connecting TEN-T roads, it is planned to carry out a separate research.

Being aware that, from the time of developing the EMDP, the circumstances in electromobility have changed as a result of technological development, one more research "Analysis of the Establishment of the Latvian National Electric Vehicle Charging Network" (hereinafter - the EV charging network research) was carried out in order to find out

whether the conditions of the second stage of establishment of the national charging network are still of significance and whether the development concept drawn up initially conforms to the situation of the following years based on the latest information available now.

It was concluded as a result of the EV charging network research that in order to ensure the conformity of the charging network with the regional policy conditions of Latvia, EV technical parameters and their development, and also charging network would ensure quick renewal of EV mobility, and its coverage - the use of EV throughout Latvia, it should be intended to install only direct current fast charging stations in the charging network (capacity at least 50 kW) instead of alternating current charging stations planned previously. The criteria for the number of fast charging stations have also been defined in the EV charging network research, providing for such number and placement of charging stations as to achieve that EV may freely move within urban/suburban agglomerations and other places of dense population. The distance criteria for charging stations on both TEN-T roads and regional roads remain the same as specified in the EMDP⁷⁴ ensuring free movement of EV between development centres of national and regional significance.

Taking into account the fact that it is not possible to mathematically calculate the number of charging stations using the total length of roads and the distance criteria, but the road network configuration (outline, crossroads, geographical location of populated areas, etc.) plays a significant role, the number of charging stations necessary in the charging network according to the installation criteria for charging stations defined in the research was determined using the method of geographical modelling. Upon determining the placement of charging stations, the placement of stations specified in both the research "Research on Placement of 60 Fast Charging Stations on TEN-T Roads" and the investments previously made in the establishment of the infrastructure for EV fast charging stations were taken into account - the placement of five direct current fast charging stations (three direct current fast charging stations in Riga and one in Ogre and Gulbene each) installed within the framework of implementation of the open tender of project applications "Reduction of Greenhouse Gas Emissions in Transport Sector, Aid for EV and Deployment of Their Infrastructure" of the CCFI.

Whereas the criteria defined in the EV charging network research are overlapping and contain each other, for example, charging stations must be installed in both populated areas on regional roads and in populated areas according to the number of inhabitants, optimisation of the number of charging stations was carried out using the method of geographical modelling. Upon carrying out the analysis of the potential number of charging stations and taking into account the abovementioned regarding the impact of the road network configuration on the number of stations, first of all, the fast charging stations installed within the framework of the CCFI project and the location of 55 charging stations already installed on TEN-T roads were marked when developing the map for placement of charging stations. The planned charging stations in populated areas with the number of inhabitants above 5000 were gradually marked as the next ones. The provisional number of charging stations on other regional roads was determined according to the distance criterion, primarily placing them in populated areas and thus filling in the missing road sections. Duplicating stations were excluded from the map. After determination of geographical places on the map it was concluded that the necessary number of charging stations in the charging network is 155. Taking into account the investments already made until now in the establishment of the EV fast charging station infrastructure - five direct current fast charging stations installed within the framework of the CCFI project thus creating the national charging network of Latvia, it is necessary to install 150 more direct current fast charging stations, however, the availability of each particular place should be taken into account. In 2017 an in-depth research will be carried out on the places of installation of direct current fast charging stations in the development centres of national and regional significance and in the regional road network.

Upon carrying out the research "Research Regarding Placement of 60 Fast Charging Stations on TEN-T Roads", a feasibility study was developed for each place of installation of a charging station after compilation and assessment of which indicative installation costs of charging stations were obtained - for both the alternating current and direct current charging stations which consist of the costs for establishment of electrical connection within the electrotransmission network of JSC "Sadales tīkls" and the construction costs of the place for installation of a charging station (construction of post-accounting cable line, designing, base construction, video, road signs, etc.). After having researched the prices of the available charging stations and having assessed the prices of charging stations installed within the framework of

the CCFI project, the indicative prices for charging stations have been determined. The costs for installation of charging stations - both alternating current and direct current - are compiled in Table 3.

Costs for Installation of Charging Stations

Table 3

	Amount in EUR (including VAT)	
	Alternating current 22 kW	Direct current 50 kW
Costs for the establishment of electrical connection JSC Sadales tīkli	2802	6502
Costs for the construction of the place for installation of a charging station	9305	10,235
Costs for the installation of security systems	823	823
Costs for a charging station	13,730	36,300
In total for one charging station (including VAT)	26,660	53,860

Source: RTSD

The total estimated costs for the establishment of the charging station network, including the costs for the necessary research work and development of a management and monitoring system, are compiled in Table 4, concurrently comparing the costs for the establishment of the network upon installing alternating current and direct current charging stations and the costs for installing only direct current charging stations.

Comparison of Costs for the Establishment of a Charging Station Network

Table 4

Type of a charging station	Electromobility Development Plan for 2014-2016		Alternative Fuels Development Plan for 2017-2020
	Alternating current up to 22 kW	Direct current up to 50 kW	Direct current up to 50 kW
Costs for the establishment of electrical connection AS Sadales tīkli	2802	6502	6502
Costs for the construction of the place for installation of a charging station	9305	10,235	10,235
Costs for the installation of security systems	823	823	823
Costs for a charging station	13,730	36,300	36,300
In total for one charging station (including VAT)	26,660	53,860	53,860
Number of stations	168	67	150
Total costs for the installation of charging stations	4,478,880	3,608,620	8,079,000
Costs for research regarding installation sites of charging stations of the first and second stage	100,000		100,000
	121,700		121,700

Costs for the development of the management and monitoring system		
Other costs (IIA, publicity, etc.)	35,035	43,535
Total	8,344,235	8,344,235

Source: RTSD

Upon providing for only direct current fast charging stations according to the installation criteria provided for in the research, it will be ensured that the financing granted for the establishment of the charging network is invested in more efficient, progressive and innovative way, because higher level of EV charging services will be ensured. Operation of a fast charging station ensures renewal of mobility of each individual EV user significantly faster (95 % of EV charging lasts up to 35 minutes) in comparison to the performance of alternating current charging stations (duration of an individual EV charging is approximately 3 hours). It means that a network of charging stations which consists of 150 direct current fast charging stations is able to recharge up to 257 electric vehicles, but a charging network created according to the criteria specified in the EMDP could service not more than 170 electric vehicles within one hour with direct and alternating current charging stations. Upon comparing these parameters of exploitation of the EV charging network (Table 5), a conclusion may be drawn that 150 fast charging stations ensure significantly higher level of customer service and greater number of EV recharges in one time unit.

Comparison of Efficiency of Charging Stations

Table 5

	Electromobility Development Plan for 2014-2016		Alternative Fuels Development Plan for 2017-2020
Type of a charging station	Alternating current up to 22 kW	Direct current up to 50 kW	Direct current up to 50 kW
Type of connection	Type 2	<i>Combo2, CHAdeMO</i>	<i>Combo2, CHAdeMO</i>
charging time per one EV	up to 3 h	up to 35 min	Up to 35 min
Theoretical number of recharges of one station in an hour	0.33	1.71	1.71
Number of stations	168	67	150
Theoretical number of recharges of all stations in an hour	55	115	257
	170		

Source: RTSD

It must be indicated that as a result of the research on the EV charging network several conclusions regarding EV and the development of electromobility in Latvia were made:

- Upon performing a survey of EV users of Latvia, and also upon analysing the results of researches carried out elsewhere in the world, it has been concluded that the EV charging infrastructure must be created using fast charging stations that would ensure charging of the EV battery within a shorter period of time. In order to recharge EV batteries according to the technological possibilities within as short period of time as possible, large capacity direct current charging stations are necessary. Fast direct current charge for the EV present in the market of Latvia is possible for 90.8 % of the models.

- Although costs for each individual direct current charging station are comparatively higher than the previously planned costs for alternating current charging stations, the charging stations of greater capacity ensure faster EV battery recharge, thus ensuring a higher-quality service for each individual user of the EV charging infrastructure (significantly faster renewal of EV mobility) which is the main objective of the national EV charging infrastructure. Thus,

the overall efficiency of the national EV charging infrastructure is concurrently increased (increased number of mobility renewing EV within a certain time unit).

- The EMDP determines that in populated areas with the number of inhabitants above 5000 inhabitants one charging station per each 1000 inhabitants must be installed. It has been concluded in the research on the EV charging network that such condition for placement is not justified and it is necessary to differentiate the number of stations to be installed according to the total number of inhabitants in the populated area.

- Currently in Latvia EV are not used for cross-regional journeys, however, EV users would be ready to do it, provided that easy and smooth coverage of EV charging stations is available in Latvia. An EV charging network only on TEN-T roads does not ensure smooth coverage in the entire territory of Latvia. Therefore, in order to ensure the possibility for an EV user to get to and return from the development centre of national or regional significance, it is necessary to establish EV charging stations not only on TEN-T roads but also in each of 30 development centres of national and regional significance.

- Upon assessing distances between the development centres of Latvia of national and regional significance, and also upon taking into account the previous conclusion that charging stations must be located in each development centre of Latvia of national and regional significance, the distance between EV charging stations on regional roads to the abovementioned centre must be approximately 50 km. It is recommended to install EV charging stations in populated areas, in such case the tolerance of ± 25 km is permitted.

