



## 22.1 Major Developments in 2017

### Introduction

The vehicle industry in Belgium is in a transition to a clean and smart mobility industry. The vehicle industry has always been an important industrial sector in Belgium, but especially the car assembly has been under severe pressure in the past years. With the closure of the Ford Genk factory in 2014, we lost 10,000 direct and indirect jobs. The government is proactively seeking solutions to recover these jobs and developed SALK, a regional strategic action plan, to mitigate the projected economic impacts of this factory closure. For future job creation, our industry has to make the right choices and has to be very efficient and innovative. Within the automotive sector, it is not only about making and selling vehicles anymore. It is about offering a clean, comfortable and cost-efficient mobility service to the end customer. Electric vehicles can play an important role, especially when we combine this with the growth of renewable energy sources in our energy supply. The transport and energy sector will get more and more interlinked and this creates new economic opportunities for companies in this new e-mobility value chain (vehicles, charging infrastructure, ICT, mobility and energy services). A dedicated study on these economic opportunities has been concluded at the end of 2016 and was a cooperation between the following countries: Austria, Belgium, Denmark, France, Germany, the Netherlands, Switzerland, and USA. All results can be found online on <http://www.ieahev.org/tasks/economic-impact-assessment-of-e-mobility-task-24/>. The Netherlands has updated their country chapter again in 2017 and this information (available in Dutch) can be found on <https://www.rijksoverheid.nl/documenten/rapporten/2017/12/22/rapport-verzilvering-verdienpotentieel-ev-2017>.

Since the beginning of 2017, the number of electric vehicles on the road in Belgium has grown significantly. Within the national action plan “clean power for transport”, new policy measures have been set up to stimulate the use of alternative fueled vehicles and related infrastructure. But also the local research and industrial activities on electric mobility are growing. Many interesting announcements were made in 2017 by different OEMs and suppliers in the e-mobility value chain. More

electric vehicles on the road means more services like sales, maintenance and after-service, but more and more charging infrastructure, energy and mobility-related services are also possible. An important trend to mention is that we not only see growth in electric passenger cars. The interest in electrification of freight vehicles and vehicles used for public transportation such as electric buses is growing fast. The fastest growing market within electric mobility is that of pedelecs, which are becoming more and more popular for younger people and for commuting, and which already have a market share of more than 23 % .

### **Passenger Cars**

Today, Belgium still hosts two car assembly plants: Audi in Brussels and Volvo Cars in Ghent. Both OEMs are active in the field of electric mobility.

The site of **Audi Brussels** in Belgium will become a key plant for electric mobility in the Volkswagen Group. Audi Brussels has been producing the Audi A1 family in the European capital of Brussels since 2010. In 2017, around 95,284 automobiles rolled off the production line. In 2018, Audi Brussels will exclusively produce and present the first fully electric series model: the Audi e-tron. With its range of 500 kilometers and the fast charging options at up to 150 kilowatts the new SUV allows customers to drive purely electrically without making compromises. Until the start of series production, almost 250 development vehicles will complete testing under extreme conditions worldwide.

Audi attaches great importance to resource-conserving production. As the first of its kind, the e-tron will be produced completely CO<sub>2</sub>-neutral at the converted Brussels plant, where also the model's batteries will be assembled. Audi has been investing considerably in rebuilding the factory. The site is now covering all production processes and all other emissions generated at the plant by either renewable energies (approximately 95 percent) or environmental projects (approximately 5 percent). Audi Brussels thus operates the world's first certified CO<sub>2</sub>-neutral high-volume production plant in the premium segment.

For example, with a total area of 37,000 square meters Audi Brussels has built the largest photovoltaic system in the region on top of their plant's roofs. This way, the company saves around 17,000 tons of CO<sub>2</sub> per year, equivalent to the consumption of around 1,500 people.



Figure 1: Audi e-tron quattro concept (Source: Audi AG)

**Volvo Cars Gent** has been producing cars in Ghent since 1965. In 2014, Volvo Cars Gent has built 264.000 cars (S60, XC60, V40 and V40 Cross Country) which was its second best result ever since the start in 1965. The number of jobs at Volvo Cars Gent has been growing to above 5,000 employees.



Figure 2: Employees training program Volvo V60 plug-in hybrid (Source: Volvo Cars Gent)

After successful testing of the pure electric Volvo C30 prototype, Volvo Cars is now moving ahead with its electrification programme. The existing Volvo V60 plug-in hybrid, which is currently built in Volvo's assembly plant in Gothenburg, will move to Volvo Car Gent early 2017 and will be the first plug-in hybrid car being built in Ghent. Volvo Cars Gent will spend a lot of attention to the training program of its employees for working with electric vehicles in the production line. This is a good preparation for the Volvo XC40 which will be the next model produced in Ghent and which will also be available in a plug-in version. Training and lifelong education of employees plays a crucial role for companies to stay competitive, especially when new technology gets introduced. Audi Brussels and Volvo Cars Gent were both recognized for their personnel management. Volvo

Cars Group has been recognised by the Ethisphere Institute, a global leader in defining and advancing the standards of ethical business practices, as a 2017 World's Most Ethical Company®. Audi Brussels was rewarded by the Top Employer Institute as “Top Employer 2016” and “Top Employer 2017” for creating excellent working conditions and development opportunities for its employees.

Besides car assembly, Belgium has a lot of other activities in the automotive sector. **Toyota Motor Europe** has its European headquarter, logistics centers, and technical R&D center in Belgium. Belgium has about 300 local automotive suppliers (for more details see below). There are assembly plants for trucks (**Volvo Europa Trucks**), heavy-duty vehicles (**MOL CY**) and for buses (**Van Hool** and **VDL Bus Roeselare**) in Belgium.

### Electric Buses

Belgian bus companies Van Hool, Green Propulsion, and VDL Bus Roeselare are very active in this field.

**Van Hool**, a Belgian independent manufacturer of buses, touring coaches and industrial vehicles, is very active in electric and fuel cell buses. Van Hool presented its inductively charged electric buses driving in the city of Bruges during Busworld 2015.



Figure 3: EquiCity Articulated Trolleybus with battery APU for TPG Geneva (Source: Van Hool)

With EquiCity, the so-called trambus, Van Hool developed an innovative concept for sustainable public transport in which hybrid, battery electric or fuel cell powertrain can be integrated. In March 2018, Van Hool announced that it is to build 58 trambuses for Trondheim in Norway, where they are set to enter service as from August 2019. This is the largest order that Van Hool has ever secured for its

trambus, which has been available on the market since 2011 and of which more than 250 vehicles have been ordered in 11 countries to date.

Van Hool is also coordinator of important fuel cell electric bus European projects like “High VLO City” and “3Emotion”, in which a total of 49 Fuel Cell Buses are being introduced in San Remo, Aberdeen, Cologne, Rotterdam, London, Antwerp, and Rome. In the beginning of 2018, Van Hool announced that it has signed a significant contract with RVK Köln and WSW Wuppertal (Germany), to supply 40 hydrogen buses of the latest generation. This order consists of 30 fuel cell buses for Cologne and 10 for Wuppertal, making it the largest order for hydrogen-powered vehicles ever been placed in Europe. These high-tech vehicles will be built in the Van Hool factory in Koningshooikt. The first buses will be delivered in the spring of 2019. Van Hool has been building hydrogen buses for the American market since 2005 and for the European market since 2007. By now, Van Hool has produced 53 hydrogen buses for North America (21) and Europe (32). The eight hydrogen-powered tram-buses Van Hool is manufacturing for Pau (France) should be added to this total. These are to be delivered in the second half of 2019.

