REPUBLIC OF BULGARIA
CABINET

Copy

DECISION No 323

of 11 May 2018

AMENDING THE NATIONAL POLICY FRAMEWORK FOR THE DEVELOPMENT OF THE MARKET AS REGARDS ALTERNATIVE FUELS IN THE TRANSPORT SECTOR AND THE DEPLOYMENT OF THE RELEVANT INFRASTRUCTURE

THE CABINET

HAS DECIDED AS FOLLOWS:

1. To amend the national policy framework for the development of the market as regards alternative fuels in the transport sector and the deployment of the relevant infrastructure, as set out in the Annex.

2. To designate the following central government bodies to take the requisite actions to transpose specific provisions of Directive 2014/14/EC in accordance with the national policy framework for the development of the market as regards alternative fuels in the transport sector and the deployment of the relevant infrastructure, as follows:

(a) Ministry of Energy:

The Ministry of Energy shall draw up a draft Act amending the Energy Act, transposing the provisions of Article 4, paragraphs (7), (8), first sentence, (9), (11) and (12) of Directive 2014/14/EC on the deployment of alternative fuels infrastructure.

(b) Energy and Water Regulatory Commission:

The Energy and Water Regulatory Commission shall take action so as to ensure that recharging point operators are able to provide electric vehicle recharging services to customers on a contractual basis, including in the name and on behalf of other service providers. In addition, the Commission shall ensure that all recharging points accessible to the public also provide for electric vehicle users to recharge on an ad hoc basis without entering into a contract with the electricity supplier or operator concerned (Article 4(8), second sentence, and (9) of Directive 2014/94/EC);

(c) Consumer Protection Commission:

The Consumer Protection Commission shall take action to ensure that prices charged by the operators of recharging points accessible to the public are reasonable, easily and clearly comparable, transparent and non-discriminatory (Article 4(10) of Directive 2014/94/EC).

(d) Ministry of Regional Development and Public Works:

Under Article 169(4) of the Territorial Planning Act, the Ministry of Regional Development and Public Works must take the actions necessary to amend secondary legislation with a view to determining the requirements for the design, implementation, monitoring and commissioning of hydrogen refuelling points.

(e) Ministry of the Interior and Ministry of Regional Development and Public Works:

The Ministry of the Interior and the Ministry of Regional Development and Public Works shall, where necessary, take action to amend secondary legislation to ensure that fire safety requirements are incorporated in the design and implementation of motor vehicles.

(f) Ministry of Transport, Information Technology and Communications:

The Ministry of Transport, Information Technology and Communications shall take action to develop and maintain an online application with an accessible interface and simplified operating module, in accordance with the requirements of Article 7(7) of Directive 2014/94/EU, ensuring that all users have open and non-discriminatory access to the data available, indicating the geographic location of publicly accessible recharging points and alternative-fuel refuelling points.

PRIME MINISTER: (signed) Boyko Borisov

SECRETARY-GENERAL OF
THE CABINET: (signed) Veselin Dakov

NATIONAL POLICY FRAMEWORK

for the development of the market as regards alternative fuels in the transport sector and the deployment of the relevant infrastructure

CONTENTS:

1. Introduction

The path mapped out in EU strategy documents for the development of the transport sector is geared to improving competitiveness through the more efficient use of resources and energy. In this context, efforts should mainly be directed at reducing dependence on fossil fuels. To a large extent, this falls within the remit of a National Policy Framework for the use of alternative fuels and the deployment and development of appropriate infrastructure.

The National Policy Framework was drawn up in compliance with the requirements set out in Article 3 of Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure (Directive 2014/94/EU). It expresses the State's desire to actively support the development of alternative fuel use in transport with a view to achieving the national goals set in the field of energy, transport and the environment. The overall objective of the policy framework is to create a suitably favourable environment for the broader use of alternative fuels and propulsion systems in the transport sector and to put in place conditions that are comparable with those in other developed EU countries.

The long-term aim (post-2030) is to fully deploy electromobility, use natural gas more widely as a standard fuel and take hydrogen technology beyond the R&D stage. Certain basic measures therefore need to be implemented to develop these technologies over the medium to long term.

The key principle underlying the national policy framework is that of technological neutrality, i.e. the public sector should not support just one type of alternative fuel. Rather, the overall goal described above should be achieved by embracing technologies on the threshold of commercial use and for which a pro-active active State policy could yield the greatest added value (i.e. electromobility and natural gas), as well as those currently at the testing/pilot stage which State support could help bring to semi-commercial use in the near future (hydrogen/fuel cell).

The development of alternative propulsion technologies and the construction of the associated recharging and refuelling infrastructure in Bulgaria should be seen as an evolutionary, interconnected process where different alternative fuels will find their application in different market segments, complementing rather than competing with each other.

The policy framework considers the following main alternative fuels with the potential to replace oil over the long term: electricity, hydrogen, biofuels, natural gas and liquefied petroleum gas. It examines the scope for their use in road, water and air transport. 'Alternative fuels' means fuels or power sources serving at least partly as a substitute for fossil oil sources in the supply of energy to the transport sector, potentially contributing to its decarbonisation and enhanced environmental performance. They include: electricity, hydrogen and biofuels as defined in Article 2(i) of Directive 2009/28/EC, synthetic and paraffinic fuels, natural gas, including biomethane, in gaseous form (compressed natural gas (CNG)) and liquefied form (liquefied natural gas (LNG), and liquid petroleum gas (LPG) (point 1 of the Annex).

The targets underlying this framework serve as a basis for further development taking into account any scope for cooperation with other Member States to ensure the necessary infrastructure coverage for alternative fuels. The scope for implementing potential measures regarding alternative fuels infrastructure in road and water transport is examined with the aim of simultaneously reducing the transport sector's dependence on oil and mitigating its negative impact on the environment. If implemented using public resources, including foregone revenue, proposed measures for potential application must be carried out in compliance with EU rules on State aid.

2. STRATEGIC FRAMEWORK

2.1 Main strategic documents at national level

The main strategic documents at national level concerned with alternative fuels and technologies are the:

2.1.1 National Action Plan for Encouraging the Manufacture and Accelerated Market Penetration in Bulgaria of Environmentally Friendly Vehicles, including Electromobility, over the Period 2012-2014

(adopted by Cabinet Decision No 862 of 19 October 2012).

The document sets out the policy framework in the field of electromobility and the main measures and activities that need to be implemented in order to boost demand for and production and use of environmentally friendly vehicles in Bulgaria.

The plan includes 29 measures designed to achieve the following seven objectives:

1. Stimulating the manufacture of electric and other environmentally friendly vehicles (EFVs) including their components - six measures.
2. Promoting R&D activities for the development of EFVs and recharging and refuelling facilities - one measure.
3. Stimulating demand for/use of EFVs - six measures.
4. Accelerated construction of recharging infrastructure for electric vehicles (EVs) and hybrid vehicles (HVs) - four measures.
5. Raising the awareness and capacity of stakeholders and the general public regarding the nature, purpose and benefits of developing sustainable mobility - four measures.
6. Promoting the development of sustainable urban mobility - six measures.
7. Promoting the production and use of alternative transport fuels derived from the treatment of waste - two measures.

2.1.2 National Development Programme: Bulgaria 2020

Sub-priority 8.4 'Limiting the negative impact of transport on the environment and human health' of the Programme's Priority No 8 'Improving transport connectivity and access to markets' sets out measures to encourage the use of hybrid and electric road transport and to stimulate the renewal of the motor vehicle fleet.

2.1.3 Third National Action Plan on Climate Change for the Period 2013 - 2020

The plan envisages specific measures to reduce greenhouse gas emissions in the transport sector. They are aimed at achieving an optimal balance in exploiting the potential of different modes of transport and are divided into four priority axes.

'Developing and stimulating the use of hybrid and electric road transport' is a measure (with indirect effect) under Priority Axis 1 'Reducing transport emissions'.

2.1.4 National Strategy for the Development of Scientific Research up to 2020

The strategy for the development of scientific research up to 2020 identifies several major priority areas for research:

- energy, energy efficiency and transport: development of green and environmentally friendly technologies;
- health and quality of life, biotechnology and environmentally friendly foods;
- new materials and technologies;
- cultural heritage, socio-economic development and governance;
- information and communications technologies.

Other focal areas of the National Strategy for the Development of Scientific Research up to 2020 relate to the development and enhancement of efficiency in scientific research and innovation, and the creation of sufficient incentives to consolidate research structures and scientific potential. By pooling financial resources, infrastructure and specialist staff, the aim is to set up and consolidate robust entities that will carry out high-quality scientific research whilst being competitive at European and world level. Building effective partnerships between research organisations, universities and businesses enriches all parties involved through the resultant influx of new knowledge and skills, as well as creating high added value for the economy. The involvement of the private sector in scientific

research is one of the main tasks of the European Union and features in almost all EU policy documents. The intention is to involve businesses not only as direct investors but also as beneficiaries of scientific knowledge and products and as stable partners in the knowledge triangle.

2.1.5 Innovation Strategy for Smart Specialisation of the Republic of Bulgaria for the period up to 2020, adopted by Cabinet Decision No 857 of 3 November 2015

This is an integrated document covering, inter alia, innovation and science policy issues, policy in the field of digital growth, resource efficiency and eco-innovation. It sets out the priorities for stimulating innovation, with the aim of accelerating the transition to a knowledge-based economy, and defining a coherent mix of policies, road maps and action plans, as well as an overall framework for monitoring and assessment.

A key operational objective of the Innovation Strategy for Smart Specialisation of the Republic of Bulgaria for the period 2014-2020 is: to focus on investments for the development of innovation potential in four identified thematic areas:

- information and communications technology
- mechatronics and clean technologies;
- health science industries and biotechnologies;
- new technologies in creative and recreational industries.

A key thematic area of the strategy is 'Mechatronics and clean technologies', holding high potential for innovative specialisation.

One priority line of action in this area is directed at clean technologies with a focus on transport and energy (storage, saving and efficient distribution of energy, electric vehicles and eco-mobility, hydrogen-based models and technologies, waste-free technologies, technologies and methods for incorporating waste products and materials from manufacturing in other production processes).

On the basis of the thematic areas formulated in the Innovation Strategy for Smart Specialisation, the following priority axes have been established in the draft National Strategy for the Development of Science in Bulgaria up to 2025:

- mechatronics, clean technologies and new energy and energy-efficient technologies;
- health and quality of life; green and eco-technologies, biotechnologies, eco-foods, purification and waste-free technologies;
- environmental protection, recovery of raw materials and bio-resources, ecological monitoring;
- materials sciences and nanotechnologies;
- information and communications technology
- national identity and anthropology, socio-economic development and governance.

Updated in 2014, the National Roadmap for Scientific Infrastructure is aligned with the goals of the Innovation Strategy for Smart Specialisation and takes into account the priorities of the scientific research activities currently being developed within the European research system. It puts forward nine infrastructure networks as being of national importance.

One of them is infrastructure for the storage of energy and hydrogen energy. The infrastructure fully covers the Strategy Europe 2020 priorities and paves the way for Bulgaria's integral involvement in the implementation of the European Strategic (low-carbon) Energy Technology Plan (SET-Plan). It is strongly geared to the provision of innovative and efficient scientific research services to specific niches of the Bulgarian economy — the production, storage and use of energy from renewable energy sources (RES) — and to speeding up the penetration of hydrogen technologies in various fields.

The infrastructure will underpin technical expertise in areas such as:

- offsetting brief load peaks in smart electricity grids;
- incorporating RES electricity in the power distribution network;
- use of low-carbon technologies in transport.

2.1.6 Strategy for the Development of the Transport System of the Republic of Bulgaria up to 2020

The main objectives of the national transport policy set out in the Strategy are:

- achieving cost-efficiency;
- developing a sustainable transport sector;
- improving regional and social development and cohesion.

Limiting the adverse impact of transport on the environment and human health is one of the main strategic priorities for development of the transport sector. This priority takes into account the need to introduce and promote the use of fuels and energy from alternative and renewable sources and to develop and stimulate the use of hybrid and electric vehicles.

2.1.7 Energy Strategy of the Republic of Bulgaria up to 2020

The National Energy Strategy up to 2020 is in line with the current European energy policy framework and the global trends in the development of energy technologies. Sustainable energy development has been placed at the very forefront of national energy policy. Its achievement is linked to the long-term quantitative targets the European Union is seeking to meet by 2020:

- 20% reduction in greenhouse gas emissions compared with 1990;
- 20% share of RES in the total energy mix and 10% share of renewable energy in transport;
- 20% improvement in energy efficiency.

The main priorities of the Energy Strategy are grouped in five areas:

- ensuring the security of energy supply;
- meeting the renewable-energy targets;
- improving energy efficiency;
- developing a competitive energy market and a policy aimed at securing energy needs;
- protecting consumer interests.

The production and consumption of biofuels is not treated as a separate energy-policy priority but is included in that relating to renewable energy sources.

The Energy Strategy of the Republic of Bulgaria highlights the challenges encountered in meeting the strict sustainability requirements for biofuels while pursuing the required sectoral target of a 10% share of energy from biofuels and renewable sources in the transport sector. The national policy on promoting the production of energy from renewable sources includes the following objectives concerning the production and consumption of biofuels:

- promoting the development and use of technologies for the production and consumption of biofuels and other renewable sources in transport;
- increasing the capacity of small and medium-sized producers of energy from renewable sources and alternative energy sources and producers of biofuels and other renewable sources;

To achieve these goals, a **National Renewable Energy Action Plan (NREAP)** has been drawn up. It defines the activities needed and the measures planned for their implementation.

The mandatory national targets in the field of biofuels are measurable and are aligned with the corresponding EU objectives. They lay down:

- a 10% share of biofuels and energy from renewable sources in transport, out of a total renewable share of 16% in the country's gross final energy consumption, and
- a 6% reduction in the life cycle greenhouse gas intensity (emissions per unit of energy) of the fuels used in the transport sector by 2020[1].

The NREAP[2] does not specify measures for the production of second-generation biofuels, for increasing the capacity of small and medium-sized producers of biofuels, or for the development of scientific potential. The main reason is the high cost of second-generation biofuels and the absence of market-oriented technologies both in the EU and internationally. The quantities of second-generation biofuels envisaged in the NREAP are negligible and amount to 4 000 tonnes of oil equivalent by 2020, with total biofuel consumption standing at 287 000 tonnes of oil equivalent. Given the country's existing raw-material resources for the production of conventional biofuels, the NREAP does not contain any plans for importing biofuels up to 2018. Only the import of bioethanol is planned after 2018.

[1] The reduction should amount to at least 6 % by 31 December 2020, compared to the EU-average level of life cycle greenhouse gas emissions per unit of energy from fossil fuels in 2010, to be achieved through the use of biofuels, alternative fuels and reductions in flaring and venting at production sites.

[2] Adopted for 2010-2020 in compliance with Directive 2009/28/EC of the European Parliament and of the Council, submitted to the European Commission and approved on 30 June 2010.

The third national report on Bulgaria's progress in the promotion and use of energy from renewable sources[3] reported that the share of renewable energy used in transport (RES-T) as planned in the NREAP had been exceeded. For 2013, a share of 5.6% was achieved against a planned share of 3.3%, and in 2014 the share stood at 5.3% compared with a planned share of 4.5%. The progress achieved came close to the 5.8% RES-T share forecast for 2015.

'Increasing the share of biofuels' is a measure with direct effect under Priority Axis 1 'Reducing transport emissions' of the **Third National Action Plan on Climate Change 2013-2020.**

A study commissioned by the Ministry of Environment and Waters entitled 'Exploring the possibilities and prospects for the production and consumption of first-, second- and third-generation biofuels for the needs of transport' attaches priority to the development of second- and third-generation biofuels in accordance with the changes in the requirements of the European directives.

It should be noted that the Ministry of Energy has already commenced the process of comprehensively analysing possibilities for producing new-generation biofuels and other renewables for use in transport and of setting an indicative sub-target for the consumption of new-generation biofuels in that sector. The analysis will be in full compliance with the provisions of Article 2 and Annex IX of Directive 2015/1513/EC and with the objectives laid down in the National Action Plan for Energy from Renewable Sources.

3 LEGISLATIVE FRAMEWORK

3.1 Legislative framework - electricity

3.1.1 Tax incentives - electric vehicles

Considerable progress has been made putting in place a regulatory and financial framework to encourage the use of high environmental performance vehicles.

A number of tax breaks were approved in 2013-2015 in connection with the environmental characteristics of vehicles. A first step in this direction was taken with the adoption of the Act amending the Local Taxes and Fees Act (ZMDT) (SG No 102/2012, in force as from 1 January 2013), under which electric vehicles were exempted from an annual tax.

The next Act amending the ZMDT (SG No 101/2013, in force as from 1 January 2014) preserved the preferential tax treatment enjoyed by owners of vehicles equipped with active catalytic converters, and further incentives were provided for owners whose vehicles meet the Euro 3, Euro 4, Euro 5 and Euro 6 emission standards. Under Article 59(2) ZMDT, in force as from 1 January 2014, the tax payable under Article 55(1) and (3) was reduced by 50% for vehicles with an engine power rating not exceeding 74 kW, including those meeting the Euro 3 and Euro 4 emissions standards, and by 60% for those meeting the requirements of Euro 5 and Euro 6.

Also, under Article 59(3) ZMDT, the tax payable under Article 55(5) (6) (7) and (13) was reduced by 40% for buses, lorries, trailer tractors and truck tractors meeting the Euro 3 and Euro 4 emission standards and by 50% for those meeting the requirements of the Euro 5, Euro 6 and EEV standards.

In 2014 the range of tax-exempt electric vehicles was expanded by an amendment to Article 58(2) ZMDT. The amendment exempts from tax not only electric vehicles but also electric motorcycles and mopeds (SG No 105/2014, in force as from 1 January 2015). The above-mentioned amendment to Article 58(2) ZMDT removed the inequality of tax treatment that existed between four-wheel and two-wheel electric vehicles.

A decisive step was thus taken towards the modernisation and integration of Bulgaria's tax and environmental legislation, and the country joined the ranks of the other 17 Member States where car taxes are based on emissions and/or fuel consumption.

At present, the fees collected by the Ministry of the Interior upon initial registration of vehicles are extremely low, with 90% of those fees covering the cost of issuing the registration certificate (Parts I and II), the registration plates and the stickers issued after the initial technical inspection.

[3] Reports on the achievement of the targets for 2013 and 2014: http://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports

Vehicle registration forms, registration plates and technical inspection stickers are regulated in Ordinance No I-45/2000, and their prices are fixed in production and supply contracts to which the Ministry of the Interior is a party.

A new Ordinance laying down the procedure for paying the product tax and the amount of that tax was adopted by Cabinet Decree No 76 of 12 April 2016. As an incentive, purchasers of electric vehicles enjoy a 30% (BGN 44) reduction in the product tax currently payable on a new car and purchasers of hybrid cars a 15% reduction in the tax for conventional cars (ranging - according to the age of the vehicle - from BGN 22 to BGN 40).

Any proposals for additional tax breaks will comply with the EU's State aid rules.

3.1.2 Registration of hybrid and electric drive vehicles

The conditions and procedures for the registration of vehicles are laid down in Ordinance No I-45 of 24 March 2000 on the registration, reporting, entry into service and immobilisation of motor vehicles and trailers pulled by motor vehicles and the procedure for providing information about registered motor vehicles (promulgated in SG No 31/2000). The authorities competent for the registration of vehicles are the Traffic Police units of the Sofia Directorate of the Interior and the provincial directorates of the Ministry of the Interior.

Ordinance No I-45 lays down the procedures for initial registration and for changes in the registration of vehicles. These procedures apply to all motor vehicles, irrespective of their propulsion system, i.e. there are no differences in procedures for initial registration and changes in registration.

3.1.3 Type-approval of hybrid and electric vehicles

3.1.3.1 European requirements

3.1.3.1.1 Information on type-approval of category M and N hybrid and electric vehicles

Article 149(1) of the Road Traffic Act (SG No 20/1999) defines road vehicle categories for type-approval purposes, and Part A of Annex 1 to Ordinance No 60 of 2009 on the type-approval of new motor vehicles and their trailers (SG No 40/2009) lays down the criteria for vehicle categorisation in accordance with European legislation (Directive 2007/46/EC of the European Parliament and of the Council establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles).

The following procedures for the type-approval of vehicles, applicable also to the type-approval of electric and hybrid motor vehicles, are laid down in Ordinance No 60 of 2009:

- EU type-approval of motor vehicles;
- EU approval of vehicles manufactured in small series;
- national type-approval of vehicles manufactured in small series;
- type-approval of vehicles with regard to systems/specific technical characteristics;
- type-approval of vehicles incorporating new technologies or concepts;
- individual approval of motor vehicles.