- In order to ensure fast EV charging, a charging network that is easily available to EV users, the use of the direct current charging standard *CHAdEMO* and *Combo2* (CCS) must be intended. The third most widespread large capacity standard of direct current may be ensured by using a transition to the *CHAdEMO* standard. In addition to the possibility of direct current charging, it is also necessary to provide for alternating current recharge of 22 kW in order to ensure charging of virtually any EV.

- In the future the capacity of batteries will increase and EV runs with one recharge will be longer. The possibilities for at least twice as large charging capacity are currently already being developed for the standards *CHAdEMO* and *Combo 2* (CCS). Therefore, upon creating the EV charging network, its connection capacities should be planned in perspective by installing the charging stations currently available on the market with the largest charging capacity possible, concurrently providing for the increase in capacity for these stations to the extent possible.

- The development intensity of the infrastructure or the density of charging stations should directly depend on intensity of the transport traffic and comparative density of economic activities of the particular area. It means that no additional large number of fast charging stations is necessary after establishment of the network of fast charging stations in a local (town, populated area) charging network for further improvement of the EV charging network upon increase in the number of EV and according to experience of other countries, but a comprehensive network of charging devices which would ensure a possibility to recharge at any EV stop (*opportunity charging*) is necessary. Usually the construction of such EV charging stations is ensured by a local government together with entrepreneurs - shops, coffee-bars, etc. where it is lucrative to attract customers in such a way.

- According to the abovementioned conclusions the following proposals were brought forward in the research:

- to install only direct current fast charging stations in the EV charging network of national level (with the capacity of at least 50 kW);
- for the criteria for the number and placement of charging stations in the EV charging network of the national level;
- to adjust the number of stations according to the criteria developed, installing up to 150 direct current charging stations in the national network of EV charging stations without changing the financing granted, thus investing it in a more efficient, progressive and innovative way.

Currently scepticism is observed in respect of the use of EV for cross-regional journeys, however, according to the research on the EV charging network, the EV users would be ready to make such if easy and smooth coverage of EV charging stations would be available in Latvia. In order for the number of registered EV to increase concurrently with

the development of the EV charging infrastructure, different aid programmes for EV purchase are necessary which would promote the spread of such vehicles.

Development of electromobility is still hindered by several specific factors of which one of the most significant ones is limited charging possibilities at night, because large part of inhabitants is mostly living in multiapartment houses, urbanised environment is not only in Riga, but also in other development centres of national and regional significance where currently there is no EV charging infrastructure. Exploitation costs have a significant impact on the selection of the charging station which have increased in Latvia along with the new electricity transmission tariffs, and also the fact that EV purchase prices are still high should be taken into account as it has caused incorrect notion regarding EV in the society.

However, it should be noted that according to the survey data carried out in 2013 by local government institutions and local government undertakings of Zemgale region the run of EV with one charge up to 100 km is acceptable for part of car users in Latvia, because 25 % of the total number of car users surveyed drives up to 100 km per day.⁷⁵ Also it was concluded in the research "Informing and Attitude towards Electric Transport" carried out in Latvia in 2016 that 8 % of inhabitants of Latvia would purchase EV if it could drive at least 100 kilometres with one charge⁷⁶.

1.5.2. Natural gas and biomethane

The supply system of natural gas of Latvia is not directly connected to the systems of other EU Member States, except Lithuania and Estonia. But since the Klaipeda Liquefied Natural Gas Terminal is operating, there is a possibility to receive natural gas not only from Russia, but also from other countries.

The main way for supply of natural gas to consumers of Latvia is transmission pipeline networks which are branching from Yamala - the European gas line in the Tver region in Russia, to St. Petersburg, Pskov and further to Estonia, Latvia. Transmission natural gas networks of the Baltic States are well developed and their capacity to ensure stable supplies is increased by Inčukalns underground gas storage facility the capacity of which is 2.3 billion m³ of active gas. Inčukalns underground gas storage facility is the only functioning storage facility in the Baltic States, and it ensures the stability of regional gas supply⁷⁷.

At the beginning of 2015 a liquefied natural gas terminal was put into service in Klaipeda (Lithuania), thus, there is a possibility to purchase liquefied gas delivered by ships and to improve the situation even more in the field of gas supply safety⁷⁸.

In Latvia several LNG terminals are planned by merchants, and currently the State is not planning to involve in implementation of the abovementioned measures. Innovative solutions have been developed in Latvia in order to ensure the use of liquefied natural gas in transport, including also in the field of road transport refuelling technologies. Compressed natural gas refuelling device (an individual refuelling device which may be installed by each natural gas user at his or her own home) may be mentioned as an example where natural gas is taken from the natural gas distribution network connection point, compressed and filled in a road transport fuel tank. However, such natural gas refuelling device is comparatively expensive and could pay off if it is used for the vehicle fleet by some undertaking. In Latvia such technology is established and tested within the framework of a pilot project. A mobile refuelling system of compressed natural gas included in the pilot project is intended for simultaneous (parallel) refuelling of the buses driven by compressed natural gas present in the Jurmala bus depot. According to the data provided by the project, the use of mobile refuelling station of compressed natural gas has given 40 % saving of financial means compared to the costs of diesel fuel⁷⁹.

However, it must be admitted that until now the use of natural gas in Latvia in the field of transport has been very poorly developed, because until now it has not been either a State strategy or aid for natural gas as the type of fuel for use in transport. There is no publicly available CNG and LNG refuelling station in Latvia. In accordance with Section 15.¹, Paragraph two of the law On Excise Duty the excise duty for natural gas as the fuel type is EUR 99.6 for 1000 m³. One of the measures for promoting the use of natural gas as fuel would be to review its excise duty.

Also upon assessing the establishment of traditional CNG refuelling stations in Latvia discussed in Chapter 1.2.2 within the context of planning of the infrastructure network development, it should be taken into account that usually such connection is possible only at a place where there is the relevant natural gas system (Figure 7). Thus, when choosing this solution, additional measures should be intended for providing Kurzeme region with CNG refuelling stations.

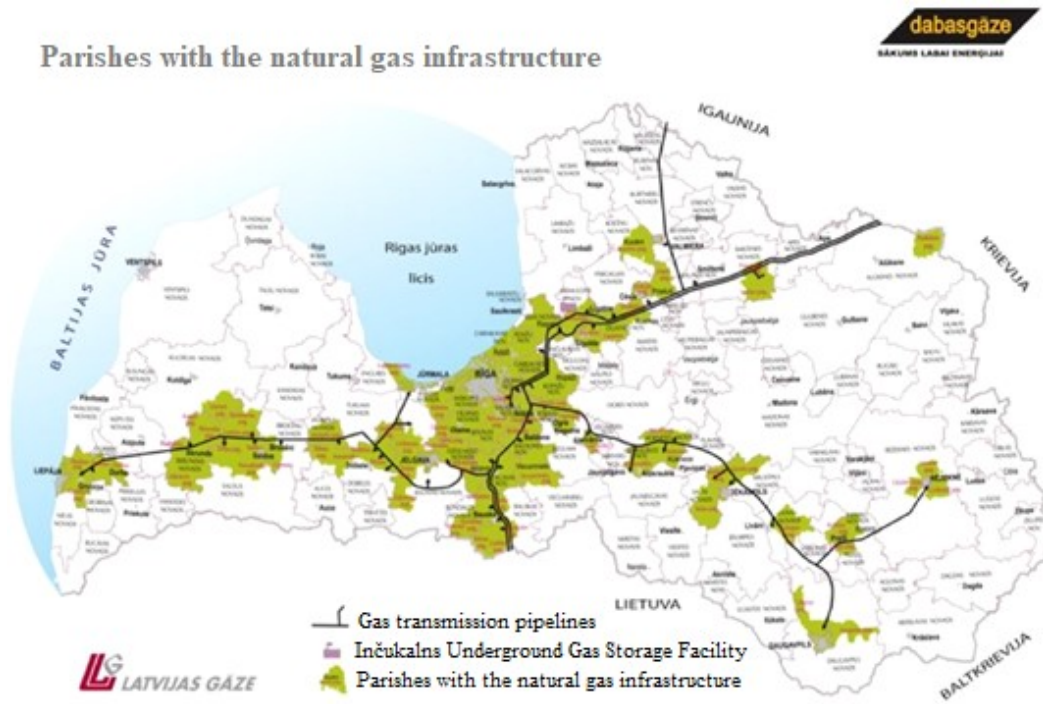


Figure 7. **Natural gas system in Latvia.** Source: JSC Latvijas Gāze

There are 59 biogas stations in Latvia now. Currently biomethane is mostly used for the production of electricity, but it would be gainful to use it also in transport. According to the calculations it was concluded that transformation of biogas into biomethane in the field of transport is more cost-effective in terms of economy than combustion of biogas at a local co-generation station by comparing income which could be obtained when transforming biogas into electricity and transforming biogas into biomethane for fuel⁸⁰. As indicated by the Latvian Biogas Association, the biogas network is often placed close to the natural gas network, however, entering biogas into the natural gas network is prevented by the many private territories and deficiencies in the present laws and regulations which provide for extremely strict requirements for the quality of biomethane which are practically impossible to be conformed to⁸¹. However, it should be indicated that special quality requirements have not been specified for biogas and the abovementioned requirements apply to a system user when entering all types of gas into the system, including biomethane. Thus, the requirements in respect of entry into the system are equal for all users (including for producers of biomethane) and they are intended in order for the system operator to ensure the supply of fuel gas of appropriate quality to the end-user. Otherwise the user has the right to bring an action against the system operator regarding non-conforming goods - the fuel gas supplied.