**VDL Bus Roeselare**, part of VDL Bus & Coach bv, produces public transport buses and coaches in the city of Roeselare. VDL Bus Roeselare plays a significant role in the development and production of the full electric public transport bus portfolio within the VDL Groep and has supplied its products to numerous European projects amongst which 43 articulated buses in Eindhoven (NL) and 100 articulated buses in Amsterdam (NL).



Figure 4: VDL Citea SLFA Electric bus fleet in Amsterdam (Source: VDL Bus & Coach bv)

The VDL Citea is available in 9, 12 and 18 meter length-variants of which the latter two are produced in Roeselare. VDL Bus Roeselare is also delivering 121 hybrid buses to the Flemish public transport operator De Lijn and electric buses to cities in Sweden, Finland, Germany, the Netherlands, Switzerland and France.

### Freight Logistics

We also see developments in other types of electric vehicles like electric cargo-bikes (**TheOpportunityFactory**) and city distribution vehicles (**E-trucks**, Addax Motors).

**Addax Motors** (<http://www.addaxmotors.com>) is convinced that, in the future, mobility in towns and cities will rely on small personalized, electric commercial vehicles. These vehicles will ensure cost and energy efficient, silent and environmentally friendly transport. Addax Motors is offering a full service solution which includes the technical, financial and administrative aspects: mobility as a service. The Addax Motors vans are electric and 100 % “Made in Belgium”.



Figure 5: Electric light commercial vehicles for green transport in cities (Source: Addax Motors)

**Rhenus SML** manufactures the Addax Motors electric vans on the suppliers' park of the former Ford plant in Genk. The Belgian SML used to supply Ford Genk, and now builds suspensions for Audi Brussels. SML has shifted up a gear, and recently began making complete vehicles. In 2017, SML expects to produce a volume of 150 Addax MT 10 and 15 vans mainly for the BeNeLux market. In 2018, this could rise to 300 following interest from Sweden, France and the Netherlands. The vans don't make any noise, neither do they release harmful emissions. Consequently, they are ideal vehicles to bring goods from the edge to the center of cities, as well as for recreational and holiday parks and even for green waste collection. The light vans weigh 600 kg and can take a payload of up to 1,000 kg. They have a maximum range of 110 km on a fully charged battery.

**Altreonic** has developed a novel modular and scalable propulsion platform for electric vehicles. It is made available in two vehicle categories, the small City-KURT's and the larger KURT-Shuttles. Both are targeted at urban environments

only. Altreonic's aim is to bring solutions to the market that fulfill the promise of sustainable Mobility as a Service (MaaS) in urban environments. Their main contribution is the KURT lightweight electric vehicle platform (<http://kurt.mobi/>) invented and developed by Altreonic. KURT is an enabler for urban electric mobility. Its modular and scalable architecture solves many issues that prevent light weight electric vehicle from taking off. With a low empty weight, it provides a much better load capability and better energy efficiency. It can be easily customised for a wide range of applications by adapting the superstructure. The result is a unique platform that allows Altreonic to develop new vehicle variants in a short period of time in a cost-efficient way. Also available under an Open Technology License.

### **Light Electric Vehicles**

As for light electric vehicles, since a few years, the electric bicycle is the most successful vehicle in Belgium. The trend was confirmed in 2016, with sales of 186,000 electric bikes, a 25 % increase compared to 2015. In 2017, the sales of electric bicycles even went up until 218.000 which corresponds to a market share of 45 %. The electric bike market in Belgium has a turnover of 420 million EUR, which is three times more than the market of full electric cars (Source: AVERE - Annick Roetync).

There are a considerable number of Belgian electric bicycle assemblers, whereas all international leading brands are available as well. On average the quality of the electric bikes on offer is high and consumers have easy access to service. All bicycles are equipped with lithium-ion batteries offering a range that increases every year. Besides electric bicycle assemblers and resellers, we also see new market players focusing on new services like the easy and safe parking/charging/storage of expensive products like electric bicycles (<http://www.gridbox.be/>). See also Task 23 for more details related to "Light-Electric-Vehicle Parking and Charging Infrastructure".

The market of electric scooters/mopeds and motorcycles is still very limited in Belgium. The offer is restricted to a few brands only and prices are not competitive (yet) with those of ICE two-wheelers.

### **Suppliers**

Belgium hosts about 300 suppliers to the automotive industry. A lot of the innovations in the automotive are taking place on the suppliers side. In Belgium we have renowned suppliers like e.g. Umicore, Siemens PLM Software, Melexis, PEC, Leclanché, DAF, and Punch Powertrain. Most of these companies are active in electric mobility.

**Umicore**, the Belgian materials technology and recycling group, announced in April 2016 investments of some 160 million EUR over a period of three years at the company's existing rechargeable battery cathode materials facilities in Cheonan (South Korea) and Jiangmen (China), as well as greenfield investments on adjacent land in both locations. In 2018, a further investment of 300 million EUR was announced. These investments will enable the company to sixfold existing capacity by the end of 2020 compared to 2015 across a broad range of material grades. The expansion is required to meet a surge in demand for materials used in hybrid and electric vehicles.

One of the key elements in cathode materials is cobalt (Co). In December 2016, Umicore obtained third party validation for its sustainable procurement framework for cobalt. Umicore was the first company in the world to have introduced such a framework for cobalt supply and the first to obtain external validation for its ethical procurement approach in this area. In order to cope with the needs for Co for rechargeable battery materials, Umicore invested 25 million EUR in its Co refining and recycling plant in Olen (Belgium) (<http://rbm.umicore.com/>).

**Punch Powertrain** continued its efforts in 2016 and 2017 to develop its first hybrid application with the customer. The hybrid electric powertrain has a transmission based on the VT2/3 CVT and uses a PMAC motor. The Switched Reluctance Motor developed earlier was not market ready for PHEV applications. The market launch of the first hybrid application is expected for 2018. In parallel additional application projects are targeted with other customers.



Figure 6: Junior electric single seater (Source: Punch Powertrain)

Punch Powertrain also elaborated an electric trike demonstrator and started the preparation of an electric powertrain for an electric race car which had its world premiere on EEVC (Geneva).

**PEC** (<http://www.peccorp.com>) delivers the building blocks for the development and manufacturing of large format cells and modules used in electric mobility. In

2016, PEC released a new generation of battery cell testers, the ACT0550 and CT0550, specifically designed for materials research, life cycle testing and simulation of Hybrid and Battery Electrical Vehicles applications, supporting currents up to 4,000 Amps. In 2016, PEC continued the delivery of its automated cell finishing lines to cell makers all over the world. Recent customer research showed that battery cells produced on PEC's automated cell finishing lines have a much better cycle life and show an improved consistency in cell capacity and impedance due to a more homogenous forming of the SEI layer in the battery cell.

More information about the Belgian vehicle industry can be found on following websites:

- [www.beautomotive.be](http://www.beautomotive.be) is the homepage of the Belgian vehicle industry. The sector represents about 300 companies and 70,000 employees, or 10 % of the Belgian export. Beautomotive.be brings together information on relevant companies, events, job opportunities and news items from the sector, covering the topics innovation, technology, talent, investments and internationalization.
- [www.asbe.be](http://www.asbe.be) is the Belgian section of the European AVERE network for manufacturers, suppliers, importers and distributors of Electrically propelled vehicles (battery, hybrid, fuel cell,...) and accessories. The purpose of the association is to promote the use of battery-electric, hybrid and fuel cell electric vehicles and supporting scientific and technological developments.