§ 1, points 14 and 15 of the Additional Provisions of Ordinance No 60 of 2009 contain definitions of 'hybrid motor vehicle' and 'hybrid electric vehicle'.

A 'hybrid motor vehicle' is a vehicle with at least two different energy converters and two different energy storage systems (on-vehicle) for the purpose of vehicle propulsion.

A hybrid electric vehicle' is a hybrid vehicle that draws propulsion energy from both of the following on-vehicle sources of stored energy/power:

(a) a combustible fuel;

(b) an electrical energy/power storage device (e.g. rechargeable battery, capacitor, flywheel/generator, etc.).

Annex No 10 to Ordinance No 60 of 24 April 2009 includes a reference to Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefor (OJ L 200, 31.7.2009) and Regulation No 100 of the Economic Commission for Europe of the United Nations (UNECE) — Uniform provisions concerning

the approval of vehicles with regard to specific requirements for the electric power train (OJ L 87, 31.3.2015), setting out electrical safety requirements and definitions relating to electric vehicles. The necessary marks and inscriptions for electric vehicles are specified in UNECE Regulation No 100 and the applicable European legislation.
Definitions of 'hybrid vehicle', 'hybrid electric vehicle' and 'pure electric vehicle' are contained respectively in Article 3(1) of Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information (OJ L 171, 29.6.2007) and in Article 2(16) and (34) of Commission Regulation (EC) No 692/2008 of 18 July 2008 implementing and amending Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information (Regulation (EC) No 692/2008) (OJ L 199, 28.7.2008).

3.1.3.1.2 Information on type-approval of category L electric and hybrid vehicles

In 2015 a draft Act amending the Road Traffic Act (Bill No 602-01-14/31.3.2016) was drawn up, providing for specific measures regarding the implementation of Regulation (EU) No 168/2013 of the European Parliament and of the Council of 15 January 2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles (OJ L 60, 2.3.2013). The Bill includes wording that makes the definitions under Article 3 of Regulation (EU) No 168/2013 applicable for the purposes of the Act. That provision in the national legislation on two- or three-wheel vehicles and quadricycles creates the conditions for applying definitions of 'hybrid vehicle', 'hybrid electric vehicle' and 'pure electric vehicle'. Provisions were put in place for the type-approval of those vehicles and the technical requirements applying to them.[4] The Regulation has been directly applicable to Bulgaria since 1 January 2016, its purpose being to simplify the existing legal framework, reduce harmful emissions from category L vehicles, increase the overall level of safety, ensure adaptation to technical progress and strengthen the rules on market surveillance. Definitions in accordance with Article 3 of Regulation (EU) No 168/2013:

'Hybrid vehicle' means a powered vehicle equipped with at least two different energy converters and two different energy storage systems (on-vehicle) for the purpose of vehicle propulsion;

'Hybrid electric vehicle' means a vehicle that, for the purpose of mechanical propulsion, draws energy from both of the following on-vehicle sources of stored energy/power:

(a) a consumable fuel;

(b) a battery, capacitor, flywheel/generator or other electrical energy or power storage device.

This definition also includes vehicles which draw energy from a consumable fuel only for the purpose of re-charging the electrical energy/power storage device;

'Pure electric vehicle' means a vehicle powered by:

(a) a system consisting of one or more electric energy storage devices, one or more electric power conditioning devices and one or more electric machines that convert stored electric energy to mechanical energy delivered at the wheels for propulsion of the vehicle;

(b) an auxiliary electric propulsion fitted to a vehicle designed to pedal;

For the purposes of Regulation (EU) No 168/2013 the following **categories and subcategories** are applied:

(a) category L1e vehicle (light two-wheel powered vehicle);

(b) category L2e vehicle (three-wheel moped);

(c) category L3e vehicle (two-wheel motorcycle);

(d) category L4e vehicle (two-wheel motorcycle with side-car);

(e) category L5e vehicle (powered tricycle);

(f) category L6e vehicle (light quadricycle);

[4] On 14 December 2016, the draft Act amending the Road Traffic Act was adopted by the Transport, Information Technologies and Communications Committee at second reading.

(g) category L7e vehicle (heavy quadricycle).

When powered by electric or hybrid motors, vehicles in categories L1e—L7e come under the domain of electric and hybrid transport.

To certify the vehicles' conformity with European type-approval requirements, including environmental protection requirements, every manufacturer must issue an EU certificate of conformity.

3.1.3.2 National requirements

3.1.3.2.1 Requirements for modifying the construction of a road vehicle into a hybrid or electric vehicle.

Ordinance No N-3 of 18 February 2013 on the modification of the construction of registered road vehicles and the individual approval of road vehicles registered outside the Member States of the European Union or another State that is a party to the Agreement on the European Economic Area (promulgated in SG No 21 of 1 March 2013) sets out national requirements for the individual approval and modification of the construction of registered road vehicles.

Article 23 of the Ordinance lays down the requirements applying to the modification of a road vehicle's construction so as to convert it into a hybrid or electric vehicle. In such cases the motor vehicle must comply with:

1. the technical requirements applicable to the respective category on the date of the first registration of the vehicle, as specified in the regulatory acts listed in:
   (a) Annex 10 or 11 to Ordinance No 60 (Annex IV or XI to Directive 2007/46/EC) - regarding category M and N road vehicles;
   (b) section I of Annex 1 to Ordinance No 117 of 2005 on the type-approval of new category L motor vehicles (promulgated in SG No. 12/2005) — regarding category L road vehicles.
2. Regulation No 100 of the UNECE — regarding category M and N road vehicles.

In accordance with Article 19(1)(1) of Ordinance No 2 of 15 March 2002 on the conditions and procedures for the approval of transport schemes and the provision of public passenger transport by bus, municipal councils approve, for each competitive tender procedure, the criteria and method for the evaluation and ranking of candidates. One of the criteria is that vehicles meet environmental protection requirements. In this connection, in the procedures for the award of contracts for the provision of public passenger transport in approved transport schemes, the possibility will be considered of adding extra points to the score of candidates offering vehicles powered by alternative fuels.

Article 21(1)(12) of Ordinance No 34 of 1999 on passenger transport by taxi **introduced a requirement** for taxis that are hybrids or are powered exclusively by an electric motor to be painted green.

3.1.3.2.2 State of recharging infrastructure for electric vehicles

In Article 56(1) of the Territorial Planning Act (TPA) 'electric-vehicle charging columns' are included only as movable objects. According to § 5(80) of the additional provisions of the TPA, a 'movable object' is an object intended for amusement, commercial or other service activities that can, after being separated from the surface on which it was placed and from the requisite technical infrastructure networks, be relocated without losing its individual features or the ability to be used elsewhere for the same purpose as, or similar purpose to, the one for which it was used in the place from which it was detached, and without its placement and/or removal permanently altering the substantive nature or method of use of the land or of the site on which it is placed or from which it is detached.

A charging column is a movable object for service activities. This is how charging columns for electric vehicles are regulated in the TPA, and they - more specifically their connection and

subsequent disconnection from the requisite technical infrastructure networks - are deemed to comply with the above definition.

The relevant competent authorities or organisations will specify the technical conditions, parameters and characteristics both of the facilities (the columns) and the technical infrastructure networks from which these columns will be powered in order to define the technical requirements applying to the movable object and to the power supply. This will determine the spatial requirements for the placement of these objects (where and under what conditions) and the requirements applying to their design and execution in terms of the **general principles** of the Territorial Planning Act and its implementing acts. This will also facilitate determination of the placement procedures in accordance with municipal ordinances.

Under Article 51(1)(6) and (7) of Ordinance No 8 of 2001 on the scope and content of spatial development plans (promulgated in SG No 57/2001; amended, SG No 68/2004; SG No 51/2005 and SG No 66/2008; amended and supplemented, SG No 22/2014; amended, SG No 56/2014), the detailed communications and transport plans drawn up in connection with detailed spatial development plans must also study, identify and determine the location, classification and parameters of car parks, including spaces with recharging infrastructure for electric vehicles (EVs), and bus stations, petrol stations and gas stations and spaces providing recharging infrastructure for EVs, where there is a stated intention to construct such facilities.

The urban communications and transport system encompasses street networks, public passenger transport, pedestrian and bicycle traffic, car park use, transport servicing facilities (repair shops, petrol stations, bus stations, etc.), as well as traffic control and management.

The detailed communications and transport plans drawn up in connection with detailed spatial development plans study, identify and determine the location, classification and parameters of car parks, bus stations, petrol stations and gas stations, including spaces with recharging infrastructure for electric vehicles.

It must be stated in the applicable regulatory act that the design, construction and installation of publicly accessible recharging/refuelling points installed on the national road network have (by alternative fuel type) to be coordinated with and approved by the Road Infrastructure Agency.

The following possibilities have to be discussed at municipal level:

- prohibition of non-electric vehicles in parking spaces reserved for electric vehicles (electric vehicle parking spaces);
- availability of two types of electric vehicle parking spaces - those used on a ‘first come, first served’ basis and those reserved for electric vehicles only.

Under the Ordinance on Parking Spaces it may be specified that every third space with a recharging point should be marked with a sign reading ‘Electric vehicles only’, while the other two places feature information panels pointing out the availability of recharging points (but not prohibiting non-electric vehicles from parking there). Later, as the number of electric vehicles increases, every second such space may be reserved for electric vehicles, and ultimately all parking spaces with recharging points will be out of bounds for non-electric vehicles.[5]

3.1.3.2.2.1 Design standards for recharging points for electric vehicles

Under § 2(11) of the additional provisions to Ordinance No RD-02-20-2 of 20 December 2017 on the Planning and Design of Communications and Transport Systems for Urban Areas (Regulation No RD-02-20-2) the terms ‘recharging point’, ‘normal power recharging point’ and ‘high power recharging point’ have the meanings defined in Article 2(3, 4 and 5) of Directive 2014/94/EU on the deployment of alternative fuels infrastructure. Under Article 157(1) of Ordinance No RD-02-20-2 recharging points (columns) for EVs are to be evenly distributed across urban areas, without restriction. The following paragraphs in the cited provisions lay down the requirements applying to recharging points: Article 157(2) of Ordinance No RD-02-20-2 stipulates that alternative current (AC) normal power recharging points for electric vehicles must be equipped, for interoperability purposes, at least with socket outlets or vehicle connectors of Type 2, in accordance with point 1.1. of Annex II

[5] The proposals were made by the Electric Vehicles Industrial Cluster.

(Technical Specifications) to Directive 2014/94/EU. While maintaining the Type 2 compatibility, those socket outlets may be equipped with features such as mechanical shutters. Article 157(3) of Ordinance No RD-02-20-2 stipulates that alternating current (AC) high power recharging points for electric vehicles must be equipped, for interoperability purposes, at least with connectors of Type 2, in accordance with the requirements set out in point 1.2. of Annex II (Technical Specifications) to Directive 2014/94/EU. Article 157(4) of Ordinance No RD-02-20-2 stipulates that direct current (DC) high power recharging points for electric vehicles must be equipped, for interoperability purposes, at least with connectors of the combined charging system 'Combo 2', in accordance with the requirements set out in point 1.2. of Annex II (Technical Specifications) to Directive 2014/94/EU. Under Article 157(5) of Ordinance No RD-02-20-2, it is also permissible for recharging points to be equipped with other connectors providing different functionality, and/or with hybrid connectors, provided they meet the requirements of point 1.1. and/or 1.2. of Annex II (Technical Specifications) to Directive 2014/94/EU. Article 158 of Ordinance No RD-02-20-2 stipulates that, when designing recharging stations with recharging points for electric vehicles, the requirements for the design, construction and maintenance of electrical installations, and the requirements set out in Article 50 of Ordinance No RD-02-20-2 regarding high power and normal power recharging points for electric vehicles must be complied with.

3.1.3.2.2.2. National standards ensuring conformity of technical specifications for electric recharging points for motor vehicles

The standards referred to in points 1.1. and 1.2. of Annex II (Technical Specifications) to Directive 2014/94/EU were introduced in Bulgaria by the following standards: BDS EN 62196-2:2012 (en), EN 62196-2 2012/A11:2013 (en), EN 62196-2:2012/A12:2014 (en), EN 62196-2:2017 (en), BDS EN 62196-3:2014 (en). An analysis of the standards introducing the standards referred to in Annex II to Directive 2014/94/EU is set out in point II of the Annex.

3.1.3.2.3 Connection of electricity customers to the electricity transmission or distribution network. Legal status of a recharging point operator

Powers under the Energy Act (EA) are vested in the Minister for Energy, who implements the energy policy of the Republic of Bulgaria, and the Energy and Water Regulatory Commission (EWRC), which regulates activities in the energy sector. The legislator has delegated to the EWRC powers to adopt ordinances provided for in the EA.

Ordinance No 6 of 24 February 2014 on the connection of electricity producers and customers to the transmission or distribution networks, adopted by the EWRC (promulgated in SG No 31/2014), governs:

- the conditions and procedures for connecting customers', electricity producers' and network operators' facilities to the transmission or distribution networks;
- changes in the connection of existing facilities and power plants to the electricity networks;
- the conclusion of connection contracts; suspension of the connection of customer facilities and power plants, and the property boundaries between the electrical equipment of customers/producers and electrical equipment forming part of the transmission/distribution network.

The EWRC also adopted Rules on measuring the amount of electricity (promulgated in SG No 98/2013), governing:

- the principles, methods and locations for measuring the amount of active and reactive electrical energy and power;
- measurement accuracy requirements, the verification of the technical and metrological characteristics of measuring instruments/systems and associated communications links;
- the content and maintenance of measurement system registers and primary databases, and access to the measurement system register;
- the reading, validation, processing, storage and provision of electricity measurement data;
- the rights and obligations of the measurement system owner and the parties to electricity transactions;

- the conditions and procedures for establishing cases of non-measured, incorrectly and/or inaccurately measured electricity amounts and the methods for adjusting (correcting) such amounts.

The structure of, conditions for participation in and rules for the conclusion of transactions on the electricity market are regulated by the Electricity Trading Rules adopted by the EWRC (promulgated in SG No 66/2013). The Ministry of Energy is the body competent to draw up a draft Act amending the Energy Act and transposing the provisions of Article 4(7), (8), first sentence, (9), (11) and (12) of Directive 2014/94/EU on the deployment of alternative fuels infrastructure;

Amendments need to be made in order to introduce the term 'operator of a recharging point' into Bulgarian legislation. The relationship between that operator and the relevant network operator also needs to be regulated.

The charging point operator will buy electricity wholesale and sell it to end customers (owners of electric vehicles), and therefore the relationship concerning connection to and use of the relevant electricity network and measurement of the electricity sold by the operator must be governed by the relevant legislation. The authority competent to regulate such public-law relationships is the EWRC.

The Energy and Water Regulatory Commission must take action to ensure that recharging point operators are able to provide electric vehicle recharging services to customers on a contractual basis, including in the name and on behalf of other service providers. In addition, the Commission must ensure that all recharging points accessible to the public also provide for the possibility for electric vehicle users to recharge on an ad hoc basis without entering into a contract with the electricity supplier or operator concerned.

The Consumer Protection Commission will take action to ensure that prices charged by the operators of recharging points accessible to the public are reasonable, easily and clearly comparable, transparent and non-discriminatory. In accordance with the provisions of Chapter Two, Section IV, 'Indication of the prices of goods and services', of the Consumer Protection Act, the Commission will monitor whether the prices charged by operators of recharging points accessible to the public are reasonable, easily and clearly comparable, transparent and non-discriminatory.

3.1.3.2.4 Electricity supply to stationary aircraft

The scope of ground handling services is regulated by Ordinance No 20 of 24 November 2006 on the certification of the fitness for operation of civil airports, airfields and ground handling systems and installations; the licensing of airport and ground handling operators; and access to the ground handling services market at airports.

Airport operators, who generally also act as ground service operators, provide electricity and heating/cooling to aircraft cabins as part of the overall package of ground handling services or under separate requests placed by air carriers.

3.1.3.2.5 Shore-side power supply installations for maritime transport

Under Article 17(3) of Ordinance No 9 of 2013 on operational suitability requirements for ports and port facilities, seaport-based vessel power supply equipment and networks which were built, reconstructed, upgraded or underwent major overhaul after 18 November 2017 must comply with the technical specifications set out in the standard BDS IEC/ISO/IEEE 80005-1:2016 (see point II of the Annex.)

3.2 Legislative framework - natural gas (liquefied and compressed), liquid petroleum gas

3.2.1 Excise duty rates

The current Excise Duties and Tax Warehouses Act provides for a lower excise duty rate of BGN 0.85 per 1 gigajoule on natural gas used as motor fuel and a zero excise duty rate on biogas used as motor fuel. The excise duty rate for liquefied petroleum gas is BGN 340 per 1 000 kg.

The main purpose of these lower rates is to reduce harmful emissions of carbon dioxide: the use

of natural gas and biogas has a more favourable effect on the environment as they emit significantly less carbon dioxide than other energy products.

3.2.2 European requirements

3.2.2.1 Type-approval of vehicles using liquefied petroleum gas or compressed natural gas

European legislation on type-approval contains requirements for motor vehicles powered by liquefied petroleum gas or compressed natural gas. The regulations containing requirements regarding these types of fuels are Ordinance No 60 of 2009; UNECE Regulation No 67 — Uniform provisions concerning: I. Approval of specific equipment of motor vehicles using liquefied petroleum gases in their propulsion system. II. Approval of a vehicle fitted with specific equipment for the use of liquefied petroleum gases in its propulsion system with regard to the installation of such equipment (OJ L 72, 14.3.2008 г.), UNECE Regulation No 110 — Uniform provisions concerning the approval of: I. Specific components of motor vehicles using compressed natural gas in their propulsion system. II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas in their propulsion system (OJ L 166, 30.6.2015) and Regulation (EC) No 692/2008. Ordinance No 60 of 2009 includes references to the two UNECE regulations mentioned above. Regulation (EC) No 692/2008 also refers to Section 1 of Annex 12 to UNECE Regulation No 83, setting out general requirements for testing vehicles fuelled by liquefied petroleum gas or compressed natural gas.

Article 3 of Regulation (EU) No 168/2013 sets out definitions relating to vehicles powered by liquefied petroleum gas or compressed natural gas, e.g. definitions of 'mono fuel gas vehicle', 'liquefied petroleum gas', 'natural gas', etc.

Commission Delegated Regulation (EU) No 134/2014 of 2013 supplementing Regulation (EU) No 168/2013 of the European Parliament and of the Council with regard to environmental and propulsion unit performance requirements and amending Annex V thereof (Delegated Regulation (EU) No 134/2014) (OJ L 53, 21.2.2014) sets out technical test requirements for category L vehicles powered by liquefied petroleum gas or compressed natural gas. The Regulation also includes a definition of 'alternative fuel vehicle'.

3.2.3 National requirements

3.2.3.1 Installation of kits for vehicle engines to run on liquefied petroleum gas (LPG) or compressed natural gas (CNG)

Ordinance No N-3 of 18 February 2013 on the modification of the construction of registered road vehicles and the individual approval of road vehicles registered outside the Member States of the European Union or another State that is a party to the Agreement on the European Economic Area (promulgated in SG No 21/2013) sets out national requirements for the individual approval and modification of the construction of registered road vehicles. Article 20 of the Ordinance lays down the requirements that have to be met when additional equipment is fitted to a motor vehicle to enable the engine to operate on liquefied petroleum gas or compressed natural gas. The requirements applying to such gas equipment are laid down in Annex 1 to Article 20(1) of the Ordinance. Also provided is a model report on the retrofitting of gas equipment to motor vehicles to be drawn up by persons fitting such equipment. The model report serves to standardise the documents to be issued when gas equipment is retrofitted and facilitates the work of persons carrying out initial inspection of such equipment. Article 26(3) to (5) lays down the requirements applying to persons carrying out initial inspections of gas equipment fitted to motor vehicles. Initial inspection of gas equipment is currently carried out by persons accredited under standard BDS EN ISO/IEC 17020 'General criteria for the operation of various types of bodies performing inspection' (EN ISO/IEC 17020). The accreditation certificate must be issued by the Executive Director of the Bulgarian Accreditation Service Executive Agency or by a national accreditation body of a European Union Member State.

3.2.3.2 State of natural gas refuelling infrastructure

Gas refuelling stations comprise a set of pressure vessels for fuel storage and a piping system meeting the definition of 'structure' given in § 5(38) of the Additional Provisions of the Territorial Planning Act and are to be categorised as a category-one structure within the meaning of Article 137(1)(1)(d) of the Act and Article 2(4)(1)(a) and (e) of Ordinance No 1 of 2003 on the nomenclature of types of structures (promulgated in SG No 72/2003).