In Latvia biogas stations receive aid within the framework of a mandatory procurement for the electricity produced, and the first of such stations stops receiving aid only in 2022.

1.5.3. Hydrogen

The local government of Riga has joined the European Association for Hydrogen and fuel cells and Electro-mobility (HyER) and is participating in several international projects which are related to introduction of FCEV, including in the project which provides for the placement of public hydrogen refuelling stations in Riga.

In 2015 Rīgas satiksme, the company of the local government of Riga, participated in several EU co-financed projects related to promoting the use of hydrogen in transport:

- "Commercialisation Strategy of Hydrogen Fuel Cell Buses in Europe *NewBusFuel*". Engineering solutions for a hydrogen refuelling station of city public transport depot;

- "*HiT2-Corridors*" - corridors of hydrogen infrastructure for transport;

- "*H2 Nodes*" establishment of hydrogen as transport refuelling infrastructure within the framework of TEN-T main network corridor *North SEA - BALTIC*. Within the project "H2 Nodes" such cities as Arhem, Rotterdam, Amsterdam, Riga, Parnu, and Kaunas have participated.

1.5.4. Biofuel, synthetic and paraffinised fuel

The proportion of biofuel in consumption of primary energy resources of Latvia was small in 2014 and corresponded only to 1.0 PJ that is by 0.06 PJ more than in 2013⁸².

Currently the second-generation biofuels which are produced from waste, residues, non-food cellulose raw materials, and lignocellulosic raw materials, are not produced and used in Latvia.

Hitherto several aid measures have been carried out for promoting the use of biofuel:

- in 2005 the Ministry of Agriculture developed and implemented the State aid programme "Aid for Production of Biofuel" (N 540/2005; N 254/2007 as amended, and N 26/a/2010 as amended) within the framework of which State aid was provided (quotas to be financially supported) for the production of biofuel during the time period from 2005 to 2010;

- in accordance with the law On Excise Duty reduced rate of excise duty has been applied to biofuel (B100) from 1 May 2004, in turn the rate of excise duty has also been reduced for biofuel with fossil fuel mixture (E85) from 1 July 2007;

- starting from 1 October 2009 the mandatory admixture of 5 % biofuel to fossil fuel has been introduced⁸³.

However, regardless of the implemented direct (quotas to be financially supported for the production of biofuel) and indirect (reduced rates of excise duty for biofuel and mixtures of biofuel and fossil fuel) State aid measures, the objective laid down in the Biofuel Law that by 31 December 2010 biofuel must form not less than 5.75 % of the total amount of fuel existing in national economy intended for transport, was not achieved⁸⁴.

Concurrently, upon planning promotion of biofuel development, the increasing topicality of the use of agricultural land for the production of bioenergy (including biofuel) on international and, especially, on European Union level should be taken into account as a result of which indirect land use change (ILUC) is promoted. Upon using land which is suitable for agriculture for growing energy crops, the food provision is endangered, therefore, the need to produce the food elsewhere arises, often resulting in deforestation. As a result of the ILUC significant deforestation of tropical rainforests is observed in the world.

E85 fuel is sold only in four refuelling stations in Latvia which is sold by LUKoil Baltija R.

Neste Latvia Ltd. is offering the product Neste Pro Diesel which, as indicated by the trader, contains 15 % of hydrogenated vegetable oil (HVO) that is obtained by hydrogenating different products of plant and animal origin - palm oil, animal and fish fat residues, canola and soya oil, algae, microbes, and other raw materials⁸⁵. The abovementioned product may be acquired at 36 largest Neste Latvia Ltd. refuelling stations⁸⁶.

1.6.1. Road transport

In Latvia there is the fourth oldest vehicle fleet in EU where the average age of the registered vehicles in 2016 was 13.95 years (for passenger vehicles 14.19 years), in turn, the average age of vehicles in technical order (with technical

inspection) was 12.92 years (for passenger cars 13.17 years). The average age of EU vehicles in 2014 was 9.7 years⁸⁸.

It must also be pointed out that 92 % of the vehicle fleet consists of vehicles driven by fossil fuel (petrol, diesel fuel) that is the main source of GHG emissions⁸⁹. As of April 2016, the number of vehicles in technical order (with technical inspection) were 727,788 whereof 584,255 were passenger cars, 73,432 - truck vehicles and 4116 - buses⁹⁰.

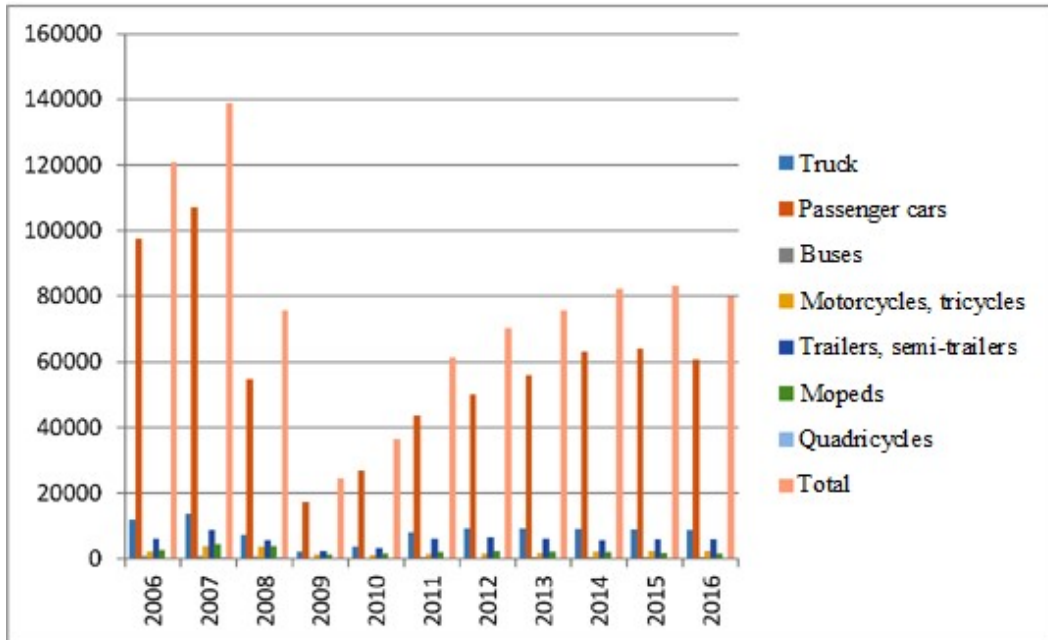


Figure 9. **Number of Vehicles Registered for the First Time from 2006 to 2016.** Source: Statistics of the RTSD

According to the statistics of the RTSD regarding vehicles registered for the first time during the time period from 2006 to 2016, a significant decline in the number of passenger vehicles registered for the first time was observed in 2009, and it may be explained by economic crisis. However, from 2010 the number of passenger cars has a tendency to gradually increase, and it will most probably continue in the following years. The situation is slightly different if we look at the general picture of registered vehicles and vehicles in technical order (Figure 10) where the difference between vehicles in technical order and registered vehicles is approximately 1000 vehicle units for truck vehicles up to 10,000 for passenger cars. However, regardless of these differences, over the years an ascending tendency is observed for the number of vehicles in technical order. Taking into account the abovementioned tendency, as well as that indicated in Table 6 on the spread of vehicles according to the type of fuel, it may be concluded that Latvia will face significant problems in respect of reducing the environmental impact caused by transport.

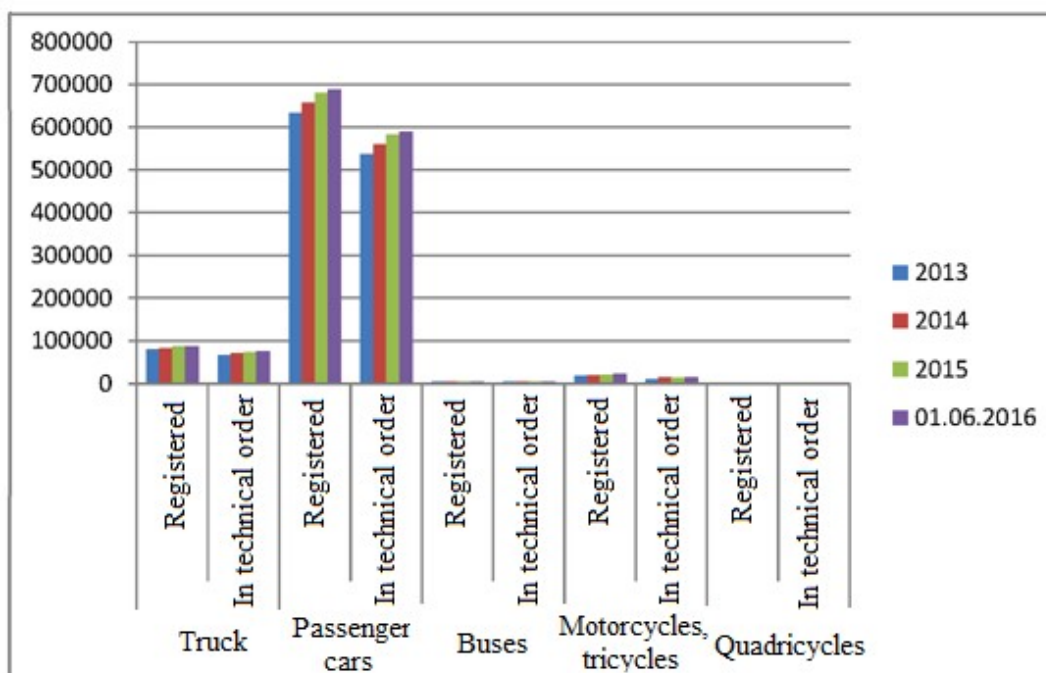


Figure 10. **Registered Vehicles and Vehicles in Technical Order during the Time Period from 1 June 2013 to 1 June 2016.** Source: Statistics of the RTSD

An essential aspect to be taken into account is that in 2016 90.2 % of passenger cars were at the disposal of natural persons and only 9.8 % - at the disposal of legal persons⁹¹. This is one of the factors to which attention should be paid when determining aid measures for the development of alternative fuels, paying attention to alterations of vehicles, where it is possible, the use of alternative fuels (for example, alteration of a vehicle from a petrol engine to petrol-natural gas (CNG)).