### Research Institutes

The Belgian automotive industry is ready for a transition to a green and smart mobility industry. Many new research and demonstration projects related to electric mobility have been set up in 2017 together with research partners like e.g. Flanders' MAKE, VUB-MOBI and VITO/EnergyVille.

The list of projects is too long to summarize in the country report, so we recommend to take a look at following websites:

- VUB-MOBI : [mobi.vub.ac.be](http://mobi.vub.ac.be)
- Flanders' MAKE : [www.flandersmake.be](http://www.flandersmake.be)
- VITO/EnergyVille : [www.vito.be](http://www.vito.be) and [www.energyville.be](http://www.energyville.be)

**VUB-MOBI:** The Mobility, Logistics and Automotive Technology Research Centre (MOBI) is nested at the Vrije Universiteit Brussel (VUB) and is a leader in in electric and hybrid vehicles with an impressive track record. It develops electric and hybrid vehicles technologies, and evaluates new concepts in mobility and

logistics on their sustainability. Its multidisciplinary team of 100 specialists enables a holistic approach. The group possesses considerable expertise in the scientific and operational management of multi-partner research projects, and is currently involved in 15 European projects. It has a unique position to address the EU roadmapping activities. Some example project references are: FIVEVB - Five Volt Battery, ELIPTIC - Electrification of public transport in cities and ASSURED - Fast and Smart Charging Solutions for Full Size Urban Heavy Duty Applications.

**Flanders' MAKE:** Flanders Make is the strategic research centre for the manufacturing industry and works together in a structural way with research departments of the 5 Flemish universities. The aim is to realise a top-level research network in Flanders that delivers full support to the innovation projects of manufacturing companies to contribute to new products and processes that help to realise the vehicles, machines and factories of the future.

**VITO/EnergyVille:** EnergyVille is an association of the Flemish research institutes KULeuven, VITO, imec and UHasselt in the field of sustainable energy and intelligent energy systems. EnergyVille provides expertise to industry and public authorities on energy-efficient buildings and intelligent energy networks for a sustainable urban environment. Electric vehicles will play an important role in energy networks based on more and more renewable energy sources. EnergyVille is performing research on batteries (stationary and vehicles), battery management systems, grid integration, demand side management, energy management systems, business models, ... Some example project references are: ZEB – Zero Emission Bus Platform, VKSL – Flemish Knowledge Platform Smart Charging and EVERLASTING - Electric Vehicle Enhanced Range, Lifetime And Safety Through INGenious battery management.

### **National Policy Framework - “Alternative Fuels Infrastructure Directive (AFID)”**

In response to the **Directive 2014/94/EU** of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure, Belgium has developed a policy framework regarding alternative transport fuels/infrastructure.

The introduction and roll out of alternative fuels in the Belgian transport sector could contribute significantly to the following objectives: the reduction of our oil dependence, the integration of more renewable energy in the transport sector, the strengthening of our economy & the creation of additional employment, the improvement of air and sound quality and the fight against climate change. However, a significant introduction of alternative fuel vehicles has progressed relatively slowly over the past few years in Belgium. This is mainly due to some

persisting barriers that are difficult to overcome, such as for example a higher purchase price of alternative fuel vehicles, the lack of recharging infrastructure, a limited driving range and the lack of objective and correct information (which causes prejudices among consumers). Given the complex institutional context in Belgium (both regional and federal entities are directly involved) and the various involved policy areas such as economy, mobility, energy, environment, finances,... an **interdepartmental transversal government working group (Energy-Transport)** was created. The Federal Public Service of Economy and the Federal Public Service of Mobility & Transport (federal government of Belgium) coordinated the national concertation and development of the Belgian policy framework. However, the Regions of Belgium (i.e. Flemish Region, Walloon Region & Brussels-Capital Region) are competent in most aspects of Directive 2014/94.

Table 1: Division of competences regarding alternative fuels in Belgium (Source: National Policy Framework Belgium)

	Federal	Regional	Local (municipalities)
<b>Fiscal measures</b>	<ul style="list-style-type: none"> <li>- Tax reduction motorcycles, tri- or quadricycles;</li> <li>- Deductibility of clean company cars;</li> <li>- System of taxable benefits of all kinds (company cars);</li> <li>- Excise duties.</li> </ul>	<ul style="list-style-type: none"> <li>- Purchase premium for electric vehicles (private individuals);</li> <li>- Car registration tax;</li> <li>- Annual circulation tax;</li> <li>- Kilometer based road charge.</li> </ul>	/
<b>Mobility &amp; Transport</b>	<ul style="list-style-type: none"> <li>- Highway code;</li> <li>- Registration of vehicles;</li> <li>- Technical standards of vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>- Public road infrastructure (highways and regional roads);</li> <li>- Availability of alternative fuels on rest areas along highways</li> <li>- Public refueling and charging infrastructure;</li> <li>- Vehicle inspection;</li> <li>- Homologation vehicles;</li> <li>- CNG/LNG/Shore Power installations in ports and along inland waterways;</li> <li>- Public transport (bus/tram);</li> <li>- H2 installations.</li> </ul>	<ul style="list-style-type: none"> <li>- Public road infrastructure (local roads);</li> <li>- Parking facilities on municipal territory.</li> </ul>
<b>Energy</b>	<ul style="list-style-type: none"> <li>- Access to transmission network</li> <li>- Security of supply</li> </ul>	<ul style="list-style-type: none"> <li>- Regulation of gas and electricity retail markets;</li> <li>Access to distribution networks;</li> <li>- Distribution tariffs;</li> <li>- Renewable energy sources (except offshore wind energy);</li> <li>- Energy R&amp;D (except nuclear).</li> </ul>	/

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<b>Economy &amp; other</b>	<ul style="list-style-type: none"> <li>- Standardisation/normalisation</li> <li>- Price indication of energy products &amp; inspection of price indications</li> </ul>	<ul style="list-style-type: none"> <li>- Integration of refueling and charging points in petrol stations;</li> <li>- Development of public network of refueling and charging infrastructure;</li> <li>- Spatial planning.</li> </ul>	/
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Also the cooperation with neighboring countries is taken into account e.g. via the **Benelux** recommendation M(2015)10 on cooperation regarding the deployment of infrastructure for alternative fuels which was signed in October 2015 by the three Benelux countries. This cooperation aims to strengthen the exchange of knowledge and best practices on the deployment of infrastructure for alternative fuels in the territories ensuring a minimum coverage by the end of 2020, 2025, and 2030. In December 2017, the ministers of the Benelux-countries signed a political declaration on borderless e-mobility services, also referred to as **eRoaming**.

Underlying regional and federal policy frameworks aim at providing an overview of the current and/or planned policies and measures in favor of the development of alternative fuel infrastructure and vehicles in Belgium. Moreover, specific targets have been determined regarding the roll-out of alternative fuels infrastructure in Belgium.