The construction of gas refuelling stations involves the construction of additional protective facilities, installations and accompanying engineering infrastructure to ensure that such refuelling stations can be used safely.

Given the nature of gas refuelling stations, the potential risk of explosion and of significant adverse impacts on the environment, and the danger to the health and life of humans, their construction must be in compliance not only with the requirements of the legal framework for spatial planning but also with the specific requirements of regulations governing environmental protection, fire safety and the protection of health and life of humans.

3.2.3.3 Fire safety requirements for natural gas refuelling stations

The main requirements applying to the design, construction and operation of gas refuelling stations in relation to fire safety are laid down in Ordinance No Ih-1971 of 29 October 2009 on the construction rules and standards to ensure fire safety (promulgated in SG No 96/2009). Structures belonging to natural gas refuelling stations for motor vehicles come under **functional fire hazard class F 5.3**. The Ordinance sets out requirements applying to the total volume of tanks in gas refuelling stations located in and outside populated areas and on trading estates, minimum distances from tanks, vent pipes, waste oils pits, recharging columns and tank filling equipment to neighbouring structures, and the distance between tank pits and underground utility lines, etc.

3.2.3.4 Connection to gas transmission and gas distribution networks

The conditions and procedures for connection to gas transmission and gas distribution networks are laid down in Ordinance No 4 of 5 November 2013 on connection to the gas transmission and gas distribution networks, adopted by the EWRC (promulgated in SG No 105/2013).

The structure of, conditions for participation in and rules for the conclusion of transactions on the natural gas market are regulated by the Natural Gas Trading Rules (promulgated in SG No 59/2015).

3.2.3.5 Construction of facilities for and the waterway transport of liquefied natural gas

Under Article 112a of the Act on the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria, a decision to build a new or extend an existing public port of national importance can be taken only by the Minister for Transport, Information Technology and Communications in accordance with the Strategy for the Development of the Transport System of Bulgaria and the Transport Master Plan for Bulgaria approved by the Cabinet. The decision must be preceded by a preliminary (pre-investment) study and a draft master plan for the development of the port based on that study.

Investment projects for the construction of new or the extension of existing public ports of regional importance must be coordinated by the Minister for Transport, Information Technology and Communications and approved by the Minister for Regional Development and Public Works (Article 112d(5) of the Act on the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria).

Moreover, the construction and operation of inland ports, liquefied natural gas terminals or marine refuelling stations (buildings, facilities and infrastructure) require appropriate construction and operating permits under the Territorial Planning Act. An investor must also obtain other consents and permits under all applicable laws (Water Act, Environmental Protection Act, etc.).

The Minister for Transport, Information Technology and Communications, the Minister for Regional Development and Public Works and the Executive Agency 'Maritime Administration' (EA 'MA') are competent to take decisions on the construction and licensing of public ports (a port with LNG facilities qualifies as a public port).

The licensing procedure is initiated by the submission of an application to the Maritime Administration and is followed by the issuance of construction and operating permits under the Territorial Planning Act.

In addition, port activities and services may be carried out only in a port (including ship facilities and terminals) that is entered in the register of ports and has a certificate of suitability for operation under the Act on the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria.

The procedure for the issuance of a certificate of suitability for operation is set out in detail in Ordinance No 9 of 17 October 2013 on the operational suitability requirements for ports and specialised port facilities (promulgated in SG No 96/2013). The procedure is initiated on the basis of an application submitted by the port owner. The certificate is issued for a period of 35 years or for the duration of the concession awarded, provided that the port meets the specific requirements laid down in the Ordinance.

The port registration procedure is set out in detail in Ordinance No 19 of 9 December 2004 on the registration of ports in the Republic of Bulgaria (promulgated in SG No 111/2004). The procedure starts when the port owner submits an application to the Executive Director of the Executive Agency 'Maritime Administration'.

Under Article 117a of the Act on the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria, access to the port services market is defined as the right of port operators to provide services at public ports (a port with LNG refuelling facilities qualifies as a public port). Access to the port services market at public ports of national importance is granted by way of a concession. At public ports of regional importance, access is granted on the basis of a contract with the owners.

A public port is any port where port services and other accompanying activities are carried out against payment from/to vessels or land vehicles. The port and the port facilities must be accessible without limitation to all vessels and cargoes (Article 103(1) of the Act on the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria). Thus, third-party access to port facilities must be available to all interested parties on payment of a fee.

3.2.3.6 Regulation of liquefied natural gas transport

Under Bulgarian law, liquefied natural gas is classified as a dangerous good. It is therefore subject to specific provisions governing the loading/unloading and transport of dangerous goods. The current arrangements and procedures are set out in Ordinance No 16 of 20 June 2006 on the handling and transport of dangerous and/or polluting goods by sea and of dangerous goods by inland waterway (promulgated in SG No 53/2006), which transposes Directive 2008/68/EC, Directive 2009/17/EC, Directive 2011/15/EU, Directive 2014/103/EU and Directive 2012/45/EU.[6] Furthermore, Ordinance No 16 incorporates into Bulgarian legislation the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN), making the rules of the ADN directly applicable. The handling and transport of liquefied natural gas are thus regulated by the ADN.

The technical specifications of vessels are laid down in Ordinance No 22 of 22 December 2008 on technical requirements for inland waterway vessels (promulgated in SG No 9/2009), referring to the provisions of the ADN.

3.3 Legislative framework - hydrogen

3.3.1 State of refuelling infrastructure for hydrogen-powered vehicles

[6] Commission Directive 2012/45/EU of 3 December 2012 adapting for the second time the Annexes to Directive 2008/68/EC on the inland transport of dangerous goods to scientific and technical progress.

Refuelling points providing hydrogen as an alternative fuel for motor vehicles are deemed to be 'structures' within the meaning of Article 137(1)(1)(d) of the Territorial Planning Act.

The construction of a hydrogen refuelling station includes the following main components: a system for the production/supply of hydrogen, compression, buffer storage of gaseous hydrogen, a pre-cooling system, an automated gaseous hydrogen dispenser and an electric vehicle interface based on fuel cells.

A thorough analysis of secondary legislation showed a lack of regulations specifying requirements for the design, implementation, monitoring and entry into operation of hydrogen refuelling points.

Under Article 169(4) of the Territorial Planning Act, the Minister for Regional Development and Public Works, either alone or jointly with the competent ministers, issues regulations laying down the requirements for the design, implementation, monitoring and entry into service of structures, for the durability of buildings, the stability of foundation ground, requirements for an accessible environment for the population, including for people with disabilities, and structural safety requirements taking into account the influence of geographic, climatic and seismic effects, in accordance with the requirements set out in paragraph (1) and paragraph (3), subparagraphs (1), (2) and (3).

It this context, it is appropriate for the Ministry of Regional Development and Public Works, together with the Ministry of the Interior, the Ministry of the Environment and Waters, the Ministry of the Economy and the Ministry of Transport, Information Technology and Communications, to take the necessary steps to modify and supplement secondary legislation so as to specify the requirements for the design, implementation, monitoring and entry into service of hydrogen refuelling points.

The fire safety rules and standards applying to the design and construction of storage facilities, compressor stations and pipes for combustible gases (including hydrogen) are set out in Ordinance Iz-1971 of 20 October 2009 on construction rules and standards to ensure fire safety (promulgated in SG No 96/2009), issued by the Minister for the Interior and the Minister for Regional Development and Public Works.

The Ministry of the Interior and the Ministry of Regional Development and Public Works shall, where necessary, take action to amend the regulatory framework under secondary legislation concerning fire safety in the design and implementation of hydrogen refuelling points for motor vehicles.

3.3.1.1 National standards ensuring compliance of technical specifications for hydrogen refuelling points for motor vehicles

The standards referred to in point 2 of Annex II (Technical Specifications) to Directive 2014/94/EU were introduced in Bulgaria by the following standards: ISO/TS 20100 was repealed and replaced by ISO/TS 19880-1:2016, BDS ISO 14687-2:2016, BDS EN ISO 17268:2017 (see point II of the Annex).

Hydrogen refuelling points accessible to the public which were deployed or upgraded after 18 November 2017 must meet the technical specifications set out in point 2 of Annex II to Directive 2014/94/EU.

3.3.2 Registration of hydrogen-powered motor vehicles

Ordinance No I-45 of 24 March 2000 fully regulates the procedures for the initial registration and changes in the registration of vehicles, including hydrogen-powered motor vehicles.

3.3.3 Type-approval of hydrogen-powered motor vehicles

In Ordinance No 60 of 2009 on the type-approval of new motor vehicles and their trailers (promulgated in SG No. 40/2009; amended, SG No 75/2012; supplemented, SG No 77/2013) measures were adopted to ensure the application of Regulation (EC) No 79/2009 of the European Parliament and of the Council of 14 January 2009 on type-approval of hydrogen-powered motor vehicles, and amending Directive 2007/46/EC (*OJ L 35, 4.2.2009*). That European Regulation lays

down requirements for the type-approval of motor vehicles with regard to hydrogen propulsion, for the type-approval of hydrogen components and hydrogen systems and for the installation of such components and systems. Article 3 sets out definitions of 'hydrogen-powered vehicle', 'hydrogen component', 'hydrogen system', 'hydrogen fuel cell vehicle', 'mono fuel gas vehicle', etc.

„**'Hydrogen-powered vehicle'** means any motor vehicle that uses hydrogen as fuel to propel the vehicle;

'Hydrogen component' means the hydrogen container and all other parts of the hydrogen-powered vehicle that are in direct contact with hydrogen or which form part of a hydrogen system;

'Hydrogen system' means an assembly of hydrogen components and connecting parts fitted on hydrogen-powered vehicles, excluding the propulsion systems or auxiliary power units;

'Hydrogen fuel cell vehicle' means a vehicle powered by a fuel cell that converts chemical energy from hydrogen into electric energy, for propulsion of the vehicle;

'Mono fuel gas vehicle' means a mono fuel vehicle that primarily runs on LPG, NG/biomethane, or hydrogen but may also have a petrol system for emergency purposes or starting only, where the petrol tank does not contain more than 5 litres of petrol; etc.

Regulation (EC) No 79/2009 is a separate regulatory act of the European Union for the purposes of the procedure for the type-approval of vehicles laid down in Directive 2007/46/EC.

Following the entry into force of Commission Regulation (EU) No 406/2010 of 26 April 2010 implementing Regulation (EC) No 79/2009 on type-approval of hydrogen-powered motor vehicles, manufacturers have to be able to apply for the EC whole-vehicle type-approval of hydrogen-powered vehicles on a voluntary basis

Ordinance No 60 fully regulates the procedures for the type-approval of vehicles, including hydrogen-powered motor vehicles.

To receive type-approval, vehicles must meet the requirements set out in the regulatory acts listed in Annex IV or XI to Directive 2007/46/EC (Annex No 10 or 11 to Ordinance No 60), and hydrogen-powered motor vehicles must also meet those set out in Regulation (EC) No 79/2009.

Commission Delegated Regulation (EU) No 134/2014 of 16 December 2013 supplementing Regulation (EU) No 168/2013 of the European Parliament and of the Council with regard to environmental and propulsion unit performance requirements and amending Annex V thereof (OJ L 53, 21.2.2014) sets out technical test requirements for category L vehicles powered by hydrogen. The Regulation also includes a definition of 'alternative fuel vehicle'. With regard to the hydrogen equipment used for category L vehicles, the requirements set out in Regulation (EC) No 79/2009 apply.

3.4. Legislative framework - biofuels

In May 2011, the Republic of Bulgaria transposed Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009) by the Energy from Renewable Sources Act (ZEVI).

Article 12 of that Act lays down Bulgaria's mandatory national goal of a 16% total share of renewable energy in gross final energy consumption, including a mandatory 10% share of renewables in transport.

The necessary quantity of biofuels and energy from renewable sources in transport is determined as a share of the final consumption of petrol, diesel and biofuels in road and rail transport, and electricity from renewable energy sources used in the transport sector

Under Article 36 of the Energy from Renewable Sources Act, the production and consumption of biofuels and energy from renewable sources in transport are to be promoted by:

1. making such transport fuels accessible;
2. ensuring efficient engine operation in compliance with the technical and quality standards for biofuel production;
3. offering biofuel blends as a component of petroleum-derived liquid fuels for internal combustion engines;
4. the sustainable development of agriculture and forestry;
5. the development and implementation of new technologies for the use of waste, residues, non-food cellulosic and lignocellulosic materials for biofuel production;

6. the development and use of electric vehicles in public and private transport;
7. the incorporation of electric vehicle recharging stations in the construction of new or refurbishment of existing urban car parks;
8. The provision of electric vehicle recharging infrastructure outside urban areas;
9. financial support for biofuel use.

Financial support for the production and use of biofuels and renewable energy in transport, and of bioliquids, will be provided, but only if sustainability criteria are met. Where financial support is provided for the production of biofuels, priority will be given to their production from waste, residues, and non-food cellulosic and lignocellulosic materials.

Under Article 37 of the Energy from Renewable Sources Act, biofuels and bioliquids are eligible for support only if the raw materials used in their production meet the specified sustainability criteria. One of those criteria is that use of the biofuels and bioliquids produced must result in the following reductions in greenhouse gas emissions:

a) at least 35% - by 31 December 2016;

b) at least 50% - from 1 January 2017;

c) at least 60% for biofuels and bioliquids produced in installations in which production started as from 1 January 2017 - from 1 January 2018.

The life-cycle greenhouse gas emissions of biofuels and bioliquids are calculated according to the methodology approved under Article 44(3) of the Energy from Renewable Sources Act.

The adoption in 2012 of the Ordinance laying down the sustainability criteria for biofuels and bioliquids (promulgated in SG No 95/2012) was linked to Bulgaria's commitments to achieve a reduction in the life-cycle greenhouse gas emissions of the fuels and energy supplied. That reduction can be achieved primarily by blending conventional fuels with biofuels, and in the production of heat and electricity from bioliquids meeting the sustainability criteria.

The goals of the Ordinance relate to the following:

- establishment of sustainability criteria for biofuels and bioliquids;
- conditions and procedures for the collection and submission of information by the economic operators, including in relation to measures taken to protect soil, land, water, air, etc.;
- approval of certification schemes and certification bodies;
- auditing of biofuel and bioliquid conformity with sustainability criteria;
- issuance of certificates of conformity.

To implement these goals, producers and importers of biofuels and bioliquids (economic operators) were obliged to report the greenhouse gas intensity of the biofuels and bioliquids supplied by them within Bulgaria over the previous year and their compliance with the sustainability criteria.

Against the background of Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009, the Environmental Protection Act laid down a national goal of a 6% reduction in the greenhouse gas emission intensity resulting from the use in transport of biofuels and bioliquids meeting the sustainability criteria. The Ministry of the Environment and Waters is responsible for the achievement of that goal.

Article 47 of the Energy from Renewable Sources Act introduced the following matrix for blending biofuels (biodiesel and bioethanol) with fossil fuels. It became mandatory as from 1 January 2012:

Table 1 Mandatory percentage proportions for blending diesel and petrol with biofuels

Biodiesel (volume %)		Bioethanol (volume %)		Double reporting
1 Jan 2012	5	1 June 2012	2	No
1 June 2012	6	1 March 2013	3	
		1 Sept 2013	4	
		1 March 2014	5	
		1 Sept 2014	6	
		1 March 2015	7	
		1 Sept 2018	8	
		1 March 2019	9	

The Energy from Renewable Sources Act also lays down the specific commitments and responsibilities of mayors, who have to draw up and submit to municipal councils for approval long- and short-term programmes promoting the use of energy from renewable sources and biofuels in accordance with the National Renewable Energy Action Plan (NREAP). The programmes include specific measures for the use of biofuels and/or energy from renewable sources in municipal transport, as well as schemes supporting projects for the production and consumption of biofuels and renewable energy in transport, etc. Mayors also have to carry out annual information and education campaigns among the population of the respective municipality regarding the support measures and the benefits and practicalities involved in the development and use in transport of electricity, heating or cooling from renewable sources, gas from renewable sources and biofuels and energy from renewable sources.

Separately, Article 2(2)(e) of Directive (EU) 2015/1513 required each Member State to set, by 6 April 2017, a national target for a minimum level of consumption on its territory of biofuels produced from feedstocks and of other fuels, listed in part A of Annex IX. A reference value for this target is 0.5 percentage points in energy content of the share of energy from renewable sources in all forms of transport in 2020. Under conditions specified in Directive (EU) 2015/1513, Member States may set a national target lower than the reference value. Under the draft Act amending the Energy from Renewable Sources Act, the national target was set at 0.05%. The Directive also set a limit of 7% for the share of conventional biofuels in the final consumption of energy in transport in 2020 (these are biofuels produced from raw materials used for production of food and grown on agricultural land). The remaining amount required to reach the mandatory 10% share of renewable energy in transport must be achieved through the use of new generation biofuels (Annex IX) and electricity from renewable sources.

Bulgaria's position regarding infringement proceedings No 2017/0518 for failure to transpose Directive (EU) 2015/1513 within the time limit is that the requirements set out therein will be transposed into national law by:

- an Act amending the Energy from Renewable Sources Act;
- an Ordinance amending Ordinance No RD-16-869 of 2 August 2011 on the calculation of the total share of energy from renewable sources in gross final energy consumption and use of biofuels and renewable energy in transport;
- a Cabinet Decree on the adoption of an Ordinance amending the Ordinance on the sustainability criteria for biofuels and bioliquids;
- supplementing the method for calculating the reduction of life cycle greenhouse gas emissions from biofuels or bioliquids;
- a Cabinet Decree amending the Ordinance on the quality requirements for liquid fuels and the conditions, procedures and method for monitoring such fuels.

3.4.1 Type-approval of biofuel-powered motor vehicles

The regulations laying down type-approval requirements for biofuel-powered motor vehicles are Ordinance No 60 of 2009, Regulation (EC) No 692/2008, Regulation (EU) No 168/2013 and Delegated Regulation (EU) No 134/2014.

Regulation (EU) No 168/2013 and Regulation (EC) No 692/2008 contain a definition of:

'Flex fuel biodiesel vehicle'- a flex fuel vehicle that can run on mineral diesel or a mixture of mineral diesel and biodiesel.

Regulation (EU) No168/2013 also includes definitions of:

'Biodiesel' - a vegetable oil- or animal fat-based diesel fuel consisting of long-chain alkyl esters produced in a sustainable way;

'Biomethane' - a renewable natural gas made from organic sources that starts out as 'biogas' but then is cleaned up in a process called 'biogas to biomethane' which removes the impurities in biogas such as carbon dioxide, siloxanes and hydrogen sulphides (H_2S).

3.5 Legislative framework - provision of information to users

The requirements set out in Article 7(1), 'User information', of Directive 2014/94/EU were transposed by Article 10(1), Article 12(1) and (2) and Article 14(1) of the Ordinance on the labelling

of new passenger cars and on the provision of information on fuel economy and carbon dioxide emissions.

The Ordinance transposed the requirements of Directive 1999/94/EC of the European Parliament and of the Council of 13 December 1999 relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars The Ordinance applies to passenger cars - category M1 motor vehicles within the meaning of Article 149(1)(2)(a) of the Road Traffic Act - and sets out the requirements for the labelling of new passenger cars offered for sale or rental and the provision of information to consumers on fuel economy and carbon dioxide emissions by means of an information panel/monitor located at the place of sale.

4 INVESTMENT SUPPORT UNDER OPERATIONAL AND OTHER PROGRAMMES RELATED TO ALTERNATIVE FUELS

4.1 Scheme for partially subsidising the purchase of electric and hybrid vehicles by the public administration

The Climate Investment Programme is the National Trust EcoFund's most recent programme contributing to climate change mitigation, under which projects leading directly or indirectly to a reduction in greenhouse gas emissions are financed. In a certain way, it represents the continuation of the National Green Investment Scheme.

A pilot scheme was launched for the first time in Bulgaria in May 2016 to provide partial funding for the purchase of electric or hybrid electric vehicles for public institutions so as to optimise fuel costs and cut greenhouse gas emissions. The funding provided amounted to BGN 1 million.

The scheme promoting the use of electric and hybrid electric vehicles under the National Trust EcoFund's Climate Investment Programme implements Directive 2009/33/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles. The Clean Vehicle Directive requires entities purchasing road vehicles to take account of energy consumption and environmental impact - emissions of carbon dioxide, hydrocarbons, exhaust gases and particulate matter

The requirements set out in the Directive were transposed into Bulgarian legislation by the Public Procurement Act. Its provisions set out the minimum requirements applying to the supply of such road vehicles. When awarding public procurement contracts for the supply of road vehicles under Annex 11 to the Public Procurement Act, contracting entities must calculate certain life-cycle costs applying the methodology set out in Ordinance No N-18 of 8 August 2016 on the determination of a methodology for calculating certain costs over the entire life cycle of road vehicles, issued by the Minister for Transport, Information Technology and Communications (promulgated in SG No 66/2016). The criteria for evaluating project proposals and for conducting public procurement procedures under the National Trust EcoFund's scheme to promote the use of electric vehicles must be in compliance with the Public Procurement Act.