Since 1 January 2016 the RTSD has been carrying out more detailed recording of vehicles according to the type of fuels used by them because previously it was not separated by what type of gas fuel the vehicle is driven, etc.:

Table 6

Engine type	Truck		Passenger car		Bus		Total	
	number	%	number	%	number	%	number	%
Petrol	3518	4.2 %	256,379	38.6 %	32	0.7 %	259,929	34.5 %
Diesel	78,714	93.6 %	355,043	53.5 %	4652	99.1 %	438,409	58.2 %
Gas	21	0.0 %	12	0.0 %	0	0.0 %	33	0.0 %
Electricity and petrol	0	0.0 %	27	0.0 %	0	0.0 %	27	0.0 %
Electricity and diesel	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Electricity	11	0.0 %	241	0.0 %	0	0.0 %	252	0.0 %
Gas generator	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Petrol and gas	1560	1.9 %	45,092	6.7 %	9	0.2 %	46,661	6.2 %
Diesel and gas	24	0.0 %	5	0.0 %	3	0.1 %	32	0.0 %
Petrol and oil gas	200	0.0 %	7291	1.1 %	0	0.0 %	7491	1.0 %
Petrol and natural gas	1	0.0 %	70	0.0 %	0	0.0 %	71	0.0 %
Diesel and oil gas	6	0.0 %	1	0.0 %	0	0.0 %	7	0.0 %

Diesel and natural gas	0	0.0 %	0	0.0 %	0	0.0 %	0	0.0 %
Oil gas	1	0.0 %	5	0.0 %	0	0.0 %	6	0.0 %
Natural gas	5	0.0 %	11	0.0 %	0	0.0 %	16	0.0 %
Natural gas and oil gas	6	0.0 %	0	0.0 %	0	0.0 %	6	0.0 %
Total	84,067		664,177		4696		752,940	

Source: Statistics of the RTSD

Thus, it may be concluded that we will face very significant challenges in the introduction process of alternative fuels, taking into account the present situation in the use of fuels in vehicles. According to the abovementioned data in the first half-year of 2016 of all registered vehicles:

- 38.6% of the total number are equipped with petrol engines;
- 53.5% are equipped with diesel engines;
- approximately 7 % are driven by both the gas (liquefied petroleum gas) and petrol;
- 0.03% (252 units) are electric vehicles;
- 0.004% (32 units) are vehicles driven by gas and diesel fuel;
- 0.004% (33 units) are vehicles driven by gas (CNG or LPG);
- 0.003% (27 units) are with electricity and petrol engine ("Plug-in" hybrids, PHEV).

Currently higher excise duty is imposed on petrol than on diesel fuel and gaseous fuels (liquefied petroleum gas, CNG, LNG, etc.). For petrol it forms EUR 436/1000 l, while for diesel fuel EUR 341/1000 l. In the end of 2015, taking into account the changes in fuel prices in the world, the issues related to budget planning and environment, the excise duty for fossil fuel was increased. Until 1 January 2016 petrol was applied EUR 411.21/1000 l, but diesel fuel - EUR 332.95/1000 l. However, also the excise duty is imposed on natural gas which is used as fuel, in terms of costs making the use of natural gas equal to the use of diesel fuel - EUR 99.60 per 1000 m³, if it is used as fuel, in turn EUR 17.07 per 1000 m³ are imposed if natural gas is used as heating fuel.

During the last years the number of EV has increased, and it may be explained by the extensive aid, in turn there are only 25 passenger cars with natural gas, diesel-natural gas and petrol-natural gas engine which indicates that without development of a natural gas refuelling infrastructure and aid measures such type of fuel has no potential for development.

Diesel fuel is an important energy resource for carriage of goods which is a significant sector of economics in Latvia, taking into account the geographical location of Latvia. It should be pointed out that according to the latest researches within the framework of the EU borders, during the last decade, the fuel consumption of trucks has not significantly improved, and it is related to existence of an alleged cartel between the five largest truck producers.

Also according to Table 6 the majority (93 %) of trucks are equipped with diesel engines, thus, alteration of a petrol engine of truck vehicles to a petrol-gas engine as an aid measure will not be effective because, according to the data, vehicles equipped with a petrol engine form approximately 5 % of the total number of truck vehicles, in turn truck vehicles equipped with a petrol-gas engine are almost twice as less - 2.3%. Thus, it may be concluded that alteration of a vehicle from a petrol engine or diesel engine to a petrol-gas or diesel-gas engine is not popular which is mainly explained by the spread of the diesel engine and comparatively more expensive alteration thereof which forms larger costs in comparison to passenger vehicles. More extensive spread of Euro V and Euro VI truck vehicles could be one of the measures for reducing emissions from truck vehicles. The Euro VI requirements are comparatively stricter than the requirements for other classes and, by increasing the number of such trucks, it would be possible to reduce the amount of GHG emissions from such vehicles.

Practically all registered buses (99 %) are equipped with diesel engines. Only 14 buses are equipped with a petrol and gas engine, in turn only three buses - with a diesel-gas engine. As of 1 January 2016 no hydrogen electric bus was registered.

It should also be noted that a significant aspect is the proportion of the oldest vehicles in the joint vehicle fleet. Thus, for example, in Latvia the proportion of vehicles that are older than 10 years, forms approximately 72 % of the total vehicle fleet which is the third highest indicator in the EU (in Lithuania - approximately 85 % and Poland - 75 %).

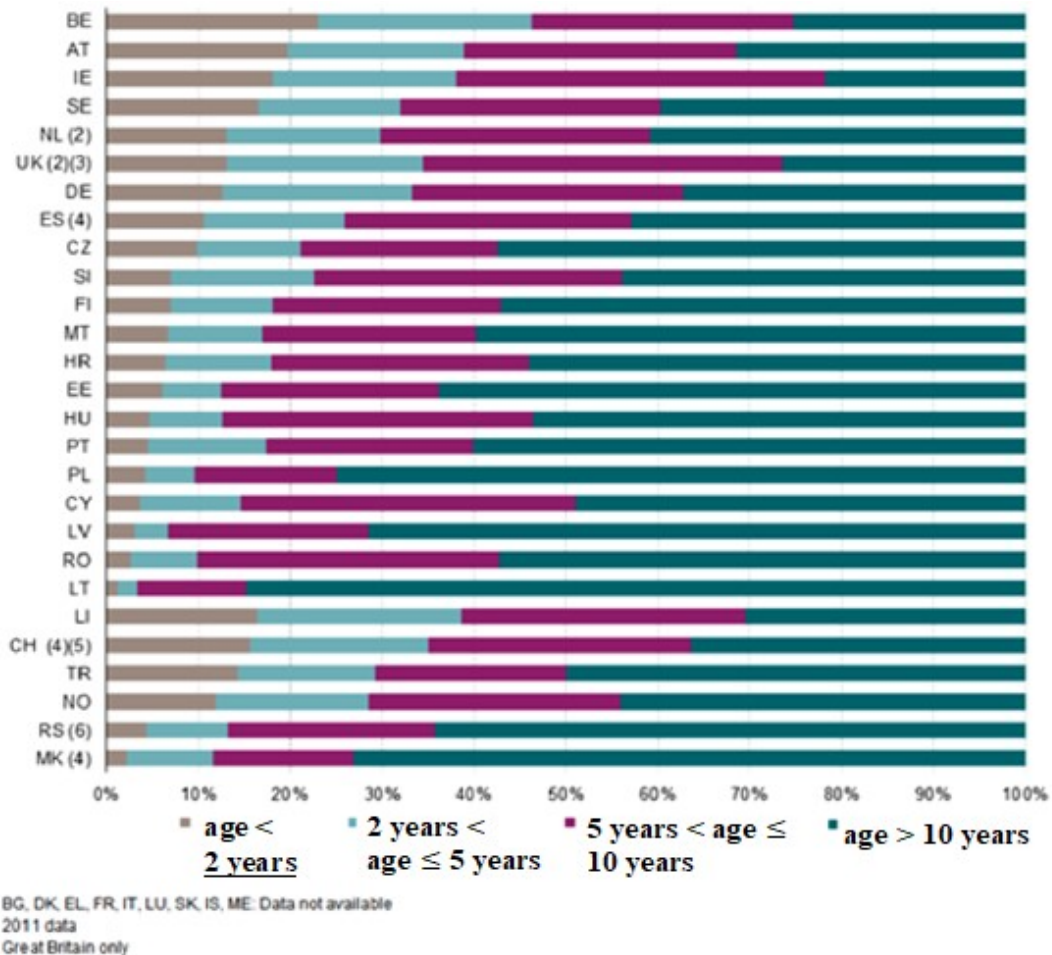


Figure 11. Number of Vehicles by Age Groups in the European Union

Source: EUROSTAT http://ec.europa.eu/eurostat/statistics-explained/images/a/ae/Passenger_cars_by_age%2C_2013_%28%25_of_all_passenger_cars%29.png

In Latvia a vehicle fleet renews slowly as a result of which deployment of alternative fuels and their use will be time-consuming process. Purchase of vehicles driven by alternative fuel is considerably more expensive than purchase of traditional vehicles, therefore, different types of aid measures should be considered, including reliefs for the purchase of vehicles and possible changes in the tax policy in respect of types of fuels. Local governments which may provide aid and reliefs to the owners of alternative fuel vehicles (free-of-charge parking lots, use of public transport lanes, etc.) have a significant role in promoting the use of vehicle driven by alternative fuel. Also at least the largest local governments of Latvia should be encouraged to assess the drafting of the strategy for the development of alternative fuel vehicles and infrastructure in their territories.

