

Green Mobility



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Czech Green Mobility at a Glance

In the Czech Republic, from different fuels that are considered to be alternatives, the most promising of these are electricity and CNG. Due to stricter CO2 regulations, we expect growth in both segments.

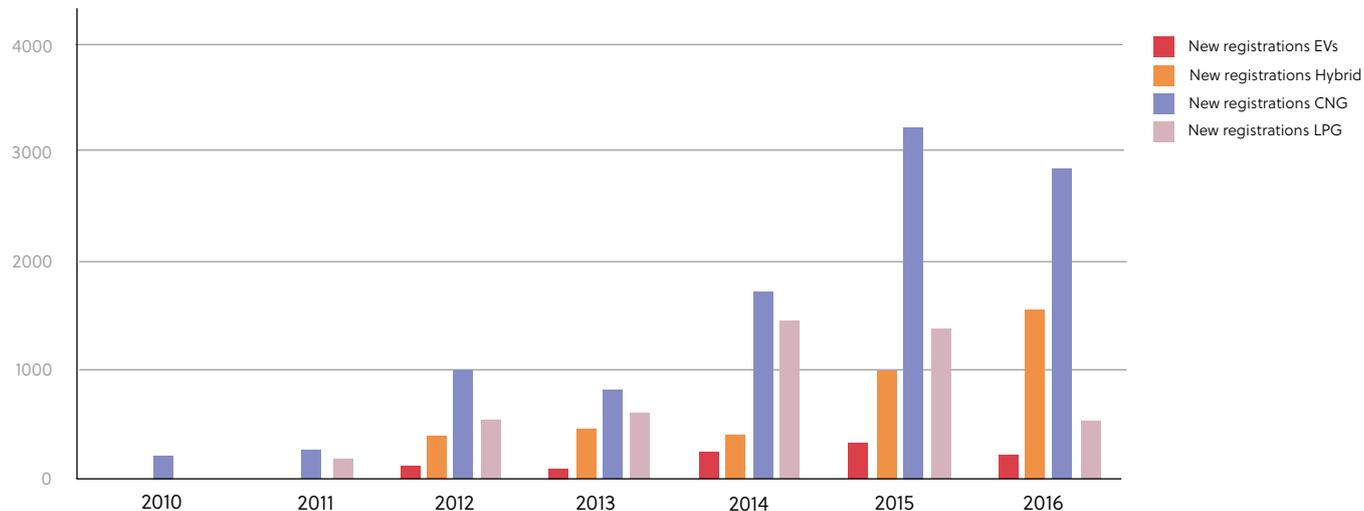
In the medium-term, CNG technology will gain market share due to its more highly developed infrastructure, wider range of vehicle models on the market, higher customer acceptance, lower prices and total cost of operation.

In the long term, when electric vehicles have a longer driving range, widespread infrastructure, lower battery costs and a broader portfolio of models, the market share of electric cars could reach 20% of new vehicle registrations.

The Czech authorities are also supporting research, development and implementation of hydrogen and LNG technologies as alternative fuels with strong potential for future mobility, especially with respect to long-distance driving.



New registrations of alternative-fuel vehicles in recent years in the Czech Republic



New registrations of alternative-fuel vehicles in recent years in the Czech Republic (Source: SDA-CIA 2017)

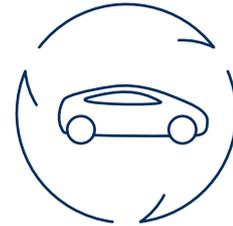


National Action Plan for Clean Mobility

To secure the competitiveness of the Czech automotive industry, at the end of 2015 the Czech government adopted a strategy to support different kinds of eco-friendly mobility called National Action Plan for Clean Mobility.

The main goal is to bring the total costs of operation of clean vehicles in line with those powered by internal-combustion engines. This includes cash subsidies for new vehicles, exemption from excise and road taxes, lower toll fees, etc. The plan counts on the con-

struction of backbone networks of filling and recharging stations as a necessity for the development of green mobility. In cities, drivers of electric vehicles will also be allowed to enter urban areas and to park free of charge and to use preferential public transport lanes.