On 13 October 2011, the Cabinet adopted a National Action Plan for the Promotion of Green Public Procurement for the period 2012-2014. A key part of the remit was to define product groups of environmentally friendly vehicles that were to be the subject of incentives designed to step up their market penetration in Bulgaria. In line with EU strategy documents, the plan included preferential treatment for electric and hybrid vehicles.

Energy-efficient vehicles, including electric vehicles, have a higher initial cost than conventional vehicles. As set out in the above-mentioned European documents and shown by the practical experience of individual Member States, demand-stimulating measures are essential to persuade consumers to purchase environmentally beneficial vehicles in sufficient numbers, particularly in the initial phase of their introduction.

The National Trust EcoFund's is the first such scheme aimed at promoting the use of electric vehicles by central and local government administrations.

By a decision dated 14 June 2016, the National Trust EcoFund's Management Board approved projects for the partial grant financing of a total of 34 electric vehicles and 10 hybrid (plug-in) electric vehicles.

The environmentally friendly vehicles purchased will save 138 tonnes of carbon dioxide a year.

The approved beneficiaries included four State institutions - the Ministry of the Environment

and Waters, the Ministry of the Economy, the Ministry of Labour and Social Policy and the Executive Agency 'General Labour Inspectorate'.

The projects of the following 22 municipalities were also approved: Asenovgrad, Pomorie, Gorna Oryahovitsa, Burgas, Tran, Razlog, Vidin, Stara Zagora, Samokov, Gabrovo, Maglizh, Smolyan, Plovdiv, Sliven, Varna, Popovo, Slivnitsa, Banite, Malko Tarnovo, Nikola Kozlevo, Nessebar and Pleven.

The 44 electric vehicles and electric hybrid vehicles purchased will be used for:

- serving municipal facilities under construction;
- monitoring the municipal road network;
- ongoing control and security of municipal facilities/sites;
- checks on facilities/sites in response to citizens' alerts;
- site/facility visits connected with the protection of water resources;
- dealing with infrastructure- and ecology-related emergencies in densely populated areas;
- social care;
- monitoring and enforcement of parking rules, etc.

By Cabinet Decision No 27 of 13 January 2017, BGN 1 million was provided to continue the scheme for promoting the use of electric vehicles that started in 2016 under the National Trust EcoFund's Climate Investment Programme.

4.2 Operational Programme Environment 2014-2020

The Operational Programme Environment 2014-2020 (OPE 2014-2020) provides financing in the areas of 'Water', 'Waste', 'Natura 2000 and Biodiversity', 'Flood and Landslide Risk Prevention and Management' and 'Improvement of Ambient Air Quality'.

The following activities are eligible for financing in the area of 'Improvement of Ambient Air Quality'.

1. Review and analysis of municipal air quality plans (AQPs) and support for their subsequent drafting/revision and control.
2. Measures addressing pollution from domestic heating.
3. Measures addressing pollution from public transport:
   - measures to reduce pollution of ambient air by public transport;
   - other additional measures identified by beneficiaries as being appropriate in pursuit of project objectives and resulting from the review and analysis of municipal AQPs.

4.3 Operational Programme Regions in Growth 2014-2020

The Managing Authority of the Operational Programme Regions in Growth 2014-2020 has not planned any specific measures to support the deployment of refuelling infrastructure for alternative fuels. Among the project proposals under investment priority 'Integrated Urban Transport', the construction of refuelling and recharging infrastructure designed exclusively for urban public transport purposes could be included as an eligible activity under grant award procedure BG16RFOP001-1.001-039 'Implementation of Integrated Plans for Urban Regeneration and Development 2014-2020', if such infrastructure is considered to be an essential component following the feasibility study.

4 3 1 Financial instrument JESSICA

New European priorities for the programming period 2014-2020 include combining grants with financial instruments and reducing national co-financing. *This will create scope for attracting more funding from private investors.*

The largest growth in the volume of financial instruments is reported under Operational Programme Regions in Growth (OPRG). Under that Programme, financial resources for financial engineering have

increased more than tenfold compared with the previous programming period, from around EUR 25 million to around EUR 254 million[7].

The financial instruments for investment in urban development will be implemented in 39 towns and cities across Bulgaria. Five funds will be created with resources totalling BGN 253.80 million for financial instruments under the OPRG. Of those, three are for urban development - for Sofia, Northern Bulgaria and Southern Bulgaria. EUR 146.5 million has been allocated to these three funds.

It is hoped that expanding support through financial instruments under the OP Regions in Growth will attract additional financial resources. This has been proven to work in practice in projects under JESSICA, where between 100% and 200% additional public and private capital has been provided

The Financial instrument JESSICA (Joint European Support for Sustainable Investment in City Areas) is a joint initiative of the European Commission (EC), the European Investment Bank (EIB) and the Council of Europe Development Bank (CEB).

This instrument promotes sustainable urban development by supporting projects in the field of urban infrastructure - including transport.

Funding under **JESSICA** is invested in the form of low-interest long-term loans or through equity participation in urban projects. The main requirement projects must meet in order to receive funding is their inclusion in the integrated urban regeneration and development plan. They must also constitute eligible activities under Priority Axis 1 'Sustainable and Integrated Urban Development' of Operational Programme Regions for Growth 2014-2020.

EUR 234 million was proposed for financing through the financial instrument JESSICA under Operational Programme Regions in Growth 2014-2020 for Bulgaria. The funds earmarked for financial instruments in the field of Integrated Urban Transport under Operational Programme Regions in Growth 2014-2020 amount to BGN 18.5 million[8].

4.4 Cross-Border Cooperation Programme INTERREG V-A Romania-Bulgaria 2014-2020

Under this programme, a third call for project proposals is pending with a view to financing activities under priority axes: PA 1 'A Well Connected Region', PA 2 'A Green Region', and PA 3 'A Safe Region'. It has to be borne in mind, however, that the list of activities described in the programme documents (Programme, Application Guidelines) is indicative. To be eligible, a proposal must contribute to the development of the refuelling infrastructure for alternative fuels in the administrative and territorial units of the two countries in the cross-border region. Under the rules of the programme INTERREG V-A Romania-Bulgaria 2014-2020, 85% of project budgets is financed by the European Regional Development Fund (ERDF), 13% is provided by the National Authority, the Ministry of Regional Development and Public Works, in the form of national co-financing, and the remaining 2% is contributed by project partners from their own funds. The criteria and priorities applied in the selection of projects are approved by the Joint Monitoring Committee (JMC), which is the main decision-making body under the programme. Each project is required to include at least one partner from each of the two partner countries — Romania and Bulgaria. The projects must have a

[7] Y. Avramov, A. Banev, Application of Financial Engineering in Public-Private Projects, IPA 2016.
[8] http://wp.jessicafund.bg/bg/programa-regioni-v-rastezh-predvizhda-234-mln-evro-za-proekti-po-jessica-v-blgariya/

clear cross-border effect and comply with the principles of joint development and joint implementation. To be eligible under the programme, the participating partners must not generate profit from their core business and must not receive State aid. Each project must fulfil at least one of the following two criteria - there must be a joint team or the project must be jointly financed.

4.5 Financing projects in the field of alternative fuels and technologies through the Scientific Research Fund

Over the period 2008-2014, the Scientific Research Fund financed six projects related to alternative fuels and alternative propulsion technologies at a cost of BGN 752 030. The projects were mostly concerned with the production of alternative fuels from biomass, bioethanol and new fuel cells based on chemical and microbial processes.

Alternative fuels and propulsion technologies fall within the scope of biological, agricultural and engineering sciences as areas open for applications and submission of proposals.

Under the Scientific Research Fund's annual operational programme for 2016, BGN 4 500 000 was earmarked for fundamental scientific research. The scientific fields referred to above also fell within its scope.

It is planned to increase that amount or keep the budget funds unchanged up to 2020. With regard to alternative fuels and propulsion technologies, funding has neither been planned nor promised for specific thematic competitions.

Currently, 44 Bulgarian organisations are participating in the implementation of 34 projects under the 'Secure, Clean and Efficient Energy' section of the Horizon 2020 Framework Programme. The financing they have received or are expected to receive amounts to approximately EUR 5 410 000.

Nine Bulgarian organisations are involved in consortia implementing seven projects under the 'Smart, Green and Integrated Transport' section of Horizon 2020. The financing the Bulgarian organisations are to receive will amount to approximately EUR 1 524 000.

Eleven Bulgarian organisations belong to consortia implementing seven projects under the Horizon 2020 Framework Programme's 'Climate Action, Environment, Resource Efficiency and Raw Materials' section. The funding the Bulgarian organisations have received or are expected to receive amounts to approximately EUR 712 000.

A project to build a pilot model of technological infrastructure for electromobility in Bulgaria, structured in accordance with the funding requirements of OP Science and Education for Smart Growth 2014-2020, was launched in 2016[9].

The project is aimed at implementing the whole process of adapting the electric vehicle (electric car) concept in line with the key educational and research programmes in the field until electromobility has been fully implemented in selected regions of Bulgaria. For the purposes of the project, a sophisticated infrastructure has to be put in place so as to make electric vehicles a viable alternative to conventional motor vehicles. This entails bringing together partners from education, non-governmental organisations (NGOs) and the private sector.

The project provides for the design, construction, testing and commissioning of a pilot model of a 'smart' electric network operated by specially developed software and consisting of universal electric charging stations with associated charging terminal infrastructure. The network, its terminals and the vehicles connected for recharging will be integrated into the national grid system and will help to balance out peaks and troughs in consumption. Software solutions will be trialled with the aim of endowing the network with universal connection, control and monitoring capabilities.

Research on the infrastructure created should allow scope for the connection of as many branded and network (smart-grid/smart-city) solutions as possible and all types and brands of electric charging stations, thus providing a basis for free competition and attracting investment in this sector. Research will be concentrated in three geographic centres that will explore both grid behaviour and communication; the application of electromobility will be studied in different environments and under different conditions.

[9] The data on the project were provided by the Ministry of Education and Science. The project was organised by a consortium including the Ruse 'Angel Kanchev' University , the 'Todor Kableshkov'Higher School of Transport', the 'Smart Economy' Cluster and others.

A certain number of electric vehicles will be purchased for the purposes of the project, initially to serve as models for synchronisation and adaptation of the system, and subsequently as the basis for developing and expanding the system to include a broad range of services and activities enhancing the operational capabilities both of the network and the vehicles themselves. These will be made available applying the 'Zipcar' principle, providing a new type of transport service in Bulgaria in order to popularise electromobility and demonstrate its advantages in actual practice.

4.6 Operational Programme Science and Education for Smart Growth 2014-2020

The procedures planned under the Operational Programme Science and Education for Smart Growth (OP SESG) 2014-2020 in implementation of the goals of the Research Development Strategy and the National Roadmap for Research Infrastructure are linked to the first of the three main priority axes of the programme — Research and Technological Development, with a budget of close on BGN 545.8 million from the European Regional Development Fund. The priorities outlined here include enhancing the quality of research into and development of innovations. The national goal is to achieve sustainable growth in Bulgaria. That requires targeted investment in national priority research areas, as well as highly qualified researchers and inventors and an attractive scientific environment.

INVESTMENT PRIORITY No 1

- Centres of competence
- Centres of excellence
- Scientific infrastructure
- Development of regional smart specialisation
- International cooperation

It was planned to set up regional research centres in 2017: The main objective of the operation is to build regional capacity at research institutions and universities for specialisation in accordance with the Innovation Strategy for Smart Specialisation (ISSS). The regional research centres will represent regional research organisations and universities that do not have the critical mass to become effective centres of excellence or centres of competence but play an important regional role in the development of the local innovation ecosystem. The programme will support several infrastructures in each of the six major geographic regions of Bulgaria (excluding Sofia).

Unique research infrastructures: The main purpose of Component 1 of the operation is to support the development of capacity to carry out research and innovations in Bulgaria by setting up a new, and upgrading the existing, unique research infrastructure to enable the Bulgarian scientific and business communities to access the most recent scientific discoveries and cutting-edge technologies in the EU. This will allow Bulgarian research organisations with their unique infrastructure and specific expertise to be included in pan-European complexes identified in the European Roadmap for Research Infrastructures. The main purpose of Component 2 of the operation is to support Bulgarian researchers in obtaining free and convenient access to international databases of scientific information and publications as they cannot be fully effective in their research without such access. This will also support researchers' efforts to achieve full integration into the European Research Area, including in relation to the development of future and emerging technologies at European level. Support under OP SESG for access to international databases and publications in recognised scientific journals will promote the internationalisation and competitiveness of Bulgarian science and the country's economy. Support for enhancing the quality of scientific publications and their preparation for inclusion in reference and scientometric databases will ensure promotion of research results and international recognition for Bulgarian scientists, as well as enhancing international cooperation.

4.7 Rural Development Programme 2014-2020

The Rural Development Programme[10] for 2014-2020, co-financed by the European Agricultural Fund for Rural Development, provides support for the production of biofuels under the following measures:

- measure M04 'Investments in physical assets': sub-measure 4.1 'Investments in agricultural

[10] http://archive.eufunds.bg/bg/page/984

holdings' and sub-measure 4.2 'Investments in processing/marketing of agricultural products';

- measure M06 'Farm and business development': sub-measure 6.2 'Start-up help for non-agricultural activities' and sub-measure 6.4 'Investments to support non-agricultural activities'

Biofuel and bioliquid production projects are supported if they meet the sustainability criteria set out in the Energy from Renewable Sources Act (ERSA)[11].

5. CURRENT STATE OF ENERGY CONSUMPTION IN TRANSPORT

5.1 General information on energy and fuel consumption in the transport sector

The use of ever-cleaner fuels and energy is one of the key prerequisites for the development of sustainable transport in the future.

The consumption of fuels and energy in transport, expressed in thousands of tonnes of oil equivalent, represents the sector's final energy consumption and is a major indicator of its impact on the environment. Energy consumption in transport grew continuously over the period 2000-2014.

Table 2. Consumption of energy and fuel in the transport sector

Year	Final energy consumption in transport	Share of transport in Bulgaria's final energy consumption, in %
2000	1 839	21.8
2001	1 948	23.2
2002	2 055	24.1
2003	2 319	25.3
2004	2 396	26.9
2005	2 642	28.5
2006	2 801	28.8
2007	2 678	28.1
2008	2 832	30.1
2009	2 772	32.7
2010	2 738	31.4
2011	2 722	30.1
2012	2 871	31.7
2013	2 604	30.3
2014	2 937	33.2

Source: NSI

The data in the table above also highlight the growth of transport's share in Bulgarian final energy consumption – from 21.8% in 2000 to 33.2% in 2014.

Road transport is a major contributor to final energy consumption in transport, accounting for 92.9% of the sector's total fuel consumption in 2014.

[11] Articles 37-40 of the Energy from Renewable Sources Act

Fig. 1 Final energy consumption in toto* and by transport type** over the period 2000 – 2014 (thousand tonnes of oil equivalent)

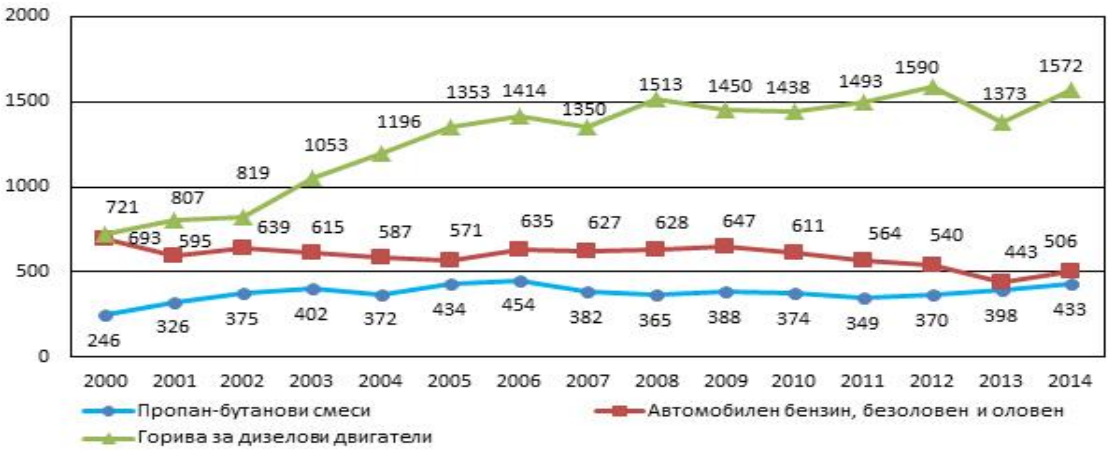
[*Key: Общо = Total; Автомобилен транспорт = Road transport; Железопътен транспорт = Rail transport; Въздушен транспорт = Air transport*]

Source: NSI
** total final consumption in transport includes not only petroleum fuels but also electricity for Bulgarian State Railways (BDZ)/urban public transport and natural gas for road vehicles*
*** with the exception of maritime and pipeline transport*

5.1.1 Consumption of unleaded petrol/diesel

The period 2000-2014 saw an upward trend in consumption of unleaded petrol and diesel fuel and comparatively constant consumption of energy from propane-butane blends in the road transport sector.

Fig.2. Consumption of fuels in road transport over the period 2000-2014, in thousands of tonnes of oil equivalent



[Key: Пропан-бутанови смеси = Propane-butane mixtures; Автомобилен бензин = Automotive petrol; Горива за дизелови двигатели = Fuels for diesel engines]

Source : NSI

According to NSI data, the use of diesel fuels in road transport more than doubled, rising from 721 000 tonnes of oil equivalent in 2000 to 1 572 000 in 2014.

The use of petrol over the period remained at around 593 000 tonnes of oil equivalent per year on average (the use of leaded petrol was discontinued in 2004) and the use of jet fuels almost doubled (compared to 2000), soaring to 178 000 tonnes of oil equivalent in 2014.

5.1.2 Consumption of propane-butane/natural gas

In 2014 the amount of propane-butane mixtures consumed in transport stood at 433 000 tonnes of oil equivalent, 1.8 times more that in 2000. Natural gas consumption in transport in 2014 amounted to 100 000 tonnes of oil equivalent. It was thus 5.3 times higher than in 2005 and accounted for a 3.4% share of final energy consumption in transport, as shown in Table 3.

Table 3 Final energy consumption in transport by energy product type over the period 2005 - 2014

Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	
Total	2 642	2 801	2 678	2 832	2 778	2 738	2 722	2 871	2 604	2 937	
Petroleum and petroleum products		2 588	2 737	2 607	2 763	2 687	2 626	2 615	2 697	2 399	2 702
Natural gas		19	25	37	35	49	66	61	65	79	100
Electricity		35	34	32	30	38	32	29	23	22	24
Biomass and industrial waste and other RES	-	5	2	4	4	14	17	86	104	111	

Source: Energy balances, NSI

5.1.3 Consumption of biofuels

In 2014 consumption of biofuels (biodiesel and bioethanol) in road transport showed a significant increase over 2010, amounting to 111 000 tonnes of oil equivalent. Biodiesel consumption in 2014 stood at 96 000 tonnes of oil equivalent, compared with 11 000 in 2010. Over the period 2010-2014, consumption of biodiesel thus rose by a factor of 8.7. Consumption of bioethanol was recorded for the first time in 2013, amounting in that year to 8 000 tonnes of oil equivalent. In 2014, consumption stood at 15 000 tonnes of oil equivalent - more than twice that of the previous year.

Table 4 Consumption of biofuels in transport, in thousand tonnes of oil equivalent

Year	2010	2011	2012	2013	2014
Bioethanol	-	-	-	8	15
Biodiesel	11	17	86	96	96
Other liquid biofuels	3	-	-	-	-

Source: NSI

Biodiesel's share in total consumption of diesel fuels in road transport in 2014 amounted to 6.38%. Table 5 sets out the share of biodiesel in total consumption of diesel fuels in the road transport sector over the period 2006-2014.