The fact that density of the population is low in Latvia - 31 persons/km² which is the fourth lowest indicator in the EU, and that there is a large proportion of small towns and villages (parish centres) should be mentioned as a significant obstacle for the development perspectives of alternative fuels. There are only 76 towns in Latvia 9 of which are cities of State significance, in turn the number of villages (more than 450 inhabitants) was 203 in 2014.

In Latvia the number of inhabitants exceeds 10,000 inhabitants only in 19 towns (of 76). In 2014 32 % of inhabitants of Latvia lived in the countryside.

This indicator significantly influences transport activities, not promoting the development of the public transport and its use, and also determining the large number of passenger vehicles and intense use thereof.

According to the survey "Results of the Survey of Inhabitants of Latvia - Awareness and Attitude Towards Electric Transport" of the Marketing and Public Opinion Research Centre SKDS, the types of movement used most often on a daily basis are on foot (95 %), by public transport (82 %), and by passenger car (74 %). 32 % of the surveyed inhabitants drive a passenger car as drivers every day or almost every day. 9 % drive a car several times a week, but 5 % - once a week or less. 29 % of the surveyed inhabitants indicate that they are not driving a car on a daily basis, but 25 % do not have a driver's licence.

A correlation may be observed between the income level and frequency of movement by a car, namely, upon increase of income the frequency of movement by a car increases.

Also within the framework of the specific aid objective (SAO) 4.5.1 "To develop an environmentally friendly public transport infrastructure" it is planned to provide financial aid to renovation of the bus depot in six cities of Latvia - Jelgava, Jēkabpils, Jūrmala, Rēzekne, Ventspils, Valmiera. It is planned that in these cities priority will be given to buses driven by CNG, hydrogen or electric power.

On the basis of the requirements laid down in Directive 2014/94/EU for the deployment of alternative fuels infrastructure in the field of road transport, an appropriate number of publicly available refuelling points should be established by 2020 in order to achieve that mechanical vehicles driven by CNG may circulate in urban/suburban agglomerations and other densely populated areas and, where applicable, in the networks determined by the Member States, but by 2025 - at least in the existing TEN-T main network in order to achieve that mechanical vehicles driven by CNG may circulate in throughout the EU. Taking into account that laid down in Directive 2014/94/EU that there should be at least 150 km between CNG refuelling station which is determined on the basis of the average run of vehicles driven by CNG, it would be necessary to establish at least five CNG refuelling stations in Latvia in order to conform to the minimum requirements of Directive 2014/94/EU.

On the basis of the models for the establishment of CNG refuelling stations described previously, establishment of a mobile refuelling system could be considered as one of solutions in the case of Latvia, for example, by using *GasLiner* or a similar solution. Concurrently according to the research of JSC "Latvijas Gāze" it is determined that there are approximately 19 refuelling stations in Latvia which would be suitable for the placement of the CNG refuelling equipment. These diesel fuel refuelling stations cover practically the entire territory of Latvia (except the northern part of Kurzeme). However, an additional research is necessary for more complete assessment of possibilities.

In accordance with the requirements of Directive 2014/94/EU the establishment of a hydrogen infrastructure is up to free choice of the Member States, however, taking into account the fact that FCEV does not cause GHG emissions, and also the possibilities of hydrogen acquisition by using both natural gas and electricity, it would be worth to consider the establishment of such infrastructure in Latvia on national scale.

In 2016 no FCEV passenger vehicle was registered in Latvia. Introduction of FCEV in the private sector is prevented by the lack of an infrastructure for this fuel and the costs of technologies in general in the world, however, FCEV is already used in the commercial sector because its economical profitability has been proven.

It is intended within the framework of the project "*H2 Nodes*" that "Rīgas satiksme" Ltd. will introduce trolleybuses in Riga for which diesel engines ensuring backup traction capacity would be replaced with hydrogen fuel element modules of new generation in order to optimize the public transport routes in the city by improving the availability of the

public transport and reducing the local pollution by GHG. It is intended in the project to construct a hydrogen refuelling station with public availability in Riga in order to promote and establish a cross-country network of hydrogen refuelling stations in the TEN-T main network corridor *North SEA - BALTIC*⁹².

In order to form economic feasibility for the marketing of hydrogen as transport fuel, the most recommended scenario would be gradual transition to the use of hydrogen electric buses for the city public transport, or - transition to the use of passenger electric vehicles and hydrogen electric minibuses in large undertakings carrying passengers (taxi companies, undertakings which ensure passenger carriage with minibuses, etc.). These hydrogen electric buses of the public transport or passenger road transport which is carrying passengers with FCEV, would refuel at hydrogen refuelling stations on a planned basis which would be constructed at the public transport depot. In turn, territories of transport depots must be located in cities or suburbs nearby the main transport arteries. Thus, the public transport refuelling stations would ensure initial base load demand for hydrogen as a transport fuel. In order for a complex development of the market of hydrogen electric vehicles to be promoted, the hydrogen refuelling stations constructed within the transport depot should be publicly available, providing the refuelling possibility not only for public transport, but also for any FCEV owned by a legal or natural person. Only by conforming to both these conditions - ensuring the base load with consumption of the public transport and availability of public refuelling stations - hydrogen gas will be able to compete with fossil fuel and favourable conditions for the development of the FCEV market will be created⁹³. Hydrogen produced using RES, including electricity from RES, should be especially supported because it would promote achievement of the RES 10 % objective in transport and reduce the import of energy resources.

Upon comparing the purchase prices of traditional vehicles and vehicles driven by alternative fuels, it may be concluded that the latter ones are more expensive, thus it is necessary to motivate the public to purchase "greener" vehicles. The public should also be informed regarding other cost positions that could be even lower for alternative fuels vehicles.

The current development of the biofuel production sector in Latvia and efficiency analysis of the State aid instruments indicate that increase in demand is mostly stimulated by policy instruments related to consumption, therefore, it would be necessary to promote the use of biofuel with different measures of indirect aid, such as certain advantages in the road traffic should be assessed (free-of-charge parking lots, use of public transport lanes, etc.).

Upon developing regulations for installation of an alternative fuels filling/charging infrastructure, the overall development interests of national economy of Latvia should be taken into account, first of all, the connection with the remaining transport infrastructure.

In practice it means, for example:

- when establishing the infrastructure, priority shall be given to the locations where it is possible to join the individual and public transport flow: railway stations, "park-and-ride" stations;
- in case the EV charging infrastructure must be compatible with other electrical transport, for example, all charging points must be also ensured with a standard socket for charging possibility of electric bicycles, electric motorcycles, and slow-run vehicles;
- the issues of national prestige must be taken into account when installing refuelling/charging points at the tourism objects which are visited by guests from abroad⁹⁴.

As it was already mentioned the spread of vehicles driven by alternative fuel is not large in Latvia, and it is mainly explained by the lack of alternative fuels regulations and aid, thus not promoting wider use thereof. In order to prevent it, the necessary amendments in respect of definitions of the vehicles driven by alternative fuels, the requirements for refuelling and charging stations, and the information to be provided to users should be assessed. Inclusion of the definition of a zero emission vehicle in the Road Traffic Law must be mentioned as a significant condition in order to ensure a uniform understanding and it would be possible to provide certain reliefs for such vehicles in laws and regulations.

Total Costs of Ownership Rights of Comparable Vehicles within a Period of Eight Years (EUR with VAT)

Table 7

Items of costs	VW e-Up!	VW Up!	VW eco up! (CNG)
Purchase costs	25,552	12,060	12,950
Fuel costs	2097	8260	4546****
Taxes***	960	2892	2892*
Maintenance costs	1164	1791	~2000**
Costs for parking lots	0	8000	8000*
Total	29,773	33,003	30,388

* Reliefs are not in effect

** Model is not for sale in Latvia, CNG service costs are greater

*** Company car tax rate - EUR 10.00 per month

**** Calculation has been carried out according to CNG as the fuel price in Estonia - EUR 0.73/m³

Source: Electromobility Manual for Local Governments and calculations of the Ministry of Transport

Taking into account the calculations of costs included in Table 7, it is concluded that the total costs of ownership rights of the car driven by petrol *Volkswagen Up!* exceeds the costs of electrical *Volkswagen e-Up!* by more than EUR 3000. Although this calculation should be regarded as approximate because it contains several assumptions and therefore the actual costs may differ from the calculated costs, the overall trend is obvious - even without the financial purchase aid for the purchase of EV, taking into account the lower costs of exploitation within a period of 5-8 years, the total costs of ownership rights are estimated lower in comparison to the combustion car of the relevant class⁹⁵. Regardless of the fact that in respect of *Volkswagen eco up!* which uses CNG as fuel, no reliefs that are due for EV are applied in Latvia, the costs of ownership rights are less in comparison to a vehicle of the same class driven by petrol. However, amending of laws and regulations would be one of the first measures, providing for similar reliefs for these vehicles as currently for EV. Upon applying such reliefs, the costs of ownership rights for vehicles driven by CNG would be significantly lower, and it would be a very strong incentive for purchasing those very vehicles.