Table 2: Number of targeted alternative fuel vehicles in Belgium (2020) (Source: National Policy Framework Belgium)

Targeted AFVs (2020)	Total	Flemish Region	Walloon Region	Brussels Capital Region
Electric vehicles	86,641	74,100	9,903	2,638
CNG vehicles	42,584	41,000	1,344	240

Table 3: Number of targeted recharging points in Belgium (2020) (Source: National Policy Framework Belgium)

Targeted recharging points (2020)	Total	Flemish Region	Walloon Region	Brussels Capital Region
Normal & high power recharging points (Public)	8,324	7,436	688	200
Shore-side electricity supply in maritime and inland ports	527	524	-	3

### **Flemish Policy Framework**

The Flemish policy framework regarding alternative fuels infrastructure for transport in response to Directive 2014/94/EU is based on the **Flemish Action Plan on the deployment of alternative fuels infrastructure as adopted by the Flemish Government on December 18, 2015**. With this Action Plan, the Flemish Government wants to accelerate the transition towards the roll out of an alternative fuels vehicle market in Flanders and to support the European dimension regarding this topic, e.g. in rolling out cross-border infrastructure for alternative fuels. As observed in other countries, multiple actions will be set up simultaneously in order to achieve maximum effect. Market support for green vehicles must be accompanied by the development of charging and refuel infrastructure while at the same time informing the stakeholders concerned, including the early adopter-drivers of Clean Power vehicles. In conclusion, the implementation of the actions as defined in the Action Plan should operate as a driving force during the period 2015-2020, stimulating future Clean Power development.

The Action Plan focusses on four-wheelers and integrates 2020 objectives for electric vehicles and vehicles on natural gas as well as objectives for charging and refueling infrastructure. Long-term goals (horizon 2025 and 2030) are to be further explored and examined. The main actions stimulate market uptake for Clean Power vehicles and aim for a fast expansion of the infrastructure required. The actions should remove the main barriers as experienced by current users, more specifically the purchase price, the lack of charging infrastructure and the limited user knowledge regarding Clean Power. A well-organized coordination structure with working groups for the implementation, including feedback and reporting mechanisms, ensures the transversal character and the involvement of all stakeholders concerned in the policy development. Key concerns are clear consumer information, visibility and user friendliness.

In order to reach the targets set forward in the Flemish Action Plan, the following policy measures are being implemented:

- Fiscal incentives for Clean Power vehicles (exemption from registration and annual circulation taxes).
- Financial incentives for zero-emission vehicles. A zero-emission premium of 5,000 EUR maximum for individuals when purchasing or leasing battery-electric or hydrogen vehicles. The zero-emission premium is currently being revised, among others with the aim of stimulating electric car-sharing.
- The 2 year prolongation of the financial support provided under the ecology subsidy to companies for the installation of electric charging infrastructure.

- The setup of a website dedicated to Clean Power ([www.milieu vriendelijkvoertuigen.be](http://www.milieu vriendelijkvoertuigen.be)) and an accompanying communication campaign.
- The development and provision of a tool to compare the total cost of ownership (TCO) of Clean Power vehicles to one another and other vehicles.
- The design of an electric mobility guide for local governments and a guide for charging and home charging.
- The obligation of the Distribution Grid Operators (DGOs) to install 5,000 extra publicly accessible charging points through public procurement in 2020 distributed over the more than 300 municipalities in Flanders. Currently, more than 1,000 of these are already in operation. Local governments are responsible for the installation of the parking spot and parking policies (e.g. enforcement). The charging points should enable EV drivers to conveniently charge in Flanders.
- The introduction of a notification requirement for publicly accessible charging points. Gather data on locations of publicly accessible charging points/fueling stations in Flanders and inform citizens through our clean vehicles website. Currently, more than 1,700 normal charging points and 34 locations for fast charging are registered in Flanders.
- The deployment of the first publicly accessible hydrogen refueling stations.
- The setup of actions to encourage the use of shore power for vessels on inland waterways.
- The use of European financial instruments to stimulate infrastructure development in Flanders. Initiated by Flanders and in cooperation with the Netherlands and Brussels Capital Region, the BENEFIC Action ([www.benefic.eu](http://www.benefic.eu)), which was selected for financial support under the CEF transport call 2016, has the ambition to implement more than 700 additional infrastructure points for clean vehicles on the TEN-T core network and in the urban nodes, combining normal/fast/ultra-fast charging points, natural gas and hydrogen fueling stations and shore power installations.
- In addition, a number of European projects, initiated by stakeholders, will stimulate the up-take of infrastructure for alternative fuels on the TEN-T core network in Flanders (e.g. FAST-E, ULTRA-E, UNIT-E, H2Benelux, LNG Blue Corridors, ...).
- The mobilization of funds (1 million EUR each year) to support studies (e.g. light electric vehicles) and Clean Power projects. At the moment, 17 CPT projects are being implemented (e.g. zero-emission buses and taxis, projects on car-sharing and light electric vehicles, projects on grid

integration). More information on some of these CPT projects/studies can be found under chapter EV Demonstration Projects.

Meanwhile, Flanders is preparing a following-up policy programme for a further transition towards zero-emission transport horizon 2030. In preparation of the policy vision, all relevant stakeholders were actively involved in stakeholders sessions on different topics (e.g. charging infrastructure, role of natural gas and hydrogen and role of local governments).

### **Walloon Policy Framework**

The Walloon Region has recently boosted its intent to foster alternative fuels on its territory. While electric mobility has improved its ability to replace fossil fuels vehicles in recent years, we have reached a point where an increased support to alternative fuels becomes necessary. Recently, the Walloon Government has approved some decisions that will impact the development of alternative fuels in coming years (i.e. 2030 and 2050). The Government has set up a ban on diesel vehicles in 2030 and a 50 % replacement rate on battery electric vehicles (100 % in 2050).

In order to reach those ambitious objectives, several formal decisions have been approved:

- 2 million EUR budget to support deployment of publically accessible charging infrastructures;
- 50 million EUR investment plan for power to hydrogen innovative projects where transport will be specifically addressed (with an aim on logistics and public transportation);
- 40 million EUR for 2018 and 2019 for specific climate actions where transport is a major objective to be encountered;
- Implementation of the first hydrogen refueling station within the H2BENELUX project;
- 400 hybrid buses to be deployed within 2 to 3 years (already 20);
- Study of the potential of electric mobility as a support to the electricity grid;
- Specific scope on transport and mobility within the National Plan on Energy and Climate;
- Plan FAST that will boost intermodality in the transport and aiming the creation of 100 platforms with shared electric or CNG vehicles, refuelling infrastructures, etc. A provisional budget has been approved in order to launch the first platform at last in 2019.

### **Brussels Policy Framework**

The Brussels Capital Region (BCR) is facing important challenges in improving local air quality and reducing road congestion. Especially the numerous diesel vehicles daily entering and circulating the roads contribute strongly to the emissions of particulate matter and nitrogen oxides, causing important health problems, as well as damage to ecosystems and cultural heritage. Changing the way of transportation towards more sustainable modes of transport (walking, cycling, public transport) is the main driver in the regional mobility policy and is translated in the Region's objective to reduce motorized traffic by 20 % by 2018, compared to 2001.

In order to reach the BCR's targets regarding air quality and climate change, additional actions are necessary. These actions have been defined by the 'Air-Climate-Energy Plan' (ACE plan), adopted on June 2, 2016 by the Brussels' regional government. Besides rationalizing the transport demand and encouraging a modal shift, the plan includes several measures to improve the environmental performance of vehicles. The introduction of a Low Emission Zone (excluding the most polluting diesel and petrol cars, vans and buses) on the complete BCR territory as of January 2018, is one of the most important measures which have been decided upon. The vehicle taxation (annual circulation tax and registration tax) will also be reformed, as part of the ACE plan, giving an advantage to environmentally friendly vehicles.