Table 5 Share of biodiesel in total consumption of diesel fuels in road transport over the period 2006-2014, in %

2006	2007	2008	2009	2010	2011	2012	2013	2014
0.63	0.30	0.27	0.42	1.59	1.27	5.69	7.17	6.38

Source: NSI

Following the entry into force of the Ordinance on sustainability criteria for biofuels and bioliquids at the beginning of 2013, the consumption of energy from renewable sources in the transport sector increased significantly that year and in 2014. In 2013 and 2014, transport-sector consumption of biofuels meeting the sustainability criteria amounted respectively to 104 000 and 111 000 tonnes of oil equivalent. The breakdown in 2013 was: 105 435 tonnes (96 000 tonnes of oil equivalent) of biodiesel and 12 568 tonnes (8 000 tonnes of oil equivalent) of bioethanol; and in 2014: 106 321 tonnes (96 000 tonnes of oil equivalent) of biodiesel and 22 824 tonnes (15 000 tonnes of oil equivalent) of bioethanol.

For 2016 the national target under the National Action Plan for Energy from Renewable Sources was a 7.1% renewables share in transport (or 154 000 tonnes of biodiesel meeting the sustainability criteria). In the first half of 2016, 30 000 tonnes of biodiesel meeting the sustainability criteria and 6 000 tonnes of biodiesel not meeting those criteria were distributed in Bulgaria[12].

In 2015 and 2016 a single company met over 90% of demand for biodiesel on the Bulgarian market and the data on the biodiesel it distributed can be regarded as representative for the whole country.

The information set out above highlights the problems associated with the fuels and energy used in the transport sector. These can be summarised as follows:

- poor structure of the energy mix in the transport sector, with gaseous fuels accounting for just a 3.4% share and electricity for 0.8%.
- 92% of the energy used in transport is provided by petroleum products, which are the biggest polluters of the air;
- negative trends in the development of the fuel mix structure, with post-2000 growth rates for diesel use outstripping those for unleaded petrol.

6. Breakdown of vehicle fleet by type of fuel used

Vehicles running on petrol accounted for the lion's share of the motor vehicle fleet in 2015, followed by those running on diesel.

At 31 December 2015 there were 3 162 115 cars registered in Bulgaria. Of that total, 147 run on electricity and only four on biofuel.

Table 6 shows the number of cars and buses by type of fuel used.

Table 6 Number of cars and buses by type of fuel at 31 December 2015

Fuel type	Cars	Buses
Unknown	49 711	129
Hydrogen	0	0
Petrol/Natural gas	11 901	12
Petrol/Liquefied gas	120 745	27
Natural gas	1 001	340
Diesel/Electricity	40	2
Petrol/Electricity	1 262	0
Biofuel	4	4
Liquefied gas	161	4
Gas	41	64

[12] The data were provided by Astrabioplant OOD, a subsidiary of Bulmarket DM OOD.

Electric motor	147	2
Diesel/Gas	28	10
Diesel	1 150 010	20 751
Petrol/Gas	62 881	51
Petrol	1 764 183	2 074

Source: National Police General Directorate - Ministry of the Interior

There are 1 764 183 cars running on petrol and 1 150 010 on diesel. A further 62 881 cars run on petrol and gas. And 41 vehicles run on gas alone. 40 vehicles run on diesel and electricity and 1 262 on petrol and electricity. There are 1 001 vehicles running on natural gas. Of 23 470 buses, 20 751 run on diesel.

Of 396 583 lorries, 322 293 run on diesel and 63 346 on petrol. Another 3 166 lorries run on petrol and gas. There are 503 vehicles built to run on natural gas only.

A total of 31 vehicles have electric motors. 227 vehicles run on petrol and electricity and only 3 on diesel and electricity.

Of 37 349 special-purpose motor vehicles, 29 961 run on diesel.

Table 7 Number of lorries and special-purpose motor vehicles by type of fuel at 31 December 2015

Fuel type	Lorries	Special-purpose motor vehicles
Unknown	1 781	86
Hydrogen	0	0
Petrol/Natural gas	1 255	45
Petrol/Liquefied gas	3 896	206
Natural gas	503	23
Diesel/Electricity	3	1
Petrol/Electricity	227	0
Biofuel	4	2
Liquefied gas	15	0
Gas	34	1
Electric motor	34	0
Diesel/Gas	26	7
Diesel	322 293	29 961
Petrol/Gas	3 166	157
Petrol	63 346	6 860

Source: National Police General Directorate - Ministry of the Interior

Table 8 Total number of motor vehicles by type of fuel at 31 December 2015

Fuel type	Total number of motor vehicles
Unknown	51 739
Hydrogen	0
Petrol/Natural gas	13 213
Petrol/Liquefied gas	124 874
Natural gas	1 906
Diesel/Electricity	46
Petrol/Electricity	1 489
Biofuel	14
Liquefied gas	180
Gas	140
Electric motor	183
Diesel/Gas	73

Diesel	1 569 659
Petrol/Gas	66 256
Petrol	1 837 553

Source: National Police General Directorate - Ministry of the Interior

Of the total number of 3 667 325 vehicles registered, 1 837 553 run on petrol and 1 569 659 on diesel. There are 66 256 vehicles running on petrol and gas, 124 874 on petrol and liquefied gas and 13 213 on petrol and natural gas. There are 1 906 vehicles built to run on natural gas only.

A separate table shows the percentage of key vehicle categories by type of fuel used.

Table 9 Percentage breakdown of cars, lorries, special-purpose motor vehicles and buses by type of fuel used at 31 December 2015.

Fuel type	Total number of motor vehicles	Cars	Lorries	Special-purpose motor vehicles	Buses
Unknown	1.41%	1.57%	0.45%	0.23%	0.55%
Hydrogen					
Petrol/Natural gas	0.36%	0.38%	0.32%	0.12%	0.05%
Petrol/Liquefied gas	3.41%	3.82%	0.98%	0.55%	0.12%
Natural gas	0.05%	0.03%	0.13%	0.06%	1.45%
Diesel/Electricity		0.001%		0.003%	0.01%
Petrol/Electricity	0.04%	0.04%	0.06%		
Biofuel				0.01%	0.02%
Liquefied gas		0.05%			0.02%
Gas		0.00%			
Electric motor	0.01%	0.01%	0.01%		0.01%
Diesel/Gas					
Diesel	42.80%	36.70%	81.30%	80.22%	88.41%
Petrol/Gas	1.81%	1.99%	0.80%	0.42%	
Petrol	50.11%	55.79%	15.97%	18.37%	8.84%

Source: National Police General Directorate - Ministry of the Interior

The breakdown shows that:

- 55.79% of cars run on petrol and 36.7% on diesel;
- 87.77% of buses run on diesel fuel and 9.93% on petrol;
- 88.41% of lorries run on diesel and 8.84% on petrol;
- 80.22% of special-purpose motor vehicles run on diesel and 18.37% on petrol;
- Electric cars, lorries and buses account for a mere 0.01% of the total number of motor vehicles.
- Vehicles with hybrid engines account for a mere 0.04% of the total number of motor vehicles.
- Cars with hybrid engines account for 0.04% of the vehicle fleet.
- Lorries with hybrid engines account for 0.06% of the vehicle fleet.
- Special-purpose motor vehicles with hybrid engines account for 0.003% of the vehicle fleet and buses with hybrid engines for 0.001%.

2015 saw a year-on-year increase, as at 31 December, of 27% in the number of electric vehicles and 49% in the number of hybrid vehicles. There was a year-on-year increase of 42% in the total number of vehicles in these two categories in 2015.

The table below shows there were 449 electric motorcycles registered in 2015. There were 183 other electric road vehicles and 1 535 with hybrid engines.

2014 saw a 36% year-on-year increase, as at 31 December, in the number of electric vehicles and a 76% increase in the number of hybrid vehicles. The total number of vehicles in these two categories was up by 60.5% on 2013.

Table 10 Categories of electric and hybrid vehicles in the period 2013-2015

Vehicle type	2013		2014		2015	
	Electric	Hybrid	Electric	Hybrid	Electric	Hybrid
Moped	204	0	286	0	345	
Motorcycle	4	0	4		5	
Three-wheeled motorcycle	1	0	1		1	
Three-wheeled road vehicle	2	0	3		3	
Four-wheeled vehicle	51	0	79		95	
Car	72	558	91	929	147	1 302
Lorry	32	25	33	99	34	230
Special-purpose motor vehicle	0	1	0	1	0	1
Bus	0	2	1	2	2	2
Total:	366	586	498	1 031	632	1 535

Source: National Police General Directorate - Ministry of the Interior

Table 11 shows trends in the breakdown of the motor vehicle fleet by type of fuel used, at mid-September 2016.

Table 11 Categories of motor vehicles by type of fuel used, at 15 September 2016

Fuel type	Total number of motor vehicles	Cars	Lorries	Special-purpose motor vehicles	Buses
Total:	3 753 982	3 231 191	410 136	38 186	23 660

Unknown	41 534	39 784	1 527	79	119
Hydrogen	0	0	0	0	0
Petrol/Natural gas	14 412	12 923	1 430	46	13
Petrol/Liquefied gas	140 176	135 456	4 467	225	28
Natural gas	2 101	1 126	561	23	347
Diesel/Electricity	61	54	4	1	2
Petrol/Electricity	2 048	1 694	354	0	0
Biofuel	15	4	5	2	4
Liquefied gas	233	210	17	1	5
Gas	128	39	30	1	58
Electric motor	228	183	43	0	2
Diesel/Gas	79	29	29	7	11
Diesel	1 662 364	1 222 207	337 726	31 247	21 279
Petrol/Gas	62 018	58 826	2 997	146	48
Petrol	1 828 585	1 758 656	60 946	6 408	1 744

Source: National Police General Directorate - Ministry of the Interior

The data show that:

- 48.71% of the total number of motor vehicles registered run on petrol and 44.4% on diesel.
- 54.43% of the total number of cars registered run on petrol and 37.83% on diesel.
- 82.34% of the total number of lorries registered run on diesel and 14.86% on petrol.
- 81.83% of the total number of special-purpose motor vehicles registered run on diesel and 16.78% on petrol.
- 89.93% of the total number of buses registered run on diesel and 7.37% on petrol.

Data on the number of electric and hybrid road vehicles at 15 September 2016 are provided in a separate table for the sake of clarity.

Table 12 Electric and hybrid road vehicles at 15 September 2016

Vehicle type	2016	
	Electric	Hybrid
Moped	403	-
Motorcycle	5	-
Three-wheeled motorcycle	1	-
Three-wheeled road vehicle	4	-
Quadricycle	101	-
Car	183	1 748
Lorry	43	358
Special-purpose motor vehicle	0	1
Bus	2	2

Total:	228	2 109

Source: National Police General Directorate - Ministry of the Interior

The data show 228 electric vehicles and 2 109 hybrid vehicles. There are 183 electric cars and 1 748 hybrid cars. There are 514 electric motorcycles registered for use on the roads, including 403 mopeds, 5 motorcycles, 1 motor tricycle, 4 three-wheeled vehicles and 101 quadricycles.

A separate table illustrates the percentage breakdown of road vehicles powered by different types of alternative fuels.

Table 13 Percentage breakdown of the categories of road vehicles powered by alternative fuels at 15 September 2016

Fuel type	Total number of motor vehicles	Cars	Lorries	Special-purpose motor vehicles	Buses
Hybrids: Diesel/Electricity Petrol/Electricity	0.06%	0.05%	0.09%	0.003%	0.01%
Electric motor	0.01%	0.01%	0.01%	-	0.01%
Biofuel			0.001%	0.005%	0.02%
Natural gas	0.06%	0.03%	0.14%	0.06%	1.47%
LPG	0.006%	0.006%	0.004%		0.02%

The above breakdown shows that:

- hybrid cars account for 0.05% of all cars registered in Bulgaria;
- hybrid lorries account for 0.09% of all lorries registered in Bulgaria;
- special-purpose vehicles with hybrid motors account for 0.003% of all lorries registered in Bulgaria;
- hybrid buses account for 0.01% of all buses registered in Bulgaria.

A similar situation is observed in the percentage breakdown of electric vehicles:

- Electric cars account for 0.01% of all cars registered in Bulgaria.
- Electric lorries account for 0.01% of all lorries registered in Bulgaria.
- Electric buses account for 0.01% of all buses registered in Bulgaria.

The percentage breakdown of vehicles powered by biofuels shows that:

- only 0.001% of lorries run on biofuels;
- 0.005% of special-purpose vehicles run on biofuels;
- 0.02% of buses run on biofuels.

The breakdown of vehicles powered by natural gas is as follows:

- 0.06% of all motor vehicles registered run on natural gas;
- 0.03% of all cars registered run on natural gas;
- 0.14% of all lorries registered run on natural gas.
- Special-purpose vehicles running on natural gas account for 0.06% of all special-purpose vehicles registered.
- Buses running on natural gas account for 1.47% of all buses registered.

Vehicles running on LPG break down as follows:

- 0.006% of all motor vehicles registered run on LPG;
- 0.006% of all cars registered run on LPG;
- 0.004% of all lorries registered run on LPG;
- 0.02% of all buses registered run on LPG.

Most motor vehicles in Bulgaria's fleet are over 10 years' old. This is the case of about 87% of motor vehicles in Bulgaria.

The unfavourable age structure of the motor vehicle fleet can be seen from the table below.

Table 14 Age structure of the motor vehicle fleet in Bulgaria at 15 September 2016

Age	0-5 years	6-10 years	11-15 years	15-20 years	over 20 years	Total
Units	162 095	359 312	696 136	1 163 009	1 744 514	4 125 066
Percentage	4%	9%	17%	28%	42%	100%

Source: Source: Ministry of the Interior and Bulgarian Electric Vehicles Association

Given the age of the fleet, it is clear that only a tiny percentage of vehicles meet the emission standards introduced over the past 10 years. At the same time Bulgaria's cities currently have no low-emission zones, which is one reason why 63% of the air pollution in Sofia, for example, comes from transport. The due implementation of the measures necessary to reduce air pollution from transport may naturally result in most of the oldest vehicles being taken off the road. To that end, thought needs to be given to the renewal of Bulgaria's vehicle fleet.

To measure the renewal of the freight and passenger fleet of motor vehicles, national statistics use the indicator 'share of newly registered and registered new motor vehicles'.

This indicator covers the most active part of the fleet, which produces the largest volume of greenhouse gases and therefore has a significant impact both on the environment and society and on road safety.

At 31 December 2014 cars accounted for 82.8% of all motor vehicles registered in Bulgaria, and lorries and tractors for 11.3%. Buses accounted for 0.6% of the fleet and other motor vehicles, including special-purpose vehicles, mopeds and motorcycles, for 5.3%.

2014 saw year-on-year increases of 7.1% and 11.3% respectively in the numbers of newly registered and registered new vehicles. Compared to 2013, the number of newly registered lorries and cars grew by 15.2% and 5.5% respectively. Year-on-year, registrations rose by 10.0% for new cars and 13.8% for new lorries. There was also a year-on-year increase of 46.7% in the number of new buses registered.

Table 15 Percentage breakdown of newly registered and registered new vehicles

Видове	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Новорегистрирани леки автомобили	4,9	5,6	5,6	6,2	6,2	6,6	10,3	16,8	14,9	8,0	7,2	7,1	7,0	6,9	7,0
Нови леки автомобили						1,0	2,0	2,1	1,9	0,8	0,5	0,5	0,5	0,5	0,6
Новорегистрирани автобуси	2,5	3,0	2,9	2,7	5,4	5,9	6,3	7,8	9,3	4,9	3,1	3,1	3,2	4,5	5,8
Нови автобуси						2,3	3,6	2,3	4,3	1,7	0,4	0,2	0,2	1,1	1,6
Новорегистрирани камиони и влекачи	3,6	4,7	4,9	5,3	6,1	6,7	10,9	14,2	14,5	8,2	8,0	8,0	8,3	8,0	8,7
Нови камиони и влекачи						2,3	4,5	4,7	4,6	1,7	1,7	2,4	2,8	2,4	2,6
Новорегистрирани МПС	3,9	4,6	4,6	5,2	6,1	6,6	10,4	16,2	14,7	8,1	7,2	7,1	7,1	6,9	7,1
Нови МПС						1,2	2,3	2,4	2,3	1,0	0,7	0,8	0,8	0,8	0,8

[*Key: From top to bottom: Type, Newly registered cars, New cars, Newly registered buses, New buses, Newly registered tractors and trailers, New tractors and trailers, Newly registered motor vehicles, New motor vehicles*]

7. Current state of refuelling infrastructure for alternative fuels in road transport

Bulgaria provides all users with open and non-discriminatory access to existing data concerning the geographical location of publicly accessible charging points and refuelling points for alternative fuels. Access to data is guaranteed by: the functioning electromobility information platforms Bulcharge and Eldrive, the electronic locator for charging stations 'Vsichkotok.bg' and the information platform 'Fuelo.net' for LPG and CNG refuelling stations.

The online platform 'Eldrive'(https://www.eldrive.eu/) offers customers all services relating to the location, access and use of the charging network, the management of payments, etc. The cloud-based platform guarantees easy and intuitive access regardless of the user's device. The map of charging points is based on Google Maps and offers easy navigation to them without charge. The price at each station and the rules for users can be consulted by selecting the station on the interactive map. The price for the charging service can be per kWh or per minute, depending on the type of station. Charging will be paid for by an RFID card or via a mobile application.

The national online system 'Bulcharge'(http://www.bulcharge.com/bg) proposes three modules: for the management and maintenance of the charging infrastructure (charging stations), for dealers and distributors of charging services for electric vehicles and for the management of user/driver profiles. Charging-service providers may be divided into virtual private commercial networks with their own charging infrastructure on the Bulcharge platform.

Users of electric vehicles and owners of charging columns can register with the platform free of charge, using it to locate the nearest free charging point, to reserve a column online, to monitor charging online and to activate additional — mostly external — services, such as access to carparks, car products, discount services, etc.

The system allows coordination and integration with other information systems and billing platforms in Bulgaria and abroad.

The information platform 'Fuelo' **(**https://bg.fuelo.net/): provides information on:

- the latest fuel prices, the traffic situation, etc.
- has the most accurate map of refuelling stations also offering LPG and CNG in Europe/Bulgaria, including information on the services offered/;
- tracks prices for the main fuels in Europe each day;
- offers a statistical and graphic report on prices over the previous three years.

The platform has a site and Android and iOS applications, which show the nearest station where the user could take on their preferred fuel;

'VsichkoTok' **(**https://vsichkotok.bg/index/1-home.html) is an online locator for electric vehicle charging stations, providing information on:

- Location
- Contact types
- Opening hours
- Means of payment (mobile application or operator's card)

The state-owned enterprise Port Infrastructure has introduced a geographical information system at Bulgarian ports that meets the requirements of Article 7(7) of Directive 2014/94/EU. Following the installation of refuelling points for alternative fuels at Bulgarian ports of national importance, these points can be included in the geographical information system with their geographical location and other key data. Data from the geographical information system are provided and accessible to users via the GeoNetwork catalogue application for managing spatially referenced resources, which is fully compatible with the European Union's spatial data infrastructure geoportal INSPIRE.

The Ministry of Transport, Information Technology and Communications is to develop and maintain an online application with an accessible interface and a simplified operating module in accordance with the requirements of Article 7(7) of Directive 2014/94/EU, providing all users with open and non-discriminatory access to existing data concerning the geographical location of publicly accessible charging points and refuelling points for alternative fuels. 'Publicly accessible charging points and refuelling points for alternative fuels' is defined in Section 1 of the Annex.

7.1 Recharging infrastructure for electric vehicles

Recharging infrastructure for electric vehicles is in the early stages of construction and is implemented mostly at municipal level by private investors. At the end of 2015 there were 26 charging stations in Bulgaria with CEE, Type 1 and Type 2 connectors operating at a voltage of 220 V or 380 V and a power rating of between 3.7 and 22 kW. In December 2016 Bulgaria had 43 public charging stations.

There were no three-phase fast charging stations with a voltage of 380 V and a power rating of more than 22 kW.

Table 16 provides up-to-date data on charging stations by number, location and type of contact.

	2015	2016	***Contact type***				
City	***Number of charging stations***	***Number of charging stations***	*Schuko*	*Type 2*	*CEE 1-phase*	*CEE 3-phase*	*CHAdeMO*
Burgas	1	3	1	2		1	
Varna	1	2	1				
Veliko Tarnovo		1		1			
Devin (Smolyan)	1	1			1		
Dimitrovgrad (Haskovo)		1	1			1	
Dobrich	1	1	1				
Drachevo (Burgas)		1				1	
Dabovo (Stara Zagora)		1		1		1	
Elin Pelin		1		1			
Zlatni Pyasatsi (Varna)		1		1			
Isperih (Razgrad)	2	2	1		1	1	
Mihalkovo (Smolyan)		1					
Nesebar (Burgas)		1	1				
Pazardzhik		1	1	1			

Plovdiv	1	1			1		
Sliven		1		1			
Slanchev Bryag (Burgas)		1		1			
Sofia	13	18	6	7	3	3	1
Stara Zagora	5	3	2	1			
Shumen	1	1			1		
TOTAL:	**26**	**43**	**14**	**15**	**7**	**8**	**1**

Source: Electric Vehicles Industrial Cluster and Bulgarian Electric Vehicles Association

All charging stations are in urban areas. No charging stations have yet been set up outside urban areas.