2. Objective of the Plan and Action Directions for Achievement Thereof

Objective of the Plan is to determine the necessary directions for research and analysis as a result of which further action policy will be developed in respect of deployment of alternative fuels in certain transport sectors in order to reduce greenhouse gas emissions.

Upon assessing the current situation in Latvia a conclusion may be drawn that deployment of alternative fuels is gradually taking place in the field of transport (electricity and biofuel), however, the current measures are not sufficient and without additional action in this field the trends which have started during the last years, may end due to the lack of an appropriate infrastructure. An exception is promotion of EV and of development of its charging infrastructure for which the EMDP has been developed and accepted and which, to a large extent, has promoted the situation that the number of EV and their charging stations is increasing in Latvia as opposed to the situation with the spread of natural gas and hydrogen as the fuel type for the deployment of which a State policy has not been developed. Thus, hereinafter co-ordinated and equal aid measures are necessary in order to promote introduction of CNG, LNG, biofuel, synthetic and paraffinised fuel and hydrogen as a fuel type in the market.

The Plan describes the types of alternative fuels, the possible various solutions in respect of charging stations, however, taking into account the fact that the spread of such alternative fuels is very low in Latvia, it is not possible to provide economically feasible proposals for further action in deployment of alternative fuels. Upon taking into account the fact that the European Commission has emphasised Directive 2014/94/EU as one of the main instruments for reducing the negative environmental impact by the road transport field, and also the fact that the use of alternative fuels in Latvia is at a very early stage, prior to implementation of any measures a comprehensive research is necessary in which a detailed analysis regarding each type of fuel, the possible impact of these fuels on the objectives in the field of environment specified for Latvia at the European Union level, and also the economically most beneficial solution

from those described in the Plan or suggesting of new solutions for deployment of the alternative fuels infrastructure in the situation of Latvia should be included.

In order to promote the use of alternative fuels in Latvia, the next step would be, on the basis of the abovementioned research, and also in conformity with the requirements laid down in Directive 2014/94, to establish an alternative fuels infrastructure, thus liquidating regularities that are significant obstacles for the development of the use of these fuels when, on one side the alternative fuels infrastructure has not been established because there is no sufficient number of such vehicles, but, on the other side, consumers are not purchasing vehicles driven by alternative fuel because, due to insufficient demand, the industry sector is not producing and selling them for competitive prices, and thus the demand among consumers is not sufficiently high. However, availability of the infrastructure is of the essence, but it is not the only measure which is necessary for promoting the use of alternative fuels. Upon taking into account that the price for the vehicles driven by alternative fuels is higher than for traditional vehicles, additional incentives on the side of consumers are necessary, for example, tax reliefs, advantages in the road traffic, etc., which together with the measures of informing the public regarding the possibilities to use vehicles driven by alternative fuels and the necessity to reduce climate changes would provide additional contribution to promoting the use of such vehicles.

On the basis of that described in the previous Chapter and conclusions drawn, the following action directions are specified in the plan for deployment of the alternative fuels infrastructure:

- assessment of scenarios for deployment of alternative fuels which are most efficient for national economy of Latvia, and determination of solutions;
- improvement of the laws and regulations;
- establishment and development of the alternative fuels infrastructure;
- informing of the public.

Upon developing the abovementioned action directions, they will be assessed in conformity with the relevant regulations for aid to commercial activity.

Although Latvia is aware of the necessity to promote the development of alternative fuels, the priority sequence of aid measures is determined by the limited budget resources of Latvia, therefore, priority should be given to those activities which provide the largest return for Latvia.

Upon determining the sequence of aid measures, the previous global experience regarding the results of measures carried out elsewhere should be taken into account. In order to successfully implement the development of alternative fuels, an in-depth research on the alternative fuels technological solutions, the most appropriate solution for the situation in Latvia, an environmental impact assessment of alternative fuels, also the attitude of the public is necessary. Thus, the first priority is a comprehensive research within the context of alternative fuels.

Global experience proves that complete and efficient development of alternative fuels cannot be ensured without a complete infrastructure network. Informative support of good quality is as important, it is necessary to inform the public in order to create a true idea regarding advantages for the vehicles of alternative fuels, and also their deficiencies because glorifying information is as harmful as false information that causes great expectations and may later have a negative impact on achievement of the overall objectives. Uniform information is put together regarding all types of alternative fuels, indicating also their technological, economic and other differences. Other measures laid down in Directive 2014/94/EU for the deployment of alternative fuels by 2030 are planned to be included in further alternative fuels planning documents.

Objective of the Plan	to promote the development of alternative fuels and reduce the negative environmental impact of the transport
	Comprehensive infrastructure of alternative fuels in Latvia; Reduction of GHG emissions in the road transport sector;

Policy result(s) and performance-based indicator(s)						
1. Action direction		Assessment of scenarios for deployment of alternative fuels which are most efficient for national economy of Latvia and determination of solutions.				
No.	Measure	Action result	Performance-based indicator	Responsible institution	Co-responsible institution	Time limit for execution
1.1.	To carry out a comprehensive research on scenarios of deployment of alternative fuels in the road transport for reduction of greenhouse gas emissions and impact thereof on national economy of Latvia.	Economically most feasible solutions for establishment of the infrastructure in the situation of Latvia and the possible map of charging stations have been determined.	Research has been carried out.	MoT	MoE, RTSD, MoEPRD, MoA	31 December 2017
1.2.	To carry out an assessment within the framework of the Tax Policy Guidelines for 2017-2021 regarding tax reliefs for vehicle users of CNG, LNG and FCEV, with biofuel, paraffinised and synthetic fuel obtained from RES, and also the possibility to change the excise duty rate for diesel fuel by approximating it to the highest petrol rate for the time being.	The most appropriate solutions in the field of taxes for more efficient use of CNG, LNG and FCEV, biofuel, paraffinised and synthetic fuel obtained from RES for promoting the purchase of adapted vehicles.	An assessment has been carried out.	MoF	MoE, MoT	31 December 2019
1.3.	To carry out an assessment for the possibility of aid for taxes laid down within the framework of the Tax Policy Guidelines for 2017-2021 and efficiency thereof for merchants with an ecological vehicle fleet.	The possibility regarding possible types of tax aid has been assessed.	An assessment has been carried out.	MoF	MoT, MoE	31 December 2020
1.4.	To carry out an assessment within the framework of the Tax Policy Guidelines for	Proposals for the vehicle operation tax rates for	An assessment has been carried out.	MoF	MoT, MoE	31 December 2019

	2017-2021 in order to ascertain the possibilities for reducing the vehicle operation tax load for ecological vehicles (PHEV, FCEV, with biofuel, paraffinised and synthetic fuel obtained from RES, hybrids, midget cars, etc.) with CO ₂ less than 50g/km.	environmentally friendly vehicles.				
1.5.	To assess the simplification of administrative procedures for the arrangement of such EV charging points which are not publicly accessible.	An assessment regarding procedures to be simplified.	An assessment has been carried out.	MoT	MoE	31 December 2019
1.6.	To assess the possibilities of promoting the purchase of EV.	An assessment regarding the possible financial aid for the purchase of EV and determination of aid beneficiaries has been carried out.	Increase in the number of EV depending on the financing available.	MoT	MoF	31 December 2020
1.7.	Within the framework of the Tax Policy Guidelines for 2017-2021, to assess the possibility to increase taxes for new non-ecological vehicles and, where necessary, make amendments to laws and regulations.	An assessment regarding the necessary amendments to laws and regulations.	An assessment has been carried out	MoF	MoT, MoE	31 December 2020
1.8.	Within the framework of the Tax Policy Guidelines for 2017-2021, to assess reduction of the excise duty for natural gas as a fuel type.	An assessment regarding the laws and regulations to be amended.	An assessment has been carried out.	MoF	MoE	31 December 2018
1.9.	To carry out an assessment regarding the necessity and economic feasibility of	Actual market needs for the necessity to establish LNG	An assessment has been carried out.	MoT, port authorities	MoE, MoEPRD	31 December 2018