Alternatively fueled vehicles form an interesting solution for the nuisance caused by conventional diesel and petrol vehicles, although these vehicles will not resolve the congested roads. Seen the urban context of the BCR and the fact that on average only 5 kilometers are travelled inside the region per trip, electric vehicles are considered as the most promising alternative vehicle technology. This is especially the case for captive fleets, such as taxis, car sharing, public fleets, etc.

To stimulate the transition towards electric transport, the BCR has already taken different measures, e.g. quota on electric cars in the public fleets, financial support for small and medium enterprises to purchase hybrid, electric and fuel cell vehicles, electric taxis, etc. The public transport company of the BCR (STIB/MIVB) is currently testing electric buses as to prepare the transition for an electric bus fleet as from 2030.

In 2017 the deployment of a public charging infrastructure network will take a lead, with an objective to have 200 recharging points by 2020 for 2,000 electric cars and 600 light duty vehicles. A concession is being prepared for the installation of public charging infrastructure in the Region. The first normal charging points will be installed as from the summer of 2018, to create a regional basic

infrastructure, after which the next round of points will be installed based on users demand. Currently, only one public CNG station is operational in the BCR, which will be expanded towards three public stations by 2020.

The port of Brussels (an inland port, part of the TEN-T core network) will also start the transition towards alternative fuels for vessels with the installation of three shore-side electricity supply points by 2020, as well as one LNG refueling point by 2030.

The urban context and limited presence of motorways on the BCR territory directs the objectives of the Brussels policy framework strongly towards electric recharging infrastructure. Infrastructure for hydrogen or LNG for heavy duty vehicles is currently not included in this policy framework due to safety considerations within our densely populated region.

The Brussels Capital Region (BCR) is also partner in the BENEFIC action ([www.benefic.eu](http://www.benefic.eu)), together with the Flemish Region and the Netherlands with the purpose to provide financial support for the installation of two additional CNG stations, ten fast chargers, one ultra-fast charger and three shore-side electricity points for the Brussels' port.

### **Federal Policy Framework**

The main elements with regard to Directive 2014/94 can be found in the policy frameworks of the three regions being mainly competent for aspects regarding alternative fuels infrastructure. The federal part of the Belgian policy framework describes the main federal policy measures/competences which directly or indirectly regard alternative fuels / vehicles / infrastructure. The federal part goes beyond the scope of Directive 2014/94.

However, the federal government of Belgium played an important role in support actions like the coordination of the national policy framework. The Federal Public Service of Economy and the Federal Public Service of Mobility & Transport coordinated the national concertation and development of the Belgian policy framework. In the ENOVER-Transport working group, all regional and federal energy and mobility related policy makers work together. Input from industry and research was collected via stakeholder meetings and communication has been done via the “Belgian Platform Alternative Fuels”.

The federal government also plays a coordinating role in Belgium related to the cooperation with the other policy levels: Benelux, EU Sustainable Transport Forum, IEA TCP Hybrid & Electric Vehicles, etc.

Main federal policy measures/competences are related to federal fiscal measures, economy & employment, mobility & transport (networked and integrated transport), energy & environment (synergy electric mobility and renewable energy), federal government fleet, standardization (CEN – NBN) and security. Some examples:

- Federal fiscal measures for (alternative) company vehicles: tax reduction for certain electric vehicles, advantageous deductibility rates for clean company cars in function of CO<sub>2</sub> emissions, lowering deductibility rates for polluting vehicles, incentives via system “benefit in kind” for company cars, advantageous excise duties for example for natural gas as a motor fuel, etc. Fiscal measures with regard to private vehicles is a regional competence in Belgium.
- Economy & employment: incentives were created by the federal government (tax shift - reduced employer contributions, tax benefit systems for shift work, tax credit for research and development, etc) which facilitated the choice of Audi to produce its first EV, the e-tron Quattro SUV, in the plant in Vorst (Brussels) for production in 2018, and its second, the e-tron Sportback, which will also be built in Brussels starting in 2019. The plant in Brussels will also produce the batteries for the electric vehicles. Further efforts will be made in order to attract additional investments with regard to the production of electric vehicles/batteries in Belgium. In February 2018, the federal government organized a stakeholders meeting on Batteries.
- Mobility & Transport: new federal regulation and incentive measures were adopted in 2017 with regard to speed pedelecs and normal (electric) bikes. Moreover, in February 2018, a smart mobility call was launched by the federal government (budget: 4 million EUR). The call will focus on - among others - projects regarding car sharing, intermodality, services / apps which provide real time information on transport services, open data with regard to mobility, etc.
- Energy & climate: integration of transport objectives in the energy & climate plans of Belgium. Moreover, a transport chapter is included in the interfederal “Energy Pact” for 2030/2050, of which the political negotiations are currently being finalized. This will have a considerable impact on the Belgian CPT policy framework with a time horizon of 2025/2030.
- Federal government fleet: new rules were adopted in 2017 with regard to the purchase of vehicles for the federal government. In general, the following objective was set: the federal government fleet consists of at least

25 % of battery-electric , hybrid or CNG vehicles and at least 25 % of the fleet has an “ecoscore” of 75 (or higher).

- Standardization issues: various standards have been developed and published by the Belgian national organization for Standardization (NBN), also regarding Directive 2014/94.

## Other Policy/Incentives

### Low-Emission Zones (LEZ)

Recently, low-emission zones have been entered into force in Belgium. This measure aims to improve the local air-quality by keeping polluting vehicles outside certain areas in the city or region.

The federal level created a sign so that there is uniformity throughout Belgium for indicating low emission zones. Cities in Flanders can introduce low-emission zones starting in March 2016. The first city to introduce a low-emission zone was Antwerp starting in February 2017. Other cities in Flanders will follow. The Brussels Region turned its whole territory with only a few exceptions left into a low-emission zone on January 1, 2018.



Figure 7: New road signs for low-emission zones (Source: Federal Public Service of Mobility & Transport)

### Green Deal Shared Mobility

Inspired by the Dutch Green Deal on car-sharing, Autodelen.net, The Shift, The New Drive and Taxistop took the initiative to launch a Green Deal Shared Mobility with the Flemish Government. The aim of the Green Deal is to accelerate the growth of shared mobility (car-sharing, carpooling and bike-sharing) in Flanders. The Green Deal is a partnership of many different organisations who are willing to undertake actions and to remove barriers to provide alternatives to car ownership.

The Green Deal, launched on March 27, 2017, is an engagement between several parties and the Flemish government. At the moment of the kick-off, 80 organisations have signed the deal with three Flemish Ministers: Bart Tommelein (Energy), Ben Weyts (Transport and public works) and Joke Schauvliege (Environment). The signing organisations have chosen their own actions to contribute to the four objectives of the green deal, with 2020 as horizon. More information: <http://gedeeldemobiliteit.be/english/>.

In Flanders, the number of electric car-sharing vehicles has quintupled in one year up to 71 vehicles at the end of 2017. The reason is that more and more car-sharing initiatives are active in Flanders and some of them even focus completely on electric car-sharing. In 2018, initiatives like Poppy (Antwerp) will introduce hundreds of extra electric car-sharing vehicles in Flanders. The ambition of the Green Deal is to reach 1,000 electric car-sharing vehicles in 2020. The seven partners in the Green Deal are:

- [www.autodelen.net](http://www.autodelen.net)
- [www.cambio.be](http://www.cambio.be)
- [www.battmobiel.be](http://www.battmobiel.be)
- [www.partago.be](http://www.partago.be)
- [www.poppy.be](http://www.poppy.be)
- [www.stappin.be](http://www.stappin.be)
- [www.zencar.eu](http://www.zencar.eu)

In Brussels, car-sharing initiatives like DriveNow, Cambio, UbeeGo, ZipCar and Zen Car are active. Zen Car already have more than 100 electric car-sharing vehicles on the road today.