At the end of September 2016 the launch of a national online platform for managing charging devices for electric vehicles, including systems, infrastructure and vehicles powered by alternative energy sources, was announced.

The Bulcharge platform has been designed with the long-term objective of covering all types of new generation vehicles. This may include hybrid, electric or hydrogen-powered vehicles.

The platform allows automated management of the charging stations in a network, charging of electric vehicles and contactless payments between traders and customers, and enables a Smart application for finding charging stations in the network, information about them, etc.

The platform currently has four main functions:

- online booking of an electric vehicle
- charging of a motor vehicle
- web-surveillance
- additional services.

The launch of the Eldrive electromobility platform was announced in the summer of 2016. It is a regional integrated electromobility platform covering all elements of electric mobility: building and managing charging station infrastructure and flexible schemes for hiring electric cars on a short- and long-term basis.

The platform ties in with a project launched in June 2016. More than 10 charging stations have so far been built under the project in Sofia, Varna, Plovdiv and Burgas and there are over 20 electric vehicles for hire.

The project provides for the installation of over 500 charging points in Bulgaria, Romania, Macedonia, Greece and Albania, including both fast charging stations (50 kW DC) and standard ones (22 kW AC), and the number of electric cars and light goods vehicles is expected to rise to 200.
Many more investors and potential operators are planning to install charging points for electric vehicles on their sites.

Two projects are being prepared to provide charging infrastructure and electric vehicles for use in city centres and residential areas.

The first project focuses on equipping parking places in public carparks and free spaces at institutions with charging infrastructure for electric vehicles (with an indicative budget averaging EUR 30 000 per location).

The second project involves providing charging infrastructure and electric vehicles for shared use by the occupants of residential buildings (with an indicative budget of about EUR 150 000 per location).

Given the difference in functionality and cost, the future distribution of charging infrastructure in Bulgaria will include both fast charging stations with a capacity of at least 50 kW DC along the TEN-T core network and a multitude of standard charging points with an individual capacity of at least 22 kW AC located in public places where vehicles are usually parked long enough for the batteries to be substantially charged without inconveniencing users (shopping centres, entertainment and leisure centres, offices, hotels, restaurants, industrial enterprises, etc.).

The scope for installing normal and high-power charging stations for electric vehicles at key points, enabling the normal operation of electric and hybrid vehicles, could be studied at the level of individual municipalities. The study should cover the availability of capacity or the feasibility of delivering it at appropriate places without major infrastructure investment. It should be carried out jointly with the electricity distribution company operating in the particular municipality.

Such studies should be carried out under the supervision of the manager responsible for major transport routes in the province or — in the case of motorways and first class roads — by the Road Infrastructure Agency.

There also needs to be a plan of potential sites for electric vehicle charging stations based on the rule that stations should be no more than 100 km apart along major roads.

Securing financial support for building charging infrastructure is a key factor in speeding up the deployment of electric and hybrid vehicles. Investment support is crucial to the implementation of:

- pilot demonstration projects;
- projects to develop charging infrastructure both in municipalities and major national resorts.

Building modular charging infrastructure will provide maximum flexibility when charging different types of electric vehicles, depending on their technological characteristics.

7.2 CNG refuelling infrastructure

CNG is a clean fuel and fully meets the Euro 6 standard. Its use is associated with environmentally-friendly and sustainable development of transport (urban, special-purpose and business transport) in urban areas.
The Bulgarian CNG market developed chiefly in the period 2003-2009.

According to European Natural Gas Vehicle Association data, Bulgaria had 110 compressor stations in 2015, 108 of them private and 2 institutional (operated by Sofia Public Transport Company EOOD). CNG refuelling stations are relatively evenly distributed throughout Bulgaria, the only exceptions being Rila-Rhodope province and the North-West.
The network of CNG refuelling stations along the TEN-T transport corridors (road E-79, Struma Motorway, Trakia Motorway, Maritsa Motorway and along the settlements on pan-European transport corridor No 7 — Danube River on the Bulgarian territory) is underdeveloped.

In Bulgaria the building of compressor stations for refuelling motor vehicles is modelled on the development of the gas distribution network. This means that most CNG refuelling stations are located in cities and urban areas with a gas distribution network, far from the trans-European transport corridors. For that reason, intercity and international travel by motor vehicles running on CNG is limited in Bulgaria.

Over the past few years two to three CNG stations have been constructed in Bulgaria each year, all of them by private investors. The public sector has been involved in the construction of 2 institutional stations at Sofia Public Transport Company EOOD.
Currently there are no established and available best practices in Bulgaria for public-sector investment, such as donations, grants and loan guarantees.

The priority is to design and implement projects for developing CNG infrastructure in a number of ways:

- construction of CNG stations on TEN-T transport corridors: 2 stations — one for each carriageway — need to be built for each geographic location (point) selected;

- the construction of CNG stations in the North-West and Rila-Rhodope region;

It should be noted that CNG and LNG have an excellent level of interoperability. The construction of combined L-CNG stations enables LNG storage losses to be recovered.

Connection to existing electric, water, sewer and gas networks is more challenging.

This entails determining the location of refuelling points across the country and the types of fuels for which they are suitable and assessing the technical feasibility of building them in the light of the existing infrastructure. There is potential for interoperability between natural gas refuelling points and plants producing and distributing hydrogen fuel produced from natural gas.

The main obstacles to the development of a CNG infrastructure network of the requisite density are as follows:

- the requisite density of CNG refuelling stations in Bulgaria has yet to be determined;

- there is no coordinated approach with neighbouring countries for agreeing joint actions to build CNG infrastructure;

- the requisite density of CNG refuelling stations has yet to be jointly determined in regions of neighbouring EU Member States.

7.3 Refuelling infrastructure for liquefied natural gas (LNG)

There is still no infrastructure for LNG, including along TEN-T transport corridors in Bulgaria.

It is therefore imperative to study regional and national demand for LNG for road transport before proceeding to build LNG fuelling stations in TEN-T transport corridors. The construction of 2 stations — one for each traffic direction — needs to be envisaged for each geographic location selected.

‘Liquefied natural gas refuelling point’ is defined in Section 1 of the Annex.

7.4 Refuelling infrastructure for liquefied petroleum gas (LPG)

Social and economic conditions in Bulgaria in recent years have favoured the use of LPG, which has in turn contributed to the establishment of a well-developed distribution and sales network for this energy product.

The main reasons for LPG’s widespread distribution are the gas kits available, which make it possible to change the type of fuel used by the motor, and the fact that petrol costs almost twice as much.

As a result, Bulgaria is among the European Union’s leaders when it comes to the number of vehicles running on LPG. No exact statistics can be provided because a large proportion of older motor vehicles in Bulgaria were purchased and registered with the competent authorities with their factory propulsion system, which was later changed. The data provided by the Ministry of the Interior on LPG consumed at the time of registration are therefore valid only for motor vehicles factory-fitted to run on gas. Based on the amounts of LPG supplied to the market for motor fuel and the number of petrol-powered vehicles registered in Bulgaria, it may reasonably be assumed that about 85% of those aged over 15 years are powered by this energy product.

Bulgaria also has one of the best developed distribution networks in Europe. There are currently about 1 890 filling stations in Bulgaria that offer LPG. [13].

The network is spread geographically throughout Bulgaria rather than clustered around major cities, meaning that LPG is also available in smaller towns.

The expansion of the use of LPG beyond private vehicles and taxi services should also be promoted. The density of filling stations offering this energy product in Bulgaria makes it extremely suitable for national freight delivery operations.

7.5 Challenges facing the deployment of hydrogen technologies in the transport sector

As part of the European Union, Bulgaria has approved the European Strategic Energy Technology Plan aimed at promoting the development and deployment of low-carbon technologies through the implementation of appropriate policies.

Bulgaria has limited carbon energy resources. It does, however, have renewable energy sources: if used appropriately, solar and wind energy can make the country energy independent. Installed capacity currently stands at over 1 gigawatt. In 2014 Bulgaria was one of the nine European countries that had met their 2020 targets for the share of renewable energy in final energy consumption. The share of energy from renewable sources in transport is lower than the planned target of 10%.

Recommendations in support of hydrogen technologies as a national priority feature in a number of strategic documents: the Energy Strategy of the Republic of Bulgaria, the Innovation Strategy for Smart Specialisation, the National Research Development Strategy and the indicators from the associated action plan, the Science and Education for Smart Growth Operational Programme and the Competitiveness and Innovation Operational Programme. Most important of all in this area is the contribution of Bulgarian scientists, who are actively involved in European projects. In 2014 the Bulgarian Academy of Science joined the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) and the European Energy Research Alliance. That membership has led to cooperation with Bulgarian industries potentially interested in the introduction of hydrogen technologies.

Preliminary analysis of the approaches followed in different European countries shows that the most appropriate model for Bulgaria's geographical and economic conditions would be one involving smaller initial investments and risk minimisation in the first few years. Hydrogen infrastructure should be built and rolled out in appropriate market segments.

Research bodies and industry are actively cooperating to pinpoint areas for the application of hydrogen technologies in Bulgaria's transport sector. The following potential niches have been identified:

- **Development of fork-lift trucks with fuel cells.** Bulgaria has the potential to participate in a project(s) at European level (FCH JU) and at national level for the development of fork-lift trucks with fuel cells owing to its long experience in the production of battery-powered fork-lift trucks (it was the world's biggest producer of fork-lift trucks in the 1980s), the availability of corporate interest and scientific support. This idea can also be implemented as part of a national project in cooperation with a foreign manufacturer of fuel cells. Interest in cooperation has been expressed by Croatia's Dalmatia region.

- **Application in water transport**

This niche is closely linked to regional policy in the province of Burgas, home to Bulgaria's largest Black Sea port (and to the famous seaside resort of Sunny Beach), which attracts more than

[13] Data on the exact number of filling stations and the types of fuels offered there can be obtained from the National Revenue Agency as regards LPG and from the Customs Agency as regards stations offering CNG, as their statutory powers mean that they have such information.

1 million visitors during the peak season. The joint efforts of the state and local government, the private sector and non-governmental organisations are framed by an infrastructure project with a multiannual implementation plan aimed at promoting yachting and cruise tourism. It is hoped that the new Marina cruise port terminal will become a hub for cruise ships. One of the steps in the innovative programme to develop environmentally friendly transport is the introduction of vessels powered by fuel cells. It is planned to use these ships in the region's many water conservation areas. The goal is to use the accumulated experience to set up a hydrogen-powered shipping service linking the Romanian seaport of Constanța (Romania) with Varna and Burgas (Bulgaria) and Istanbul (Turkey). Scooters, trains and bicycles will be used in the holiday resorts. An association has been formed to implement this idea by Delphin Varna Shipping, the municipality of Burgas, the Bulgarian Academy of Science's Institute of Electrochemistry and Energy Systems and the Burgas Institute for Regional Strategies.

- **Applications in road transport**

Electric vehicles also powered by fuel cells, including extended-range electric vehicles

Hybrid electric vehicles include vehicles that use a battery as a device for storing and converting energy and a hydrogen-based fuel cell as a range extender.

Combining fuel cells with batteries capitalises on the advantages of both technologies and drives the rapid penetration of fuel cells in the public transport market. This approach has already been used in France's Mobipost project, where small fuel cells have been installed in the French post office's electric vehicles. The results show increased vehicle efficiency. The project is interesting for Bulgaria because:

- Bulgaria has expertise in hybridisation

- electric vans are used by courier companies

- Sofia Municipality has expressed interest in deploying hybrid microbuses to transport passengers over short distances so they can quickly connect to the metro, as part of the Green Energy Initiative in transport.

On-board hydrogen production by reforming (converting) conventional fuels (for direct injection or for fuel cells)

Reforming hydrocarbons is still the cheapest way to produce hydrogen. This approach eliminates the need to transport hydrogen and the need for hydrogen refuelling stations while reducing emissions of toxins and greenhouse gases. There is a potential niche for the development and production of auxiliary power units (for ships and heavy goods vehicles).

Society as a whole (industry, regional bodies, politicians, community groups) is not yet sufficiently aware of the need to develop hydrogen technologies and the advantages and opportunities of doing so. Experience accumulated over the last two or three years shows that Bulgarian society (ranging from industry to consumers) is open to hydrogen technologies but poorly informed about them.
This requires:

- the elaboration of a streamlined information policy by the public administration (Ministry of Education and Science and Ministry of Economy) in cooperation with the Bulgarian Academy of Science aimed at:

o industry-related structures (Bulgarian Chamber of Commerce and Industry, Bulgarian Industrial Association, Bulgarian Industrial Capital Association, industry associations and companies (electromobility, renewable energy sources, natural gas, biofuels, fuel producers, electricity distribution companies, etc.)).
o municipalities: Sofia Municipality, the National Association of Municipalities (the European Regions and Municipalities Partnership on Hydrogen and Fuel Cells is very successful at European level, it has been a partner to a number of demonstration projects);

- the development of a strategic plan with priorities established on the basis of: an analysis of the potential, strategies for tapping that potential (management), a vision of the future;

- the creation of a database of best practices and experience of other regions, including through cooperation based on common goals, benefits and mutual need. More information should be collected from successful regions and mechanisms for combining national and European financing.

Lastly, it should be noted that the development of the above potential niches in the field of hydrogen technologies requires coordinated targeted activities, prioritisation consistent with the economic and practical realities, the adaptation of society to hydrogen technologies and institutional cooperation for the effective use of existing mechanisms.

8. Current state of infrastructure for alternative fuels in waterway transport

The prospects for the development of ports and port terminals in Bulgaria are largely tied up with the types and quantities of goods to be handled there. In this connection, the main effort should be focused on providing opportunities to increase cargo and passenger traffic and developing water transport in line with European transport policy. It is essential in this context to create favourable conditions for modernising existing infrastructure and improving its technical condition. The long-term approach to shaping trends in ports' development should ensure that measures are taken to better integrate Bulgarian ports into the European transport system, which partly involves providing a high level of safety and security of transport and limiting its harmful impact on the environment and human health.

Creating conditions for the construction, development and maintenance of alternative fuels infrastructure for water transport will significantly further the integration of Bulgarian ports into the European transport system. The following alternative fuels are currently included in Bulgaria's national policy framework for water transport: the supply of electricity for transport (shore-side electricity supply) and the supply of LNG for transport. 'Shore-side electricity supply' is defined in Section 1 of the Annex.

8.1 *Shore-side electricity supply in maritime and inland ports*

Article 4 of Directive 2014/94/EU requires Member States, within the framework of their domestic policies, to assess also the need for shore-side electricity supply to inland waterway vessels and sea-going ships in maritime and inland ports. The Directive requires shore-side electricity supply to be installed as a priority in ports of the TEN-T Core Network by 31 December 2025, unless there is no demand and the costs are disproportionate to the benefits, including environmental benefits.

Supplying ships with electricity is a maritime technical service provided to public transport ports by port operators. The service is currently available at a large number of terminals at Bulgarian ports, including public transport ports of national and regional importance and a number of marinas, fishing ports and special-purpose ports. The possibility of providing the service figures on the certificate of fitness for operation issued to the port.

By the end of 2015, the service was available at a total of 31 ports and port terminals (seaports and river ports of national and regional[14] importance located in the comprehensive TEN-T core network).

8.1.1 Seaports within the TEN-T core network

Bulgarian ports and port terminals where ships are supplied with electricity have an even geographical distribution.

The service is provided at seven seaports and port terminals (of national and regional importance) belonging to the TEN-T core network.

[14] Ports and port terminals of national and regional importance providing transport vessels with mooring and handling services were taken into account when drafting this document.

The following seaports and terminals within the TEN-T core network are covered:

public transport port of national importance Burgas, including terminals: Burgas-East-1, Burgas-East-2, Burgas-West, Nesebar, Rosenets;

public transport port of regional importance Port Bulgaria West, public transport port of regional importance Transstroy-Burgas.

When data on the number of ports and port terminals providing shore-side electricity supply to ships at the end of 2015 are compared with current data, an upward trend can be seen.

8.1.2 Seaports outside the TEN-T core network

Shore-side electricity supply is a service provided at the following seaports and port terminals outside the TEN-T Core Network: public transport port of national importance Varna, including terminals: Varna-East, Varna-West and Lesport.

8.1.3 Ports along the inland waterways within the TEN-T core network

There are 13 inland ports and port terminals of national and regional importance within the TEN-T core network.

The service of shore-side electricity supply is available in the following inland ports of the TEN-T core network:

public transport port of national importance Ruse, including terminals: Ruse-East, Ruse-Centre, Ruse-West, public transport port of regional importance Port Bulmarket Ruse, public transport port of regional importance Danube Dredging Fleet - Ruse, public transport port of regional importance Double W Co - Ruse, public transport port of national importance Vidin, including terminals: Vidin-North, Ferryboat Complex Vidin, Vidin-Centre, Vidin-South; public transport port of regional importance Ro-Ro SO MAT - Vidin, public transport port of regional importance Danube Dredging Fleet Budin - Vidin, public transport port of regional importance Pristis.

8.1.4 Inland ports not part of the TEN-T core network

A shore-side electricity supply service is provided at the following inland ports not part of the comprehensive TEN-T core network:

public transport port of national importance Lom — port terminal Oryahovo; public transport port of national importance Ruse, including terminals Silistra and Ferry Terminal Silistra; public transport port of regional importance Silistra-Polaris 8, public transport port of regional importance Silistra Lesil, public transport port of regional importance East Point - Silistra, public transport port of regional importance Svishtov - Svilosa, including terminals: Svilosa and Thermal Power Plant Svilosa.

8.2 Supplying inland waterway vessels with liquefied natural gas

There is currently no LNG refuelling infrastructure in place at Bulgarian ports.
However, Bulgaria's first ever small-scale LNG terminal has already been built on the Danube; it has a total capacity of 1 000 m^3 and is used for storing LNG, bunkering inland vessels, refuelling trucks and the further distribution of LNG in the region. The terminal is located on the site of a former heavy machinery plant at the port of Ruse and occupies a surface area of 1 000 m^2.

The terminal was built as part of the LNG Master Plan project for the Rhine-Main-Danube inland waterway axis within the trans-European transport network (LNG Masterplan Rhein-Main-Danube). Under that project, points are being set up along the Rhine, Main and Danube, with small

terminals for the supply, storage and further distribution of LNG. The consortium involved in this masterplan comprises 33 companies from 17 countries. The ports of Rotterdam and Antwerp are the driving force behind the consortium, together with ProDanube, Austria. On the Danube, there will be terminals at Galați and Constanța as well as at Ruse. The push to limit harmful emissions from vessels, which has made it necessary to accelerate the development of the technology for using LNG as ship fuel, has given added impetus to speed up the process of building the terminals.

The goals of the project LNG Masterplan Rhein-Main-Danube are quite ambitious:

❖ Identification of supplies and creation of primary markets and a critical mass of consumers in the hinterland of inland waterways.

❖ Development of technical concepts for the inland shipping sector through research into and evaluation of innovative engines or tanks and equipment for LNG technology.

❖ Facilitation of the creation of a harmonised European regulatory framework for the use of LNG as fuel and cargo for inland waterway shipping.

❖ Development and assessment of technical concepts for new and upgraded ships and terminals and implementation of pilot deployments (investments).

❖ Development of a comprehensive strategy with a detailed roadmap for the use of LNG in accordance with EU policies in the fields of transport, energy and the environment.

The small-scale LNG terminal is equipped with four vacuum-insulated cryogenic LNG storage tanks, each with a volume of 250 m³, arranged parallel to the river bank and with a 4-metre safety zone left between tanks. Each tank is 4 metres in diameter and 30 metres in height.

The terminal provides facilities for the loading/unloading and bunkering of inland vessels with LNG as well as for refuelling lorries running on LNG. The refuelling stations are linked to the facilities for loading lorries with LNG for distribution to different customers in the interior of the country.

The LNG storage facilities are connected to the existing hazardous goods terminal by a dedicated pontoon quay. LNG tankers will dock at the existing terminal pontoon quay, which will also be used for bunkering inland vessels powered by LNG.

Loading and unloading operations will be carried out using special flexible hoses on the pontoon quay and fixed pipelines connecting it to the storage facility. The flexible hoses and pipelines will feature special insulation for the cryogenic handling of LNG. The terminal is connected to public infrastructure such as water and electricity supplies and roads through the existing connections.