Goal by 2030:

- + 10% share of alternative fuel vehicles on the road
- + 250,000 EVs in operation

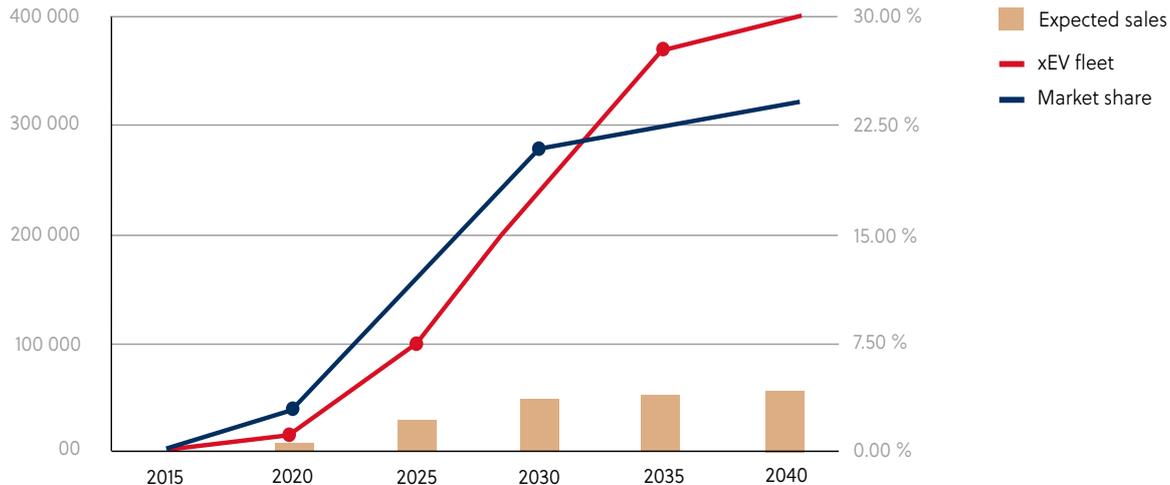
Number of filling stations in operation according to the Action Plan

	2015	2025	2030
Recharging stations	200	1300	
CNG filling stations	100	200	300
LNG filling stations	0	1-2	5
Hydrogen filling stations	1		3-5

E-mobility

Demand for electromobility is rising worldwide and the Czech Republic is no exception. The growth of e-mobility awareness here is driven by the activities of key players, particularly manufacturers of electric cars and buses, universities, R&D centres, electricity distributors and e-mobility associations. In the Czech Republic more and more customers are buying e-cars because of the broader portfolio of brands and models sold on the local market.

Expected xEV sales in the base scenario



Source: Roland Berger

Electric bus producers



Škoda Electric

The Plzeň-based company Škoda Transportation (not to be confused with Škoda Auto, a subsidiary of Volkswagen AG) is a traditional Czech manufacturer of locomotives, tramcars, metro trains and trolleybuses. In recent years, its Škoda Electric division has developed a range of electric and hybrid buses.



Sor Libchavy

Originally a Czech producer of city and intercity buses, SOR has been offering a wide range of eco-friendly buses and trolleybuses since 1991. The company offers both CNG and electric propulsion in different models and lengths. The main advantages of SOR buses is their low weight, low average fuel consumption and higher specific output.



Ekova Electric

The Ostrava Transport Company established its subsidiary Ekova Electric as a provider of repair and modernisation services for trams, trolleybuses and electric buses. In 2015 Ekova presented the Electron, its first all-new, fully electric low-floor city bus.



E-mobility at the Czech Technical Universities



Technical University of Ostrava

In 2014 students at the Technical University of Ostrava announced the completion of the SCX prototype, – an advanced student-designed car. It is a fully electric sports car with four synchronous motors generating a total of 295 horsepower. The SCX accelerates from 0 to 100 km/h in five seconds and has a range of roughly 180 km. A limited series of this car will be sold following homologation.



Czech Technical University in Prague

Since 2010 students of the Faculty of Electrical Engineering at the Czech Technical University in Prague have developed five prototypes of e-Formula Student monopost cars. The eForce FEE Prague Formula team participated in its first race in 2012 and is the only regular participant in e-Formula Student events from the Czech Republic.