	establishment of LNG refuelling points at ports (within the TEN-T core network).	refuelling points at ports of the TEN-T core network have been assessed.				
1.10.	To carry out a research on commensurability of demand and costs for coastal electricity supply for ships at ports in comparison to benefits in the field of environment, taking into account the initial assessment within the framework of the Plan.	It has been assessed whether the coastal electricity supply for ships at ports is necessary.	An assessment has been carried out.	Port authorities, MoT	MoE, MoEPRD	31 December 2020
2. Action direction		Improvement of the laws and regulations				
2.1.	To update laws and regulations in accordance with the requirements of Directive 2014/94/EU by determining the requirements for CNG, LNG and FCEV refuelling stations.		The laws and regulations have been updated in accordance with the requirements of Directive 2014/94/EU.	MoE	MoT	31 December 2017
2.2.	To update laws and regulations in accordance with the requirements of Directive 2014/94/EU by determining the requirements for EV charging stations, and also operators of EV charging points.		The laws and regulations have been updated in accordance with the requirements of Directive 2014/94/EU.	MoT	EMCD	31 December 2017
2.3.	To make amendments to laws and regulations by supplementing with definitions for EV, FCEV, vehicle driven by natural gas, and zero emission vehicle.	Amendments to the Road Traffic Law have been made in order to define vehicles driven by alternative fuel, thus creating a uniform understanding and possibility to further determine reliefs for them in other	Amendments to the Road Traffic Law.	MoT	MoEPRD, MoE	31 December 2017

		laws and regulations.				
2.4.	To update laws and regulations in accordance with the requirements of Directive 2014/94/EU in respect of information to be provided to users of alternative fuels vehicles at CNG, LNG and FCEV refuelling stations.		The laws and regulations have been updated in accordance with the requirements of Directive 2014/94/EU.	MoE	MoT	31 December 2018
2.5.	To update laws and regulations in accordance with the requirements of Directive 2014/94/EU in respect of information to be provided to users of alternative fuels vehicles at EV charging stations, in user manuals of vehicles, and at vehicle trading places.		The laws and regulations have been updated in accordance with the requirements of Directive 2014/94/EU.	MoT	MoE	31 December 2018
2.6.	According to the research results of section 1.1. of the Plan, to develop amendments to laws and regulations for promoting the purchase of CNG, LNG, FCEV vehicles, vehicles driven by biofuel, paraffinised and synthetic fuel obtained from RES.	Aid for purchase of CNG, LNG, FCEV vehicles, vehicles driven by biofuel, paraffinised and synthetic fuel obtained from RES.	Amendments have been made to laws and regulations.	MoT	MoF	31 December 2020
3. Action direction		Establishment and development of the alternative fuels infrastructure.				
No.	Measure	Action result	Performance-based indicator	Responsible institution	Co-responsible institution	Time limit for execution (with precision up to a half-year)
3.1.	To establish the EV charging infrastructure on TEN-T roads.	The EV charging infrastructure network has been established.	Number of EV charging stations (approximately 55 stations by	MoT	EMCD	31 December 2018

			31 December 2018).			
3.2.	To establish the EV charging infrastructure on other roads (regional roads connecting TEN-T roads and towns and populated areas).	The EV charging infrastructure has been established on roads connecting TEN-T roads and in populated areas.	The number of EV charging stations (approximately 95 stations by 31 August 2020).	MoT	EMCD	31 August 2020
3.3.	According to the research results of section 1.1, to establish the CNG refuelling infrastructure.	Publicly available refuelling stations in urban/suburban agglomerations.	Number of CNG refuelling stations (approximately 5 stations by 31 December 2020).	MoT	MoE, LALRG	31 December 2020
3.4.	According to the research results of section 1.1, to establish refuelling stations for vehicles which are driven by biofuel, paraffinised and synthetic fuel obtained from RES.	Publicly available refuelling stations of biofuel, paraffinised and synthetic fuel if it is provided for in the research referred to in section 1.1.	Places of refuelling stations of biofuel, paraffinised and synthetic fuel (the number in conformity with that laid down in the research referred to in section 1.1).	MoT	MoE, LALRG	31 December 2020
3.5.	To develop an environmentally friendly public transport infrastructure (buses), providing more aid to zero emission transport (in accordance with the Transport Development Guidelines for 2014-2020).	Improved public transport infrastructure in urban territories.	Increase in passengers in environmentally friendly public transport is increasing in six towns of Latvia.	MoT	MoEPRD, local governments	31 December 2023
3.6.	To develop an environmentally friendly public (rail transport) infrastructure (in accordance with the Transport Development Guidelines for 2014-2020).	Improved public transport infrastructure in urban territories.	Increase in passengers in environmentally friendly public transport in three towns of Latvia.	MoT	MoEPRD, local governments	31 December 2023

3.7.	To promote the popularity of alternative fuels vehicles.	Informing of local governments regarding the possibilities of promoting alternative fuels.	Assessment of local governments regarding the most appropriate solutions for promoting alternative fuels and implementation thereof.	Sectoral ministries	LALRG	31 December 2020
4. Action direction		Public informing				
4.1.	To form understanding of the public regarding the plan for deployment of alternative fuels in Latvia.	The public is provided with information regarding the necessity to reduce climate changes, and the contribution of alternative fuels vehicles in achievement of this objective.	The number of publications regarding the measures provided for in the plan on certain websites (MT, BIMAD, RTSD, etc.).	MoT, RTSD	MoEPRD, MoE, MoF	Throughout the period.
4.2.	To involve non-governmental organisations in the development policy planning of alternative fuels.	Involvement of interested parties in the policy-making process.	Number of meeting events.	MoT, MoE	MoEPRD	Throughout the period.

3. Territorial perspective

The establishment of alternative fuels charging stations covers the entire territory of Latvia. The possible places for electric charging, hydrogen, natural gas and biofuel stations are presented in subsequent maps. The maps have been created in conformity with sectoral assessments regarding the places which are the most substantiated ones for the establishment of stations from economic point of view. The map of EV charging stations has been developed according to the criteria for determination of places for charging stations included in the research "Analysis of the Establishment of the Latvian National Network for Charging of Electric Vehicles". The mapping of hydrogen refuelling stations is established in conformity with the assessment of the Latvian Hydrogen Association regarding suitable places for refuelling stations, in turn, the possible CNG mapping - in conformity with the suitable places for the establishment of refuelling stations marked by JSC Latvijas Gāze. Concurrently it must be indicated that researches are necessary for determination of suitable place for precise number of stations which is one of the main action directions of this Plan.

- Mapping regarding the potential establishment of the EV infrastructure in the territory of Latvia.



Figure 12. **Potentially Possible Geographical Placement of Latvian National EV Fast Charging Network.**
 Source: Research "Analysis of Establishment of the Latvian National Charging Network for Electric Vehicles".

Designations used in the Figure: pictographs in yellow - the planned charging stations on TEN-T roads; pictographs in red - the planned charging stations on TEN-T connecting roads and territories of development centres of regional significance; pictographs in grey - charging stations already constructed.

- Mapping regarding geographical placement of the current fuelling stations where CNG refuelling devices may be located

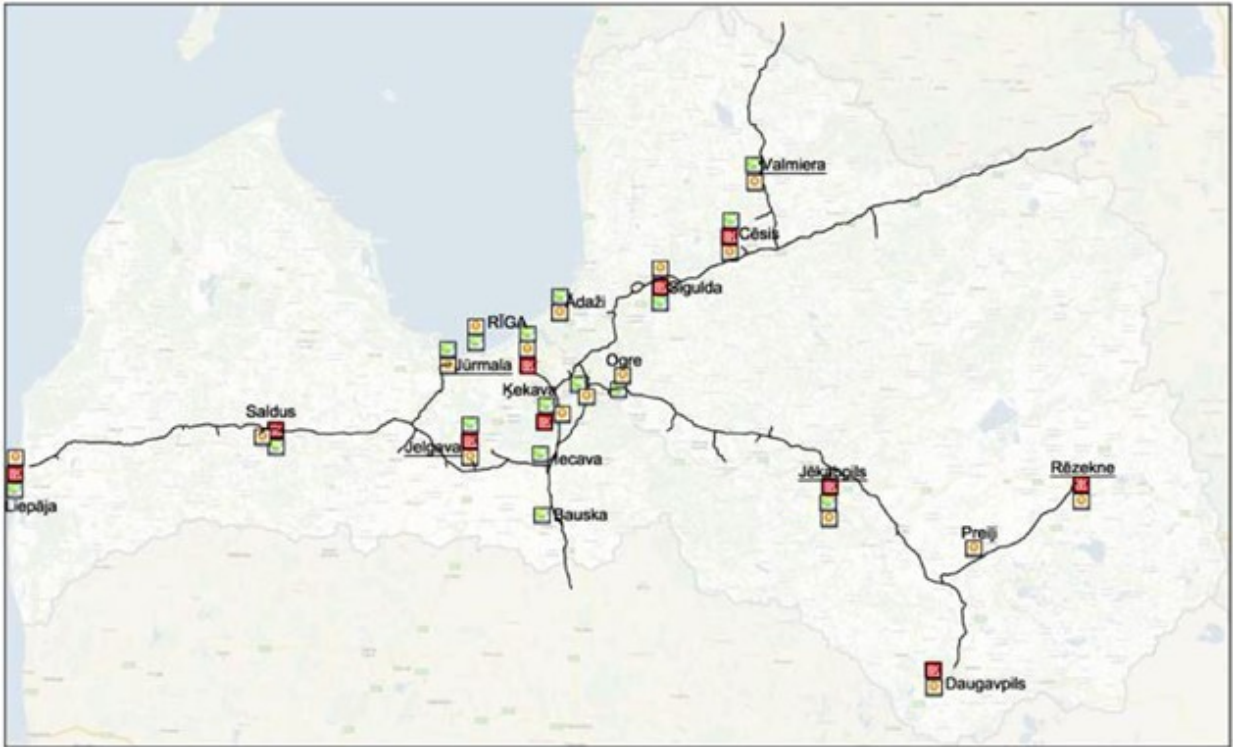


Figure 13. Geographical Placement of Current Refuelling Stations where CNG Refuelling Devices may be Located. Source: JSC "Latvijas Gāze"

- Mapping regarding the potential establishment of hydrogen charging stations in the territory of Latvia.