The first lorries running on LNG that will use the refuelling stations situated in the LNG terminal zone have been purchased. The lorries will also be used to distribute LNG to the customers identified in the market analyses.

Terminals will also have been built in Sofia and Plovdiv within about three years. An existing terminal with rail and road connections will also be used in Plovdiv. The investments in the future LNG terminal in the city of Sofia will be larger. The most likely location for the terminal will be close to a railway connection, the aim being to establish it as an intermodal centre.

The use of LNG as a marine fuel is one of the most discussed topics in water transport and shipping. This growing interest is a response to legislation and the cost of this type of fuel. The EU has already introduced legislation that will require ships that use EU ports to start monitoring, reporting and verifying emissions from 2018 onwards. The EU may align this legislation in the event of an international agreement on a global system. As regards air pollutants, the European Commission supports further measures by the International Maritime Organisation to reduce atmospheric emissions, such as the designation of additional Emission Control Areas **and the introduction of a global cap on the sulphur content of fuel in 2020.**

Limiting emissions of sulphur oxide in the Emission Control Areas (ECAs) to 0.1% from 2015 and to 0.5% worldwide from 2020 will effectively prohibit the use of heavy bunker fuel. This means

that ships will have to switch to low-sulphur fuels, marine gasoil or LNG. At the same time, limiting NOx emissions in ECAs from 2016 is forcing ships to install scrubbers or to switch to liquefied natural gas as fuel.

Despite its indisputable advantages, the use of LNG as a fuel still poses a number of problems that stand in the way of its more widespread use. The special shape of the tanks, the need to insulate them and the specific requirements regarding their location mean that the space required for fuel is three to four times greater than in the case of conventional arrangements.

Various arrangements exist for bunkering vessels: shore-side stations, lorries or a supply ship at sea. Despite the different methods available, there are too few bunkering locations and most are in Norway. This is the main reason why most ships operating there use LNG as fuel.

According to International Gas Union (IGU) data for 2016, there are 410 LNG tankers in the world. Orders have been placed and confirmed for the construction of 146 new vessels by 2022. According to data from the international classification society DNV-LR (Det Norske Veritas-Germanischer Lloyd), there were 70 LNG-fuelled ships plying the world's oceans in 2016, and orders had been placed and confirmed for the construction of another 80.

Another serious obstacle to the large-scale use of LNG as a fuel is the lack of staff trained in bunkering and in the operation and maintenance of the new systems and devices.

The problems are generally organisational or purely technical in nature. The organisational problems include the development of international law and rules and the infrastructure required for supplying and bunkering LNG.

The second group of problems concern purely technical solutions, or rather a more reliable method for comparing the effectiveness of different solutions for existing and new ships.
Onshore, LNG is an interesting alternative as a marine fuel, especially in Emission Control Areas. However, a number of practical issues need to be resolved before that fuel is introduced on a commercial scale, including refuelling, safety, technical and operating conditions and, last but not least, infrastructure.

At this stage the supply of LNG from Qatar to the Black Sea Basin countries of Ukraine, Romania and Bulgaria is unlikely because Turkey is reluctant to allow ships carrying LNG to sail through the Bosporus.

It makes sense for Bulgaria to employ best practices from projects carried out at sea and river ports in other European countries before proceeding to build the infrastructure needed for supplying and bunkering LNG.

A good example in this respect is provided by the Baltic Sea Ports I and II projects, which are focused on LNG as a key solution and are aimed at fostering a harmonised approach to bunkering LNG and building infrastructure in the areas concerned. The participating ports are Stockholm, Helsinki, Turku, Tallinn, Copenhagen-Malmö, Aarhus, Helsingborg, Trelleborg, Sundsvall, Rostock and Klaipeda. Their individual projects have led to investments in port infrastructure and helped to make bunkering LNG possible thanks to feasibility studies for LNG terminals and bunker vessels, environmental impact assessments, the drafting of safety manuals and regional market research.

The following steps can be recommended on the basis of experience gained in those projects:
• Technical feasibility study.
First, a comprehensive feasibility study should be carried out into the market potential for supplying LNG to the port concerned and adjacent areas, the required volumes and the storage method.

The various roles in the development of an LNG terminal must be clearly delineated. The port concerned is usually the owner of the land, while responsibility for investment in a terminal may lie with the port, the municipality, the gas supplier and/or the operator. It is important to define the different investment roles at the beginning of the project.

• Financial analysis to establish the maturity of the project at hand.
• Complete inventory of all stakeholders and applicable regulations.
• Staff training on risk and safety measures.
• Once process design has been completed, work can commence on the requisite installations.
• Identification of the relevant laws and regulations applying to the process.

• Dialogue with the relevant authorities at an early stage. This can take place at both local and national level.
• The stakeholders and potential investors in the terminal should be involved in the design phase.
• Financial aspects: it is very important to find ways of cooperating with stakeholders in order to share investment costs for the terminal. A dialogue should be started at an early stage of the planning process with funding providers, gas suppliers, operators, etc. in order to identify financial decisions.

9. Current state of alternative fuels infrastructure for air transport

9.1 Power supply of airports

As used in Directive 2014/94/EU, the term 'stationary airplane' refers to the phase in which an airplane is positioned at the airport, at an aircraft stand in a stationary state, with the engines off, in the period between completion of taxiing after landing and before starting taxiing for the next flight.

To provide the power required during that phase an airplane has its own Auxiliary Power Unit (APU), which is usually a small gas turbine engine with a generating unit connected to it which provides the electricity needed to power the on-board equipment, regulate the pressure in the hydrosystem and operate the air conditioning in the aircraft cabin.

The use of an APU has a negative impact on the environment in two major ways:

- low engine efficiency (10-14%), high kerosene consumption (over 500 litres per hour for a Boeing 747 type airplane) and correspondingly high greenhouse gas emissions;
- high noise levels on the airport apron (about 80 decibels).

The impact of the above negative factors can be reduced significantly if airplanes are powered from alternative sources during the 'stationary' phase, thereby avoiding the use of their APU.

This possibility for deploying alternative fuels infrastructure is described in Directive 2014/94/EU as a major trend in air transport.

According to Recital (36) of the Directive: 'Electricity supply to stationary airplanes at airports can reduce fuel consumption and noise, improve air quality and reduce the impact on climate change'.

The installation of the relevant infrastructure for the supply of electricity to stationary airplanes at airports is described as a key operational possibility for minimising fuel consumption and the corresponding noise and CO_2 emissions near passenger terminals.

Key technological capabilities as an alternative to APUs

There are currently a number of technologies with the potential to obviate the need to use APUs in stationary airplanes.

Fixed Electrical Ground Power — FEGP

This involves powering airplanes from the airport electricity system. Since the electricity frequency at most airports is 50 or 60 Hz, frequency converters are needed to convert it to the 400 Hz required for the operation of airplanes. Such converters are installed in one of two ways:

- In the lower part of the passenger sleeve — the devices installed are attached to the passenger sleeve and electrically controlled to roll out the cable supplying 400 Hz. When the operations have been completed, the electrical device rolls the cable back onto the spool or
- a fixed mount at the terminal near the nose of the parked aircraft.

Pre-Conditioned Air Systems — PCAs

Devices providing conditioned air to the airplane cabin are supplied with electricity from the airport's main system. They are usually attached to the passenger sleeve or close to it and supply conditioned air to the airplane through mobile air ducts.

Mobile ground power units and air conditioners

Mobile ground power units (GPUs) and air conditioners using diesel fuel provide an

alternative to the APU because of their high efficiency, significantly lower fuel consumption and low noise levels.

The use of the above technologies at airports depends on a range of factors relating to expenditure, infrastructure requirements and operational and environmental considerations. The key factor is normally the volume of passenger and air traffic, which determines the efficiency of high-tech solutions.

Article 3 of Directive 2014/94/EU requires Member States, when developing their national policy framework for the development of the market for alternative fuels in the transport sector, to make an assessment of the need for additional facilities to supply electricity to stationary airplanes at airports. This issue primarily has to be analysed in terms of Sofia Airport, which is the only one in Bulgaria to qualify as a 'major airport'.

9.1.1. Airports in the TEN-T core network

Sofia Airport has an annual traffic volume of more than 4 million passengers. Terminal 2 provides power supply from stationary facilities and conditioned air that comply with the highest standards and tested European practices.

Fixed Electrical Ground Power — FEGP

400 Hz power is provided to all contact aircraft stands at Terminal 2 through stationary converters installed on the passenger sleeve. The converters are powered from the airport's electricity system. The service is included in the overall passenger sleeve package and is used by all airlines using a passenger sleeve at Terminal 2.

Fixed Pre-Conditioned Air (PCA) systems

This service is provided to all contact aircraft stands at Terminal 2 through stationary air conditioners installed on the passenger sleeve. The conditioners are powered from the airport's electricity system. The service is included in the overall passenger sleeve package and is used by all airlines using a passenger sleeve at Terminal 2.

Mobile Ground Power Units (GPUs) and air-conditioning systems

Mobile GPUs are provided by all three ground-handling operators at Sofia airport and the service is either included in the aircraft ground handling package or supplied on request.

Mobile air conditioning systems are not provided as a service by any of the ground-handling operators, as the significant cost of these units makes it uneconomical to offer this type of service given the expected number of requests.

9.1.2 Airports outside the TEN-T core network

- **Burgas Airport** has an annual traffic volume of more than 2.5 million passengers;
- **Varna Airport** has an annual traffic volume of about 1.5 million passengers;
- **Plovdiv Airport** has an annual traffic volume of about 100 000 passengers;
- **Gorna Oryahovitsa Airport** has an annual traffic volume of less than 10 thousand passengers.

These airports do not provide Fixed Electrical Ground Power (FEGP) owing to the lack of centralised infrastructure at the passenger terminals. No fixed Pre-Conditioned Air systems are provided owing to the lack of centralised infrastructure at the passenger terminals.

The scope for also installing fixed equipment at the airports outside the TEN-T core network is determined primarily by the financial possibilities and the economic rationale based on the existing volume of air traffic; the need and economic rationale for such infrastructure has yet to be analysed at national level.

10. Forecasts for the introduction of electric and hydrogen-powered vehicles and the deployment of the relevant recharging and refuelling infrastructure in Bulgaria[15]

The development of electromobility in Bulgaria is still in its infancy. The underlying reasons for

[15] The forecasts were drawn up on the basis of analyses provided by the Electric Vehicles Industrial Cluster and the Bulgarian Electric Vehicles Association.

this include the following:

- electric vehicles cost more than vehicles with conventional engines (the cost of batteries and electric vehicles is expected to drop in the future)
- the lack of financial incentives to promote the use of electric vehicles (the only exception being exemption from the annual motor vehicle tax)
- the lack of recharging infrastructure (insufficient density of the recharging network, especially as regards fast charging stations)
- the limited driving range (lack of comfort and freedom of movement)
- low awareness of environmental issues, especially the need to reduce emissions of harmful substances into the ambient air.

Interest in electromobility in Bulgaria can be expected to increase in the years ahead, the main contributory factors being:

- clarification of the legislative framework in the field of electromobility
- a fall in the cost of purchasing electric vehicles, and especially the cost of batteries, increasing their economic potential
- an increase in the range of electric vehicles
- pressure to improve the quality of life, especially in urban areas
- the organisation of public information campaigns presenting the advantages, benefits and practical aspects of electric vehicles.

The development of electromobility in Bulgaria should not be perceived in terms of electricity quickly replacing conventional transport fuels. It should instead be seen as an evolutionary process in which various fuels, including alternative ones, will be used in different market segments, complementing rather than competing with one another.

Attention should currently also be focused on hybrid vehicles that could provide sufficient range, using the existing conventional fuels distribution network, while at the same time representing a modern and environmentally friendly means of transport. The development of these types of engine has now reached the stage where they can be used to power vehicles without presenting any serious risk of technical failures. Last but not least, such vehicles are cheaper to buy than those powered solely by electricity or hydrogen.

10.1 Forecast targets and potential measures to encourage the introduction of electric vehicles

Over the next 15 years electric vehicles will achieve a market share of 3% globally. The prices of electric vehicles will fall slowly, but in the long term there is no alternative to electric propulsion systems.

The Visegrad Group countries also have ambitious plans for the mass introduction of electric vehicles. Poland plans to have a million of them on its roads by 2030[16]. Slovakia has declared its ambition for electric vehicles to account for 31% of newly registered vehicles in 2030[17].

In the first three phases (June to September 2016) of Romania's programme to reduce greenhouse gas emissions through promotion of low-emission vehicles, more than EUR 173 000 was granted in direct subsidies for the purchase of electric vehicles and construction of infrastructure. In the fourth phase currently under way, EUR 13 million in subsidies will be provided for the installation of 350 to 1 000 charging stations, depending on capacity.

Given the negligible share of electric vehicles in the markets of these countries, such plans may seem highly optimistic, but they are a response to international documents already adopted that declare the firm intention of achieving the mass electrification of road transport.

The Paris Declaration on Electromobility and Climate Change set a target for at least 20% of all road vehicles to be electrically powered by 2030, representing at least 100 million electric

[16] http://www.bloomberg.com/news/articles/2016-06-07/poland-seeks-to-take-tesla-s-electric-revolution-for-a-bus-ride-ip6uiai3

[17] http://www.eltis.org/discover/news/slovakia-support-purchase-evs

vehicles[18]. To achieve this goal, electric vehicles will, according to the International Energy Agency, have to account for at least 35% of sales in 2030.

Bulgaria is lagging behind developed European countries in the introduction of electric vehicles.

Countries in the vanguard of electromobility have undertaken to make electric vehicles account for 3% of their motor vehicle fleets by 2020. This is an ambitious goal for all of them. If it is to be achieved, the existing electric fleet of about 900 thousand vehicles must grow 15-fold and pass the 13 million mark.

The most ambitious plans envisage electric vehicles accounting for 5% (United Kingdom, Portugal), 6% (France) and even 9% (Denmark) of the national motor vehicle fleets in 2020.

According to the different time frames under consideration, the estimated numbers of vehicles with propulsion systems involving varying degrees of electrification but featuring a charging component and an electric range of at least 40 km are as follows:

2020 — up to 35 000 vehicles

2025 — up to 70 000 vehicles

2030 — up to 130 000 vehicles

Measures and incentives to encourage the introduction of electric vehicles

Promotional measures in different countries combine direct incentives with indirect restrictions on vehicles with lower energy efficiency and high pollutant emissions.

While the specific direct incentives depend largely on the economic situation of the individual countries concerned, energy efficiency requirements and tighter emission standards are applicable in all countries.

Generally speaking, emission standards and purchase incentives are implemented at national level, while measures encouraging daily use are the result of policies at local government level.

As a continuation of the Pilot Scheme launched in 2016 to promote the use of electric or hybrid electric cars under the Climate Investment Programme of the NTEF, Cabinet Decree No 27 of 13 January 2017 provided a further BGN 1 million in additional funding to continue the scheme to promote the use of electric vehicles in public institutions.

At this stage, some of the largest municipalities in Bulgaria have undertaken the following measures to support the use of electric vehicles:

In the City of Sofia electric vehicles and two-wheel motor vehicles park free of charge; for every hundred parking spaces in the hourly paid parking zones, there is one parking space reserved for a two-wheel vehicle[19]. Similar measures have been introduced in municipalities such as Plovdiv, Dobrich and Ruse, to name but three.

The charge for parking in the Blue Zone in the municipality of Plovdiv is laid down in the Ordinance on setting and administering local fees and charges for services on the territory of the municipality of Plovdiv; an exception is made for electric vehicles parked at a charging station and being charged by it[20].

[18] http://www.unep.org/transport/EMOB/pdf/Paris_ElectroMobility_Declaration_2Dec.pdf
[19] Article 104 of the Ordinance on Traffic Organisation on the territory of the City of Sofia.
[20] Under the Ordinance on motor vehicles stopping, staying and parking on the territory of the City of Plovdiv.

Under the Ordinance on the management and safety of traffic and discipline of drivers and pedestrians in the municipality of Dobrich, the owners of electric motor vehicles with an electric vehicle parking card can park free of charge in municipally owned streets, squares and carparks within the Blue Zone, where parking charges otherwise apply.

There is a similar measure in place in the municipality of Ruse in accordance with Ordinance No 18 on public order when using vehicles on the territory of the municipality of Ruse.

A good example of promoting the development of sustainable urban mobility is the implementation of two pilot projects for the use of electric buses in public transport in the City of Sofia.

The proposed measures with potential application under Bulgarian conditions include the following[21]:

- norms for energy consumption in motion (applicable not only at initial registration but also when vehicles are resold/re-registered)
- emission standards for road vehicles (applicable not only at initial registration but also when vehicles are resold/re-registered)
- introduction of zones (especially in city centres) accessible only to energy-efficient and low-emission vehicles
- progressive taxation encouraging the use of energy-efficient and low-emission vehicles
- direct subsidies for the purchase of new vehicles with zero emissions at the point of use (valid for a limited number/period until a minimum critical mass of vehicles has been reached)
- tax credits for the purchase and use of vehicles with zero emissions at the point of use (valid for a limited number/period until a minimum critical mass of vehicles has been reached)
- access to bus lanes for vehicles with zero emissions at the point of use (valid for a limited number/period until a minimum critical mass of vehicles has been reached)
- use of electric vehicles for the purposes of the public administration and local authorities
- promotion of the uptake of services for the shared use of vehicles with zero emissions
- promotion of the transition of taxi companies and public carriers to vehicles with zero emissions.

The specific content and scope of the measures must be defined after assessing each measure's impact and prioritising them to achieve maximum results (measured as improvements in energy efficiency and reductions in harmful emissions), making optimal use of public and private resources after consulting all stakeholders (public institutions, municipalities, business organisations and associations).

10.2 Forecast targets and potential measures for the deployment of recharging infrastructure for electric vehicles

Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure lays down the provision of adequate infrastructure for recharging electric vehicles as an obligation of the Member States depending on the expected number of electric vehicles by 2020. The Directive recommends providing one publicly accessible recharging point per 10 electric vehicles.

In view of the assessment criteria of Directive 2014/94/EU and the formula below:

$$\frac{\text{Vehicle fleet (Member State)}}{\text{Vehicle fleet (EU)}} * \frac{\text{Share of urban population (Member State)}}{\text{Share of urban population (EU)}} * \text{Number of electric vehicles} * 2 = \text{Number of recharging stations in Member State}$$

the following forecast targets have been set for the construction of charging stations:

- Charging columns at 'Public Access' points

[21] The measures have been proposed by the Bulgarian Electric Vehicles Association.

2500 by 2020

6000 by 2025

9000 by 2030

As a guideline, the appropriate average number of recharging points should be equivalent to at least one per 10 cars, taking into account the type of cars, charging technology and available private recharging points. The locations are public transport stations, port passenger terminals, airports, railway stations, etc.

- Charging columns at 'Non-Public Access' points

2000 by 2020

6000 by 2025

10 000 by 2030

Private owners of electric vehicles depend to a great extent on access to recharging points in collective carparks of the kind found in apartment blocks, office buildings, business premises, etc.

To promote the market penetration of electric vehicles, the central and local authorities will encourage the establishment of the recharging infrastructure necessary for their use. This can be done using different tools, depending on the type and capacity of the individual charging points.

As a general trend, a number of countries use promotion measures supporting the installation of recharging infrastructure, thereby addressing one of the major problems facing the spread of electric vehicles: the limited scope for charging at the speed necessary for smooth daily use.

While the battery capacity of the first generation of urban electric vehicles was in the range of 16-24 kWh and even a completely discharged battery could be recharged overnight from a home outlet, the massive increase in the capacity of batteries to 40-60 kWh and on-board charger adapters with a capacity of 7-22 kWh have triggered a growing need for specialised infrastructure.

The benefit of the rise in capacities is that even 'urban' class electric vehicles can now run for 250-400 km per charge and become fully functional options for universal use.

At the same time, they can be charged at cheap charging stations the size of a standard electric panel that can be mounted virtually anywhere where the distribution network has sufficient capacity. By way of comparison, while a fast direct current charging station with a capacity of 50 kW costs about EUR 25 000, an alternate current charging station with a capacity of 22 kW may cost less than BGN 3 000 (not including installation costs and connection charges)[22].

Some of the measures proposed to encourage the installation of recharging infrastructure in Bulgaria are:

- direct investment;
- tax incentives;
- administrative facilitation.

Their scope and content should be precisely defined after assessing each measure's impact and prioritising them to achieve maximum results and make optimal use of public and private resources.

Given the relatively low cost of the standard AC charging points with capacity up to 22 kW, it can be expected that administrative facilitation will have the strongest effect on the mass roll-out of recharging infrastructure.