### **Standardisation Support to Electric Mobility in Belgium**

In Belgium, the Belgian Bureau for Standardisation (NBN) has started to develop a Belgian standard on “Electrical propelled road vehicles – controlling risks during interventions” in 2017.

The reason for this initiative is the fact that more and more vehicle manufacturers in the EU are placing e-mobility vehicles on the market. The take-off of e-mobility has started slowly, but is now in full expansion transforming the automobile sector fundamentally, from assembly to recycling. This new technology has a serious influence and impact on all safety procedures, requirements and precautions which need to be considered in case of interventions on these vehicles.

Standardization of procedures and practices across the European Union and providing adequate, correct and updated information to first and secondary

emergency responders and persons working on electric traction vehicles becomes a priority matter. This Belgian standard is being developed by the standardisation committee NBN/B Electric Vehicles. Within this committee there are representatives of the private and public transport sector, the academic institutions, and the technical service departments of car manufacturers or their importers involved in Belgium.

The purpose of this standard is to define the requirements for the control of risks during interventions on electric traction hybrid, plug-in hybrid, full electric passenger cars, small commercial vehicles and motorcycles (categories M-N-L). Special requirements will be identified to remove any electrical risk and to properly handle damaged and defective components of such vehicles.

Several other EU Member States have developed similar standards in the past few years: the Netherlands (NEN 9140-2013), France (NF C18-550), and Germany (DGUV 205-022). In addition to these European initiatives, the International Standard Organisation (ISO) has been working on the standard ISO 17840 “Road Vehicles - Information for first and second responders” since 2015 which is to be published in 2018.

This standard consists of four parts:

- ISO 17840-1, Rescue sheet for passenger cars and light commercial vehicles
- ISO 17840-2, Rescue sheet for buses, coaches and heavy commercial vehicles
- ISO 17840-3, Emergency Response Guide template
- ISO 17840-4, Propulsion Energy Identification

Educating technical personnel and intervention teams has become an integral part in the deployment of electric traction vehicles on the European marketplace. Technical information and advice is essential to control all the risks potentially associated with this new technological mobility development.

### **22.2 HEVs, PHEVs and EVs on the Road**

The number of electric passenger cars in Belgium has been growing quickly. Most sold electric passenger cars in 2017 are PHEV’s with Mercedes GLC350e, BMW X5 40e, Volvo XC90 PHEV, BMW 530e and BMW 330e. as top sellers Within the BEV’s segment, the top sellers in 2017 are Tesla Model S, Tesla Model X, Nissan Leaf, Renault Zoe and BMW i3.

**Top 10 PEV (M1) market share Countries in the European Union**

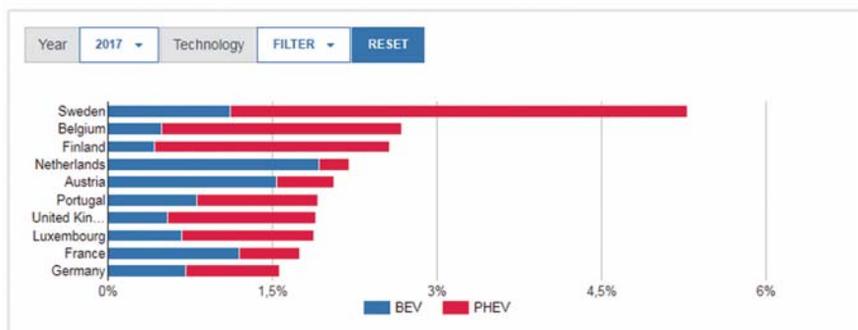


Figure 8: Top 10 PEV (M1) market share Countries in European Union (Source: EAFO)

**PEV (M1) market share in Belgium**

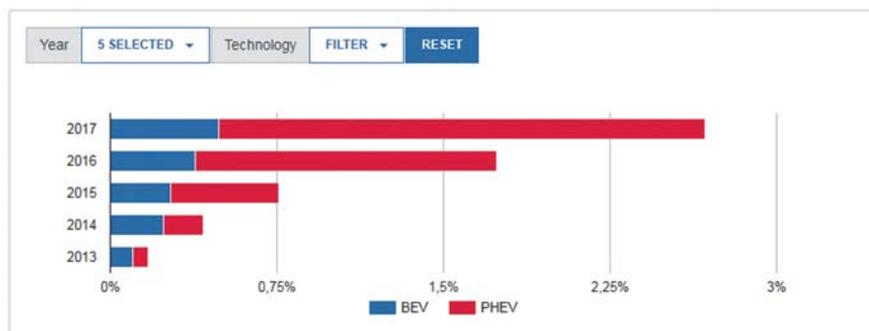


Figure 9: PEV (M1) market share in Belgium (Source: EAFO)

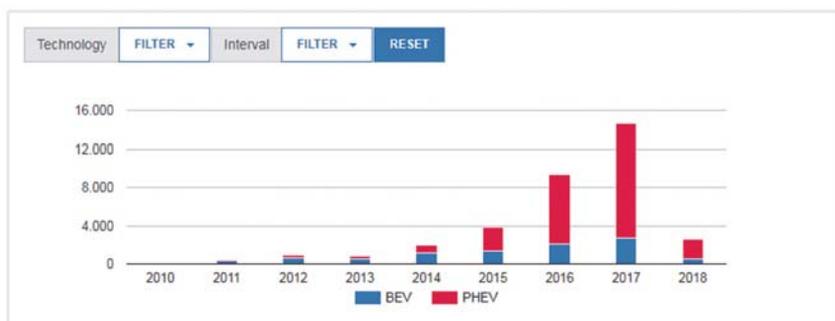
**PEV (M1) new registrations in Belgium**


Figure 10: New registrations for PEV (M1) in Belgium (Source: EAFO)

All statistics on electric passenger cars but also on the other types of electric vehicles like 2-wheelers, light commercial vehicles, medium and heavy freight trucks and electric buses can be found below.

Table 4: Distribution and sales of EVs, PHEVs and HEVs in 2017 (Data source: Federal Public Service of Mobility &amp; Transport)

Fleet Totals on 31 December 2017					
Vehicle Type	EVs	PHEVs	HEVs	FCVs	Total <sup>6</sup>
2- and 3-Wheelers <sup>1</sup>	10,878	0	178	0	606,589
Passenger Vehicles <sup>2</sup>	7,524	22,974	52,559	15	5,798,628
Buses and Minibuses <sup>3</sup>	10	0	269	5	15,987
Light commercial vehicles <sup>4</sup>	776	0	0	0	741,015
Medium and Heavy Weight Trucks <sup>5</sup>	14	0	13	0	145,088
<b>Totals without bicycles</b>	<b>12,350</b>	<b>22,974</b>	<b>53,018</b>	<b>20</b>	<b>7,300,239</b>

Total Sales during 2017					
Vehicle Type	EVs	PHEVs	HEVs	FCVs	Total <sup>6</sup>
2- and 3-Wheelers <sup>1</sup>	6,024	0	0	0	39,968
Passenger Vehicles <sup>2</sup>	2,705	11,832	12,235	4	552,102
Buses and Minibuses <sup>3</sup>	0	0	63	0	855
Light commercial	127	0	0	0	76,116

vehicles <sup>4</sup>					
Medium and Heavy Weight Trucks <sup>5</sup>	0	0	4	0	10,130
<b>Totals without bicycles</b>	<b>4,172</b>	<b>11,832</b>	<b>12,302</b>	<b>4</b>	<b>674,448</b>

<sup>1</sup> UNECE categories L1-L5

<sup>2</sup> UNECE categories M1

<sup>3</sup> UNECE categories M2-M3

<sup>4</sup> UNECE categories N1

<sup>5</sup> UNECE categories N2-N3

<sup>6</sup> Including non-electric

## 22.3 Charging Infrastructure or EVSE

Within the National Policy Framework “Alternative Fuels Infrastructure” extra policy measures have been taken to stimulate the market for charging infrastructure in Flanders, Walloon Region and Brussels Capital Region. See chapter “National Policy Framework” for all details.