University of West Bohemia

The University of West Bohemia in Plzeň is another centre of electric-vehicle development. In 2010 the university presented the HER, an electric hot rod developed in only 150 days. Three years later, the same team presented an electric chopper called Blue Elyctra with a 16kW electric motor providing the maximum speed of 130 km/h. In 2015 the team rolled out its brand new electric sports motorcycle called Électricité. The goal of this project was to construct a prototype with reasonable parameters for a reasonable price.



Battery Technologies



HE3DA

HE3DA is an innovator in applied research and commercialisation of battery technologies. The company's 3D technology and lithium battery production processes are based on three-dimensional electrodes using lithium nano-materials. This is a technological platform meeting all requirements for mass-market application.



battswap

BattSwap

BattSwap offers a unique, fully automatic battery swap solution for electric cars. The removable battery can be changed within 30 seconds. The start-up has patented the battery swap system comprising regular market cells and patented swap stations. BattSwap requires a special battery housing which is fixed in the car body and is easy to insert without significant vehicle modifications.

Olife Energy

Olife Energy is a Czech start-up that has developed a unique technology of lithium starting batteries for cars. It uses supercapacitors to provide the instantaneous power needed to support the battery in the first second after ignition. The supercapacitors ensure trouble-free operation in all conditions and over a wide range of temperatures.



CNG and LNG

Of all the alternative fuels, CNG is the most advanced on the Czech market. There are dozens of models of CNG vehicles available and CNG is also very popular among the public transport authorities. In the last ten years the average year-to-year growth in the number of CNG vehicles in the Czech Republic was 41%. This is mainly due to low excise duties, road tax exemption and financial support for buying CNG buses. The studies suggest that the total number of CNG vehicles in operation

might reach 250,000 units in 2025 and 300,000 units by 2030. CNG is very popular among public transport companies and state-controlled organization. LNG technology is basically used only by long-haul heavy trucks. However, its use is expected to expand in Europe after 2020. In the Czech Republic, the first LNG filling station should be built in 2017 and the total number of such stations could rise to 14 by 2030.



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Fuel Cell and Hydrogen Technologies

Currently, the only hydrogen-powered vehicles in the Czech Republic are demonstration projects. However, the government is aware of the technology's future potential and supports commercialisation research in this field. It is expected that fuel-cell vehicles will get the same tax exemptions and other benefits as electric vehicles.

Development of the hydrogen distribution network will be coordinated with Germany and the early phase will focus on main highway routes and big cities. A consortium of Czech and German companies led by the Czech technology company ÚJV Řež (Nuclear

Research Institute in Řež) has developed a hydrogen bus in the Czech Republic. The aim of the H2Bus project was to demonstrate hydrogen-powered transport and to verify the suitability of using this modern concept in real city traffic.



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Implementation of Priority Green Mobility Technologies

2020

2025

2030

2030+

E-mobility

- + infrastructure in all cities and on highways
- + 1,300 recharging points
- + 6,000 BEVs and 11,000 PHEVs in operation
- + annual sales of 7,000 xEVs

E-mobility

- + infrastructure in towns
- + 35,000 BEVs and 66,000 PHEVs in operation
- + annual sales of 25,000 xEVs

E-mobility

- + 250,000 xEVs in operation
- + annual sales of 44,000 xEVs

E-mobility

- + end of subsidies
- + e-mobility will be perceived as a standard technology
- + 400,000 xEVs in operation
- + annual sales of 50,000 xEVs

CNG

- + low excise duties
- + 50,000 vehicles in operation
- + 200 public and 100 non-public stations

CNG

- + 130,000 vehicles in operation
- + 300 public and 150 non-public stations

CNG

- + 1,300 vehicles in operation
- + 14 filling stations

CNG

- + end of subsidies
- + CNG will be perceived as a standard fuel
- + 300,000 vehicles in operation

LNG

- + 180 vehicles in operation
- + low excise duties

LNG

- + 500 vehicles in operation
- + Five filling stations

LNG

- + 10% share of the fuel market
- + 200,000 vehicles in operation
- + 340 public and 160 non-public filling stations

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