The application of special tariffs for connection to the electricity distribution and transmission network can serve as an incentive measure, developed jointly with network operators, that allows

[22] http://shop.solarpro.bg/Chargin%20Stations/centers-hotels/CCL-WBM-TOUCH-TRI2

optimisation of costs at the initial stage of infrastructure rollout for both transmission and distribution network operators and the investors and operators of recharging infrastructure. This can be achieved through joint planning, based on matching available network capacity with the optimal location of charging points according to the needs of end users.

The electrification of vehicle propulsion could, albeit in a long-term perspective, contribute to the development of environmentally friendly road transport in Bulgaria.

Electric vehicles have a number of advantages: they are more environmentally friendly because they are energy efficient and have lower emissions because they use renewable energy. In the energy balance, electric propulsion is more efficient than conventional propulsion even with the current energy mix.

We should not overlook the capacity of hybrid designs to reduce CO_2 emissions and energy consumption in the short and medium terms.

Electric vehicles can play an important role in the transition to sustainable mobility, but they should not be viewed as a single solution. More specifically, the manner of the shift towards electromobility will also determine the sustainability of the possible results. Only when electric vehicles are powered mainly by renewable energy source will there be a real reduction in CO_2 emissions. The benefits will be significant and the changes will be positive. Unless electric vehicles are used in appropriate combination with other sustainable transport modes, excessive use of passenger vehicles will continue to generate huge external costs through congestion and reduce the quality of life in cities.

Electromobility can be encouraged by: promoting the use of electric bicycles, microbuses and delivery vehicles in urban areas, shared use of cars and taxis in order to increase electric vehicles' market share among private buyers.

Bulgaria's electric vehicle potential can also be tapped by conversion and by promoting mass demand for electric and hybrid vehicles. A number of conditions need to be met for that purpose: a fall in the price of electric vehicles; an increase in the range of electric vehicles; the development of a network of public charging stations for electric vehicles of various classes; the development of electric vehicles and conversion in Bulgaria.
It is necessary and appropriate to implement measures to promote the uptake of electric vehicles and deploy the relevant recharging infrastructure by three means:

- incentives for the purchase and use of electric vehicles;
- restrictions on the purchase and use of energy intensive and polluting vehicles with an internal combustion engine, especially in sensitive urban areas;
- incentives and administrative facilitation for the installation of suitable and sufficient recharging infrastructure.

The specific content and scope of the measures should be determined after considering the possible and realistic scenarios and identifying the relevant policies with a view to maximising the effect of the optimum use of public and private resources. Some measures with significant potential impact may entail no direct costs after the initial formulation and planning of the implementation.

The paradigm shift and the massive deployment of electromobility worldwide is a unique opportunity for Bulgaria. Bulgaria has what it takes to rank among the leading countries with environmentally friendly transport by setting an example of intelligently implemented policies that perfectly reflect the public interest and lead to a drastic reduction in emissions and noise from transport in urban areas.

10.3 Forecasts for the introduction of hydrogen-powered vehicles and the deployment of hydrogen refuelling infrastructure

As far as hydrogen-powered vehicles are concerned, the estimated number by year is as follows:

2020 — 50 vehicles

2025 — 400 vehicles

2030 — 900 vehicles

Various hydrogen mobility scenarios based on good practices will be studied. The scope for establishing a national network of hydrogen refuelling stations will be explored. The aim is to develop a model that best suits Bulgarian economic conditions.

The building of the first hydrogen refuelling station, at the port of Burgas, is at an early stage. Several locations for building refuelling infrastructure are being discussed for the long term: Sofia, Stara Zagora, Ruse. The necessary refuelling infrastructure will thereby be established in Bulgaria. The distance between refuelling stations will be about 200 km.

The forecasts are: at least one operational refuelling station and one station under construction after 2020. Four finished refuelling stations by 2030[23].

According to another, more optimistic forecast, the numbers of refuelling stations for hydrogen-powered vehicles should be as follows:

4 by 2020

10 by 2025

50 by 2030[24].

11. Scope and potential measures for the construction of CNG and LNG refuelling infrastructure and promoting the use of vehicles powered by CNG and LNG

According to data from the European Natural Gas Vehicle Association, by the end of 2015 Bulgaria will have 61 000 CNG-powered vehicles of all categories, with cars accounting for over 99% of them.

Bulgaria has 110 motor vehicle compressor stations, which represents a density of 1 motor vehicle compressor station per 1 000 km². These data make Bulgaria a front-runner in the use of CNG in road transport in Europe. The distribution network is spread relatively evenly throughout Bulgaria, with a markedly lower density in the North-West and Rila-Rhodope province. There are, however, too few CNG refuelling stations along the main TNT-T transport corridors. This limits international and intercity journeys over medium and long distances with vehicles running on CNG, which makes Bulgaria a blank spot on the European map in terms of the use of natural gas in transport, hindering its integration into European transport networks and the single market and dragging down the level of economic cohesion between Eastern, Central and Western Europe.
However, the fleet of CNG-powered vehicles is seriously outdated and the situation will dramatically change in the coming years. Over 95% of all natural gas vehicles are used and were converted to run on that fuel at the start of this century, and the technology and equipment are already worn-out and obsolete. They will therefore have to be taken off the roads by 2020, which will cause a sharp decline in the situation of vehicles running on natural gas in Bulgaria. At the same time, owing to the low supply of models factory-fitted to run on gas and the unattractive CNG to LPG price ratio, the market is virtually at a standstill and there is no new demand.

[23] Forecast of the Bulgarian Academy of Science's Institute of Electrochemistry and Energy Systems.
[24] Forecast of the Electric Vehicles Industrial Cluster.

Accordingly:

- the natural gas vehicle market in Bulgaria is currently relatively well developed, but future prospects are unfavourable because the fleet is worn out and obsolete;
- CNG refuelling infrastructure has yet to be built along the roads in the TNT-T Network on the territory of Bulgaria.

Here it makes sense to apply the following approach with regard to the deployment of CNG and LNG refuelling infrastructure and wider use of motor vehicles running on CNG and LNG:

- The priority for the period to 2020 will be to build CNG and LNG infrastructure along TEN-T transport corridors in Bulgaria.

It is a matter of pan-European and local European importance for future Member States in the region. Bulgaria can thus finance projects to that end from the Cohesion Funds, and in particular the Connecting Europe Facility, and under cross-border cooperation programmes with future Member States, for example Serbia.

- In the period 2020-2025 the emphasis should be placed on building CNG infrastructure in regions less well covered by the distribution network, such as: North-West Bulgaria and Rila-Rhodope region.
- In the period 2020-2025 it will be necessary to support investment in a fleet of heavy goods vehicles and buses running on LNG.
- In the period 2025-2030 activities should be aimed at increasing the density of the LNG distribution network and at promoting new technologies in the field of transport with alternative fuels.
- Measures should also be undertaken to strengthen demand by 2020. With a view to wider deployment, these measures should primarily help end-users purchase and install CNG kits.

  Modern technological solutions offered by European manufacturers that guarantee energy efficiency should be eligible. These activities should be funded through the axes of the Structural Funds, more specifically the Environment Operational Programme and the Rural Development Programme as regards the private fleet and the Competitiveness and Innovation Operational Programme as regards public-sector fleets.
- It is crucial to lay the foundations for innovative solutions by 2020 and to improve personnel training in this industry. To that end, it is essential to support research initiatives and initiatives for improving vocational training for the young people who will be working in this industry in the future. Funding for this needs to be provided under the Science and Education for Smart Growth Operational Programme.

An assessment should be made of the scope for making wider use of natural gas in such areas as: public transport, waste removal and transport by municipal companies and administrations.

A range of measures can be implemented to encourage the use of natural gas, for example:

- preferential treatment in areas with special parking arrangements (free parking, paid parking but for longer periods or a combination of the two);
- when evaluating tenders for ‘transport services’, bonus points could be awarded to companies using vehicles running on natural gas;
- others.

Consortia of private and public partners could help create a market and demand, which would in turn justify investment in supply infrastructure (stations for CNG and LNG). A consortium of private investors and municipalities could, for instance, determine and award a certain percentage of public transport for implementation by vehicles running on natural gas.
Provision of targeted EU financial instruments including:

- grants from the financial instruments of the operational programmes and the Cohesion Fund;
- soft loans from a 'special promotion fund' provided through the Bulgarian Development Bank would help maintain investment in alternative fuels infrastructure.

The financial instruments should be earmarked for:

- building stations for CNG (including subsidiary stations with no access to the gas transmission and distribution network) and LNG;
- supporting projects for the development of LNG stations and compressor stations at a distance from the gas transmission and gas distribution network;
- supporting pilot projects to develop the use of natural gas as motor fuel by new user groups: intercity, suburban and international bus transport, heavy goods transport, commercial transport, yachting and commercial and entertainment river transport.

These investments will also serve the creation of harmonised and uniform alternative fuels infrastructure at European Union level.

12. Forecasts and measures with regard to shore-side electricity supply in maritime and inland ports

National short-term and long-term goals

As analysis of the current situation shows that many ports in the core and comprehensive TEN-T network have installations for providing shore-side electricity supply to ships, the need to modernise these installations should be investigated with regard to the scope for simultaneously supplying all vessels in the ports and the requisite power both overall and at each point depending on the needs, the type and the size of the ships visiting the ports. The results of this study should be used to identify the priorities for repairing and building points, with the requisite equipment being built in compliance with the relevant standards. These technical requirements and standards should be reflected in Bulgarian law.

According to data for 2015, many ports and port terminals have made organisational arrangements for the shore-side supply of electricity. Shore-side electricity supply will be installed as a matter of priority at ports from the TEN-T core network and at other ports **by 31 December 2025**.

Shore-side installations for supplying electricity to shipping deployed or renovated since **18 November 2017** have to comply with the technical specifications laid down in Article 4(6) of Directive 2014/94/EU on the deployment of alternative fuels infrastructure.

The installation of that equipment is not mandatory if there is no demand and the costs are disproportionate to the benefits, including the benefits for the environment.

Measures to guarantee the national short-term and long-term goals set

Since shore-side electricity supply is provided to ships at many ports and port terminals, the sustainable provision of that service should be ensured by transposing into national law the relevant standards and technical specifications for shore-side electricity supply to seagoing ships and shore-side electricity supply for inland vessels. Shore-side electricity supply installations for maritime transport and the design, installation and testing of the systems currently have to comply with the technical specifications referred to in Article 4(6) of Directive 2014/94/EU on the deployment of alternative fuels infrastructure. Shore-side electricity supply installations for maritime transport deployed or renewed since **18 November 2017** have to comply with standard IEC/ISO/IEEE 800005-1. An appropriate legal framework needs to be developed so that the owners of ports can ensure the conformity of shore-side electricity supply installations for maritime transport.

13. Forecasts and measures relating to the supply of liquefied natural gas to maritime and inland ports

National short-term and long-term goals

Identifying the national short-term and long-term objectives for the supply of water transport with LNG entails investigating the scope for building the number of LNG refuelling points at seaports needed to allow LNG-powered vessels to sail on inland waterways or LNG-powered seagoing vessels to sail on the TEN-T core network. The LNG refuelling points required at Bulgarian sea ports are to be built by **31 December 2025**.

The study must also determine the number of LNG refuelling points needed at inland ports to allow LNG-powered vessels to sail on inland waterways or LNG-powered seagoing vessels to sail on the TEN-T core network. The LNG refuelling points needed at Bulgarian inland ports are to be built by **31 December 2030**.

The goals set cover the following ports as priority: Burgas, Ruse and Vidin, since they are part of the TEN-T core network, which does not exclude the possibility of providing LNG refuelling points in the long term at ports of the comprehensive network: Varna, Lom, Oryahovo, Silistra and Svishtov.

To achieve the above goals, Bulgaria is cooperating with Romania to ensure adequate coverage of the network at both maritime and inland ports and at the requisite points along the whole of the Bulgarian-Romanian stretch of the Danube.

Measures to guarantee the national short-term and long-term goals set

For the purposes of meeting the above targets for the installation of an appropriate number of LNG refuelling points at seaports **by 31 December 2025** and an appropriate number of LNG refuelling points at inland ports by **31 December 2030**, thereby enabling LNG-powered vessels to navigate on inland waterways and seagoing LNG-powered vessels to navigate on the TEN-T core network, the costs and benefits of installing such equipment need to be analysed.

The study will determine the locations and time-frames for building the relevant refuelling points in the TEN-T core network: ports of Burgas, Vidin and Ruse. The study should also assess the actual needs of the market for building refuelling points at maritime and inland ports. The need to build suitable infrastructure at ports covered by the comprehensive TEN-T network should also be assessed.

Carrying out a similar study and building the necessary infrastructure are a precondition for the better integration of Bulgarian ports in the European transport system, providing a high level of safety and security of transport and limiting its harmful impact on the environment and human health. Attaining the objectives set depends to a great extent on identifying the long-term trends in the development of Bulgarian ports.

14. Conclusion

This policy framework provides an overview of the national strategic documents addressing the topic of alternative fuels and alternative propulsion technologies.

It sets out the current laws and regulations directly or indirectly affecting the different types of alternative fuels: electricity, natural gas, LPG, biofuels, hydrogen. It identifies the need to harmonise certain laws and regulations with a view to transposing the requirements of Directive 2014/94/EU.

It reviews the scope for investment support under a number of operational programmes and other programmes funding projects in the field of alternative propulsion technologies and alternative fuels.

The measures planned for the implementation of Article 3 of Directive 2014/94/EU on the deployment of alternative fuels infrastructure are indicative. Where budget funding is needed, measures will be executed and funded within the limits of the state budget for the years of the

medium-term budget forecast up to 2020 approved by the Cabinet. For years outside that budget forecast, the implementing measures and values are indicative.

Trends in final energy consumption in the transport sector (consumption by transport type and fuel type: petrol/diesel, propane-butane/natural gas, biofuels) have been noted.

Current data on the breakdown of Bulgaria's vehicle fleet by type of fuel used and s age structure have been provided.

The current state of infrastructure for the types of alternative fuels used in road, water and air transport has been presented. Forecast targets, possibilities and potential measures are set out with regard to:

- uptake of electric and hydrogen-powered vehicles and the deployment of the associated recharging and refuelling infrastructure;
- the construction of CNG and LNG refuelling infrastructure;
- shore-side electricity supply at maritime and inland ports;
- the supply of liquefied natural gas at maritime and inland ports.

15. Annex

I. Definitions

For the purposes of this policy framework, the following definitions have been taken from Article 2 of Directive 2014/94/EU:

1. 'Alternative fuels' means fuels or power sources which serve, at least partly, as a substitute for fossil oil sources in the energy supply to transport and which have the potential to contribute to its decarbonisation and enhance the environmental performance of the transport sector. They include, inter alia, electricity, hydrogen, biofuels as defined in Article 2(i) of Directive 2009/28/EC, synthetic and paraffinic fuels, natural gas, including biomethane, in gaseous form (compressed natural gas (CNG)) and liquefied form (liquefied natural gas (LNG)), and liquefied petroleum gas (LPG);

2. 'electric vehicle' means a motor vehicle equipped with a powertrain containing at least one non-peripheral electric machine as energy converter with an electric rechargeable energy storage system, which can be recharged externally;

3. 'normal power recharging point' means a recharging point that allows for a transfer of electricity to an electric vehicle with a power less than or equal to 22 kW, excluding devices with a power less than or equal to 3,7 kW, which are installed in private households or the primary purpose of which is not recharging electric vehicles, and which are not accessible to the public; 'high power recharging point' means a recharging point that allows for a transfer of electricity to an electric vehicle with a power of more than 22 kW;

5. 'shore-side electricity supply' means the provision of shore-side electrical power through a standardised interface to seagoing ships or inland waterway vessels at berth;

6. 'recharging or refuelling point accessible to the public' means a recharging or refuelling point to supply an alternative fuel which provides Union-wide non-discriminatory access to users. Non-discriminatory access may include different terms of authentication, use and payment;

7. 'refuelling point' means a refuelling facility for the provision of any fuel with the exception of LNG, through a fixed or a mobile installation;

8. 'refuelling point for LNG' means a refuelling facility for the provision of LNG, consisting of either a fixed or mobile facility, offshore facility, or other system.

II. Standards referred to in Directive 2014/94/EU on the deployment of alternative fuels infrastructure

An analysis of the standards implementing the standards of Annex II to Directive 2014/94/EU is presented in Table:

No … of the international or European standard referred to in Directive 2014/94/EU	No … of the BDS implementing the international or European standard BG/EN	Name of the standard in English	Name of the standard in Bulgarian	Note:
EN 62196-2	BDS ISO 62196-2:2012 (EN)	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact- tube accessories	Щепселни съединения, съединители и входни устройства за пътни превозни средства. Кондуктивно зареждане на електрически пътни превозни средства. Част 2: Изисквания към размерите за съвместимост и взаимозаменяемост на приспособления за контактни щифтове и контактни гнезда, захранвани с променливо напрежение (IEC 62196-2:2011)	
	EN 62196-2 2012/A11:2013 (en)	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact- tube accessories	Щепселни съединения, съединители и входни устройства за пътни превозни средства. Кондуктивно зареждане на електрически пътни превозни средства. Част 2: Изисквания към размерите за съвместимост и взаимозаменяемост на приспособления за контактни щифтове и контактни гнезда, захранвани с променливо напрежение	
	EN 62196-2:2012/A12:2014 (EN)	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact- tube accessories	Щепселни съединения, съединители и входни устройства за пътни превозни средства. Кондуктивно зареждане на електрически пътни превозни средства. Част 2: Изисквания към размерите за съвместимост и взаимозаменяемост на приспособления за контактни щифтове и контактни гнезда, захранвани с променливо напрежение	
	EN 62196-2:2017 (EN)	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact- tube accessories	Щепселни съединения, съединители и входни устройства за пътни превозни средства. Кондуктивно зареждане на електрически пътни превозни средства. Част 2: Изисквания към размерите за съвместимост и	Replaces BDS EN 62196-2:2012 and repeals it from 2020-04-28 replaces BDS EN 62196-2:2012/A11:2013 and repeals it from 2020-04-28 Replaces BDS EN 62196-2:2012/A12:2014 and repeals it from 2020-04-28 Replaces BDS EN 62196-2:2012/A12:2014/AC:2014

			взаимозаменяемост на приспособления за контактни щифтове и контактни гнезда, захранвани с променливо напрежение (IEC 62196-2:2016)	and repeals it from 2020-04-28
EN 62196-3	BDS EN 62196-3:2014 (EN)	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 3: Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers	Щепселни съединения, съединители и входни устройства за пътни превозни средства. Кондуктивно зареждане на електрически пътни превозни средства. Част 3: Съвместимост на размерите и изисквания за взаимозаменяемост на щифта и контактного гнездо на съединители за пътни превозни средства при захранване с постоянно напрежение и комбинирано захранване с променливо напрежение/постоянно напрежение (IEC 62196-3:2014)	
IEC/ISO/IEEE 80005-1	BDS IEC/ISO/IEEE 80005- 1:2016 (EN)	Utility connections in port - Part 1: High Voltage Shore Connection (HVSC) Systems - General requirements	Комунални връзки в пристанище. Част 1: Системи за високо напрежение за свързване с брега (HVSC). Общи изисквания	
ISO/TS 20100 ISO/TS 19880-1:2016		Gaseous hydrogen - Fuelling stations		Repealed and replaced by ISO/TS 19880-1:2016
		Gaseous hydrogen - Fuelling stations - Part 1: General requirements		ISO standards have direct effect and can be applied without being transposed as national standards.
ISO 14687-2	BDS ISO 14687-2:2016 (EN)	Hydrogen fuel - Product specification - Part 2: Proton exchange membrane (PEM) fuel cell applications for road vehicles	Водородно гориво. Спецификация на продукт. Горивна клетка с обменна мембрана Proton (PEM) с приложения за пътни превозни средства	
ISO 17268	BDS EN ISO 17268:2017	Gaseous hydrogen land vehicle refuelling connection devices (ISO 17268:2012)	Устройства за свързване при зареждане на пътни превозни средства с водород в газообразно състояние (ISO 17268:2012)	
ISO 14469-1	BDS EN ISO 14469:2017	Road vehicles - Compressed natural gas (CNG) refuelling connector – Part 1: 20 MPa (200 bar) connector	Пътни превозни средства. Накрайник за зареждане със сгъстен природен газ (CNG) (ISO 14469:2017)	Repealed and replaced by ISO 14469:2017
ISO 14469-2		Road vehicles - Compressed natural gas (CNG) refuelling connector – Part 2: 20 MPa (200 bar) connector, size 2		