Getting an up-to-date overview on all charging points available in a country is not an easy task, because this information is spread out over the different market players. For previous annual reports, we collected this information via a survey sent to the different market players in Belgium. But this only gave a rough idea of how this charging infrastructure market is growing and which companies are active in this market. Worldwide, drivers of an electric vehicle need much more detailed real-time information on the charging infrastructure: location, ways of access, availability, prices, etc. There is still a long way to go, because at the moment all information is scattered over different databases/websites/apps and not always up-to-date and certainly not available in a standardized way. So big improvements are needed for user-friendly access to charging infrastructure information.

Therefore a new **Task 39 on “Interoperability of e-mobility services”** has been started within the framework of the IEA HEV TCP (see chapter 19). Task 39 will be coordinated by VITO (Belgium). In the annual report of 2018, a more comprehensive country chapter focused on the charging infrastructure market in Belgium will be included. For this annual report we will focus in detail more on the statistics on charging infrastructure in Flanders.

### Statistics on Charging Infrastructure in Flanders

Triggered by the end customer needs and by the European and national/regional governments, the market for charging infrastructure is trying to organize itself to aim for an open and interoperable charging network. In Flanders, this process started already in the Flemish Living Lab Electric Vehicles (2011-2014) within the

interoperability working group. Afterwards, different initiatives like EVORA and OpenChargePoint.be continued this huge effort of bringing the different stakeholders together to set-up “code-of-conducts” in which the main and basic conditions for public accessible charging are described. This Code will be used as a standard in Flanders, as it was also referred to in the Flemish EV policy. The Code covers topics such as charging definitions, conditions for accessibility, payment standards and interoperability. As described in the chapter “National Policy Framework”, a lot of new policy measures have been taken to stimulate the alternative fuels infrastructure. To avoid duplication of information, we recommend to read that chapter. All measures aim for having more publicly accessible charging points and for giving the potential EV drivers more accurate information. All information is centralized on the following website: [www.milieuvriendelijkevoertuigen.be](http://www.milieuvriendelijkevoertuigen.be)

Currently, 1,726 normal charging points and 34 locations for fast charging are registered in Flanders (Source: Annual Report Flemish Action Plan CPT).

More charging infrastructure is expected in the next years, coming from initiatives like BENIFIC ([www.benific.eu](http://www.benific.eu)) and via the obligation of the Distribution Grid Operators (DGOs) to install 5,000 publicly accessible charging points through public procurement in 2020. In order to differentiate between private and (semi) public charging infrastructure, a definition of publicly accessible charging points (24/7 accessibility) was integrated in the Energy Decree of the Flemish Government. The charging points are distributed over the more than 300 municipalities in Flanders. Currently more than 1,000 of these are already in operation. Local governments are responsible for the installation of the parking spot and parking policies (e.g. enforcement). The charging points should enable EV drivers to conveniently charge in Flanders. An overview of all publicly accessible charging points is available on the clean vehicles website ([www.milieuvriendelijkevoertuigen.be/laden](http://www.milieuvriendelijkevoertuigen.be/laden)).

## 22.4 EV Demonstration Projects

### Electric company cars (PEB)

The “Platform elektrische bedrijfswagens” (Platform electric company cars or “PEB”) aims at accelerating the adoption of electric vehicles in company fleets in Belgium/Flanders. Its primary objective is to adopt a thorough selection of EV in the car policy of multiple companies and create incentives for employees to implement the adoption in practice. PEB offers a platform for fleet owners and market players to share knowledge on the subject and challenge each other, with a clear focus on bringing more EV on the road. PEB is an initiative from Fleet &

Mobility (the Belgian organization of fleet owners), Traxio (the Belgian umbrella organization of mobility retailers) and The New Drive (management consultants in e-mobility). The Platform is supported and co-financed by the Flemish government through the Clean Power for Transport program. The project started on January 1, 2017 and will run over the course of two years.

In 2017, the Platform organization brought together a group of five companies which aim at an average 25 % EV share (total fleet, not new sales). These frontrunner companies, have a diverse fleet in terms of size, utility/person cars and legal entity (profit and non-profit). The 25 % goal was reached after several in depth knowledge sessions in which best practices and experience from other companies was shared. The Platform initiated a Request for Information (RFI) toward the market (car, leasing and charging service companies) to review the market offer and roadmap and to challenge the TCO, compared to gasoline company cars. 24 companies participated in the RFI (Allego, Alphabet, Athlon, Arval, Audi, Belfius, BMW, EDF Luminus, ENGIE, Eneco, EV-Box, Fastned, Jaguar, Mini, Mobility+, Land Rover, New Motion, Powerdale, Renault, Tesla, Total, Volvo, VW, and VW D'Ieteren Lease). The deliverable was a report which showed us that the TCO of electric cars dropped below gasoline cars in certain cases, especially at a yearly distance of 25,000 km or more. The report was shared with more than 20 fleet owners with over 20,000 company cars.

At the end of 2017, the Platform developed a model e-car policy, together with the front runner companies, which was made publicly available in March 2018. The Platform also initiated two conferences with fleet owners and market players, to share best practices. In spring 2018, there will be an EV experience test for the employers of the frontrunner companies. They will test electric cars during a period from 1 to 3 weeks. The aim of this experience is to convince the employees and make the choice for an electric company car. At the end of spring 2018, the Platform will also publish an electric fleet manual/guideline, to support even more fleet owners to electrify their fleet.

### **E-Taxis**

The “Clean Power for Taxis” project is led by BBL and taxi federation GTL with support from the Flemish government. The scope of the project is to have at least one out of ten taxis driving electrically in 2020. The “Clean Power for Taxis” builds further on the pilot projects in Antwerp and Louvain and will also roll-out in Bruges, Ghent and Mechelen. The project wants to support cities and taxi companies in the process to introduce electric taxis.



Figure 11: Clean Power for Taxis (Source: Jasper Léonard)

In Brussels, the taxi sector took its first steps in introducing electric vehicles into its fleet already at the end of 2014. The operation seems to be successful. However, while waiting for the next client electric taxis have to make use of fast charging infrastructure and there is a lack of fast chargers, so today these electric taxis in Brussels have to rely on the fast chargers at VUB-MOBI and Engie Electrabel.

## E-Buses

### ZEB Platform & ZeEUS

Projects like **ZeEUS** (<http://zeus.eu/>) and events like **Busworld Europe** ([www.busworld.org](http://www.busworld.org)) prove that the market of electric buses is in full expansion worldwide. At the latest Busworld Europe in Kortrijk (Belgium), 41 electric buses were presented. In 2017, the ZeEUS project produced an update of the **ZeEUS eBus Report**, a very comprehensive overview of the electric buses being used in Europe today and gives information about 90 European cities and a growing number of bus manufacturers. The 2017 update also included electric system suppliers for the first time. From Belgium, input was foreseen from the city of Bruges and Namur and from bus manufacturers Van Hool and VDL Bus & Coach. VITO gave support in creating the ZeEUS eBus Report.