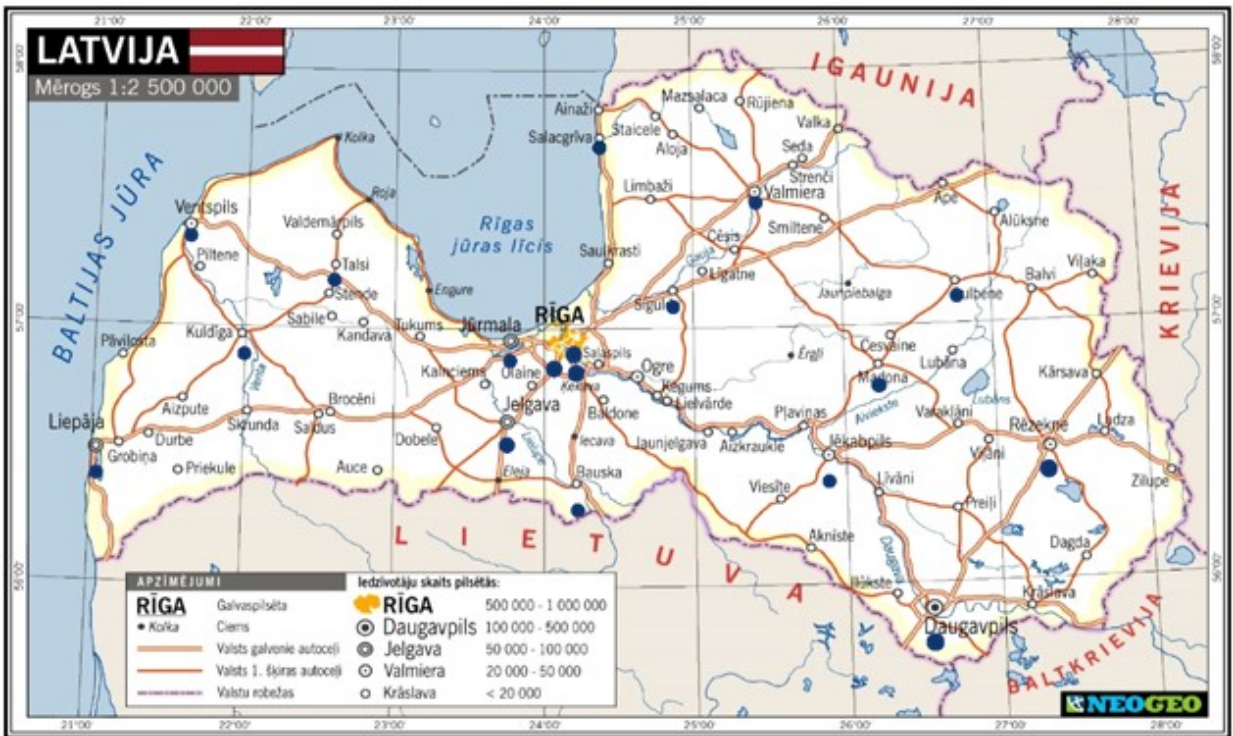
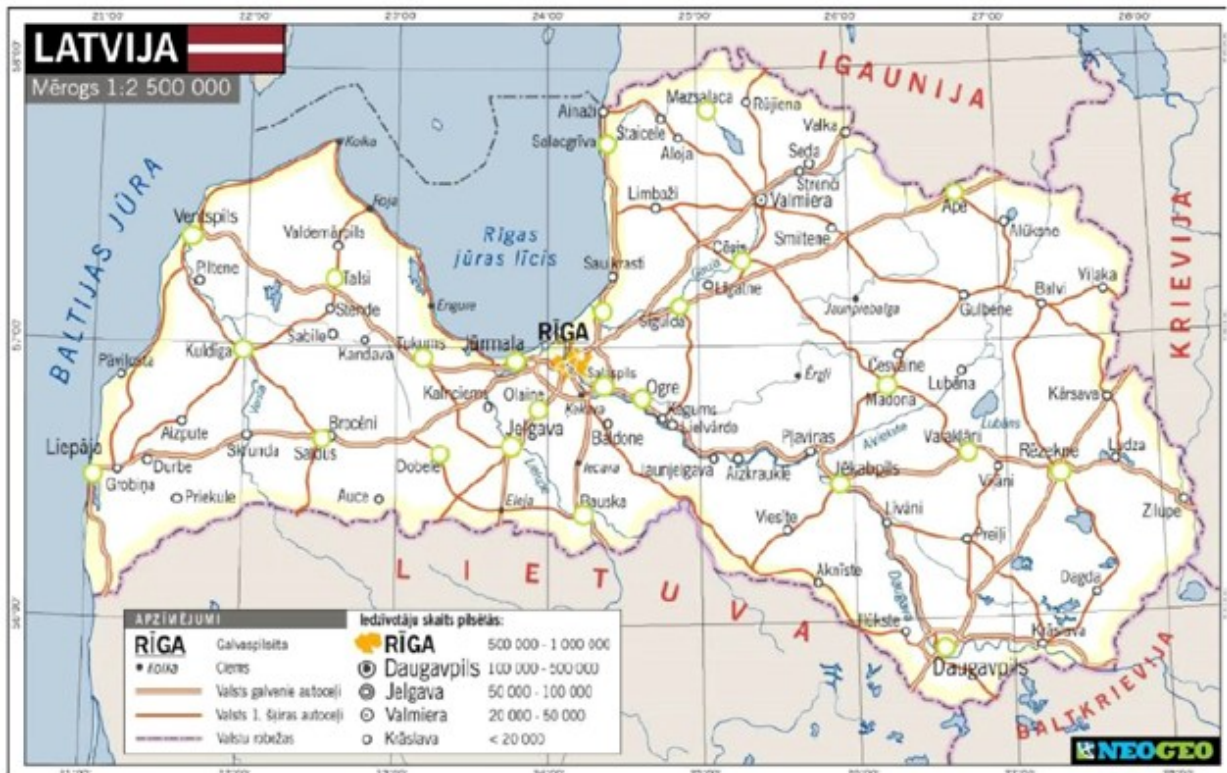


Figure 14. Mapping Regarding Establishment of Hydrogen Charging Stations in the Territory of Latvia. Source: Latvian Hydrogen Association

- Map regarding the potential establishment of charging stations of biofuel in the territory of Latvia.



Data: BBAL

Figure 15. Mapping Regarding the Potential Establishment of Charging Stations of Biofuel in the Territory of Latvia. Source: Biofuel and Bioenergy Association of Latvia

⁷¹ Central Statistical Bureau <http://www.csb.gov.lv/en/notikumi/consumption-renewable-energy-resources-2015-44050.html>

⁷² Study on the Introduction of Refuelling Infrastructure for Hydrogen Transport in Riga Region

⁷³ Indicator for the objective regarding the number of installed stations initially set in Cabinet Regulation No. 637 of 3 November 2015, Regulations Regarding Implementation of the Specific Aid Objective 4.4.1 "To Develop an EV Recharging Infrastructure in Latvia" of the Operational Programme "Growth and Employment". The Plan provides that the number of stations to be reached is 150.

⁷⁴ The distance between recharging stations is 30 km (+/- 10 km) on TEN-T roads; the distance between stations is 50 km (+/- 10 km) on regional roads connecting TEN-T roads

⁷⁵ Proposals for the Local Governments of Zemgale Planning Region for a Possible Innovative Public Service Offer - Establishment of Recharging Points http://www.zrea.lv/upload/attach/33%20PRIEKSLIKUMI%20E_MOBILITATEI%20ZEMGALE_30jun2014.pdf (In Latvian)

⁷⁶ Marketing and Public Opinion Research Centre SKDS. Results of the Survey of Inhabitants of Latvia - Awareness and Attitude Towards Electric Transport. March 2016 <http://emobilitate.lv/wp-content/uploads/2016/04/SKDS-aptaujas-atskaite.pdf> (In Latvian)

⁷⁷ Energy Development Guidelines for 2016-2020

⁷⁸ *Ibid*

⁷⁹ Energy Development Guidelines for 2016-2020

⁸⁰ Source: Riga Technical University

⁸¹ Source: Latvian Biogas Association

⁸² Energy Development Guidelines for 2016-2020

⁸³ Informative Report of the Ministry of Economics on the Situation in the Sector of Biofuels Production

⁸⁴ *Ibid*

⁸⁵ Source: <http://www.neste.lv/lv/content/neste-pro-diesel> (In Latvian)

⁸⁶ Source: <http://www.neste.lv/lv/content/neste-dus-saraksts-prod> (In Latvian)

⁸⁸ <http://www.acea.be/statistics/tag/category/key-figures>)

⁸⁹ Statistics of the RTSD

⁹⁰ *Ibid*

⁹¹ Statistics of the RTSD

⁹² <http://mvd.riga.lv/uploads/videgaiss/dok/R%C4%ABc%C4%ABbas%20programmas%20izpilde%202014.pdf> (In Latvian)

⁹³ Source: Latvian Hydrogen Association

⁹⁴ Electromobility Development Plan 2014-2016

⁹⁵ Electromobility Manual for Local Governments

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