The **Flemish Zero Emission Bus Platform (ZEB Platform)** was approved at the end of 2016 and is running from 2017 until mid 2018 (<http://www.platformzeb.be/>). The Zero Emission Bus project aims to accelerate the transition to zero emission bus transport in Flanders, by improving the cooperation and knowledge sharing between the different stakeholders. Many workshops have been conducted. The ZEB platform worked closely together with the ZeEUS project, to translate the huge amount of knowledge build up by ZeEUS on the European level to the local situation in Flanders.



Figure 12: FBAA Symposium on electric public transport (Source: FBAA)

The ZEB platform had its first symposium at FBAA (<https://vimeo.com/210910748/8cb8dc93bf>). The public transport authorities and operators were informed about the barriers and opportunities of introducing electric buses in operational use. At Busworld 2017, the first intermediate results have been presented and the final ZEB report is in preparation and will be delivered by mid 2018.

### **TEC Group**

TEC Group, the Public Transport company of the Walloon Region, has very ambitious plans in the electrification of its bus fleet. TEC ordered 90 electric hybrid buses and 12 charging stations for Charleroi and Namur.

The Belgian cities of Charleroi and Namur are to receive 90 Volvo 7900 Electric Hybrid buses and 12 ABB charging stations as part of a complete solutions contract with Volvo Buses. Charleroi will introduce 55 Volvo 7900 Electric Hybrids and four ABB charging stations. This order comes on top of the previous order for Namur and brings the total for both cities to 101 Volvo electric hybrids and 15 ABB charging stations! This will be the largest single network of electric buses and bus charging systems in Europe.

The TEC Group previously ordered 11 Volvo 7900 Electric Hybrids along with charging stations for Namur, a system that became operational in January 2017. Once the 35 extra electric buses for Namur are on the roads, 90 percent of Namur's public transport will be electrified!



Figure 13: Volvo 7900 Electric Hybrid charging in Namur (Source: TEC Group)



Figure 14: Opportunity charging station in Namur (Source: ABB)

In January 2017, ABB inaugurated the first two OppCharge bus charging stations ordered in February 2016, to power eleven electric hybrid buses running within a new zero-emissions zone in the city center of Namur. The charging stations will fully charge the electric hybrid buses with 150kW of charging power in three to six minutes during layover times at the bus route's end points. ABB's fast chargers are compliant with the open Interface **OppCharge** ([www.oppcharge.org](http://www.oppcharge.org)), which means that buses from other manufactures can also be charged. The scope of ABB's second contract is a complete turnkey project to charge the additional 90 Volvo Electric Hybrid buses and includes twelve 150kW charging stations, substations, switchgear, civil works, installation and a service contract. ABB's fast charger connectivity includes remote diagnostics and management, and over-the-air software upgrades to ensure a fast response and high availability. With over 5,000 web-connected DC fast chargers sold around the world, ABB's connectivity solutions have delivered industry leading uptimes.

The quiet and clean Volvo 7900 buses are designed for zero-emission areas and silent or safety zones. The buses extend their reach and flexibility when needed with a small diesel engine. They create possibilities to open new routes and stops in areas that were not possible before.

### **STIB/MIVB**

STIB/MIVB, the Public Transport company of the Brussels Capital Region, is currently testing electric buses to prepare the transition for an electric bus fleet as from 2030.

### **De Lijn**

De Lijn, the Public Transport company of the Flemish Region, has the ambition to drive completely electric in 2025 in the “urban environments”. The first project with inductive charging for electric buses in daily operation started already a few years ago in the city of Bruges.

Today, De Lijn is starting up projects with six full electric buses in three cities (Ghent, Antwerp and Louvain). The buses will be charged via pantograph opportunity charging.

Brussels Airport and De Lijn are starting up a pilot project with a self-driving bus on the Brussels Airport. The vehicle that is being developed for this, will be one of the first to drive in Belgium in mixed traffic. After the summer of 2019, tests without passengers will begin at constructor 2GetThere in Utrecht (The Netherlands). The shuttle bus will arrive at Brussels Airport in the beginning of 2020 for further tests.

### **ECAR**

ECAR (<http://www.ecar333.be/>) was shown as a concept on the Brussels Motorshow 2015. Since then business angels have provided funds through three consecutive capital increases and a regional subsidy has been obtained to develop and homologate the first rolling vehicles. Final prototypes were shown at the Brussels Motorshow in January 2017, creating a lot of interest of regional and national government. Industrial partners have been identified who will industrialize the whole concept.

ECAR is an L5 category full electrical vehicle aiming at being different than a traditional car and affordable through its simplicity. It is a 3 wheel category simplifying the homologation track but also light weight product whilst still seating three people and reaching 130 km/h speeds. With one battery set an autonomy of 150 km can be reached and 300 km with two battery sets. These batteries will be

rented as a second life is planned as home batteries stretching the overall life of the battery to over 20 years, time at which recycling will generate a surplus versus its cost.



Figure 15: Design of self-driving electric bus (Source: De Lijn)



Figure 16: ECAR (Source: Xavier Van der Stappen)

## Saroléa

Saroléa ([www.sarolea.com](http://www.sarolea.com)) was the first Belgian producer of motorcycles, and one of the first producers of motorcycles in the world. This Belgian factory was established in 1850 by Joseph Saroléa. As of 2008, Saroléa is focused on the development and production of high-performance electric two-wheelers and electric drivetrains. The Saroléa SP7 electric race bikes and the Saroléa MANX7 road bikes are built around an innovative carbon fibre monocoque chassis and an ultra-efficient 180 kW axial flux motor, powered by a 22 kWh interchangeable battery pack. This combination of materials and techniques results in ultra-efficient motorcycles with an autonomy already surpassing 330 km.

Saroléa is also supplying high-performance / high-capacity battery packs as well as electric drive-trains for automotive, nautical and aerospace applications.



Figure 17: Saroléa SP7 electric race bike with DC quick-charge capabilities (Source: Saroléa)

### 22.5 Outlook

GEAR 2030: Belgium is represented by Flanders' minister of innovation, Mr Muyters in the High Level Group on Automotive Industry GEAR 2030, that started its activities in early 2016 to make recommendations to reinforce the competitiveness of the European automotive value chain, in particular developing a roadmap for the connected and automated vehicles. Within the context of AVICA, Flanders' MAKE is working on the realisation of self-driving buses that consider other road users and are able to participate in public road transport. This is a logical next step following the self-driving vehicles that are already in use for instance in agriculture fields. The strategic research centre smart manufacturing gets support for its research program 'Autonomous Vehicle and Infrastructure Cooperative Architecture'. The objective is to create a demonstration environment for automated vehicle technologies to facilitate the take up in public transport in the coming years.

The use of electric vehicles in new mobility services, the improvement of important components like batteries, higher end user comfort/trust and the seamless integration of electric vehicles in a smart grid environment are still high on the research agenda within Horizon 2020. Research centres like VUB-MOBI, Flanders' MAKE and VITO/EnergyVille are therefore setting up a lot of new research projects on these topics in close collaboration with the industry/governments to further improve the ecologic and economic benefits from electric mobility for the society.