(Image copyright: Rob Vos | Living Lab Smart Charging)

Electric transport in the Netherlands

2016 highlights

Electromobility in the Netherlands

2016 highlights

Dutch businesses, social institutions, knowledge institutes and government agencies have joined forces at the national and international level to accelerate the adoption of electric transport, intending to capitalise on the economic opportunities associated with it.

This has once again borne fruit in 2016. For one thing, the number of electric cars in the Netherlands has again increased significantly over the past year. The nearly 25,000 new electric passenger vehicles were a welcome addition.

100,000 electric passenger vehicles

In October 2015, the Netherlands welcomed its **100,000th electric vehicle with 2 or more wheels**. This figure does not include electric bicycles, but does include electric mopeds and scooters. Another important milestone was achieved in November 2016, when the **100,000th electric passenger car** was registered. The Netherlands is only the second European nation to achieve this important milestone; Norway was the first in late September 2016. Worldwide, only the US, Japan and China are doing better. As of 31 December 2016, the tally for the Netherlands stood at 115,223 electric vehicles. Of this figure, 112,038 are electric passenger vehicles.

Opportunities through innovation

It is evident from the growing interest in electric transport that this innovation offers economic opportunities for the Dutch business sector. Dutch companies are involved in various related activities, including the provision of a charging infrastructure and charging services, the manufacture of components and the production of light electric vehicles such as electric scooters.

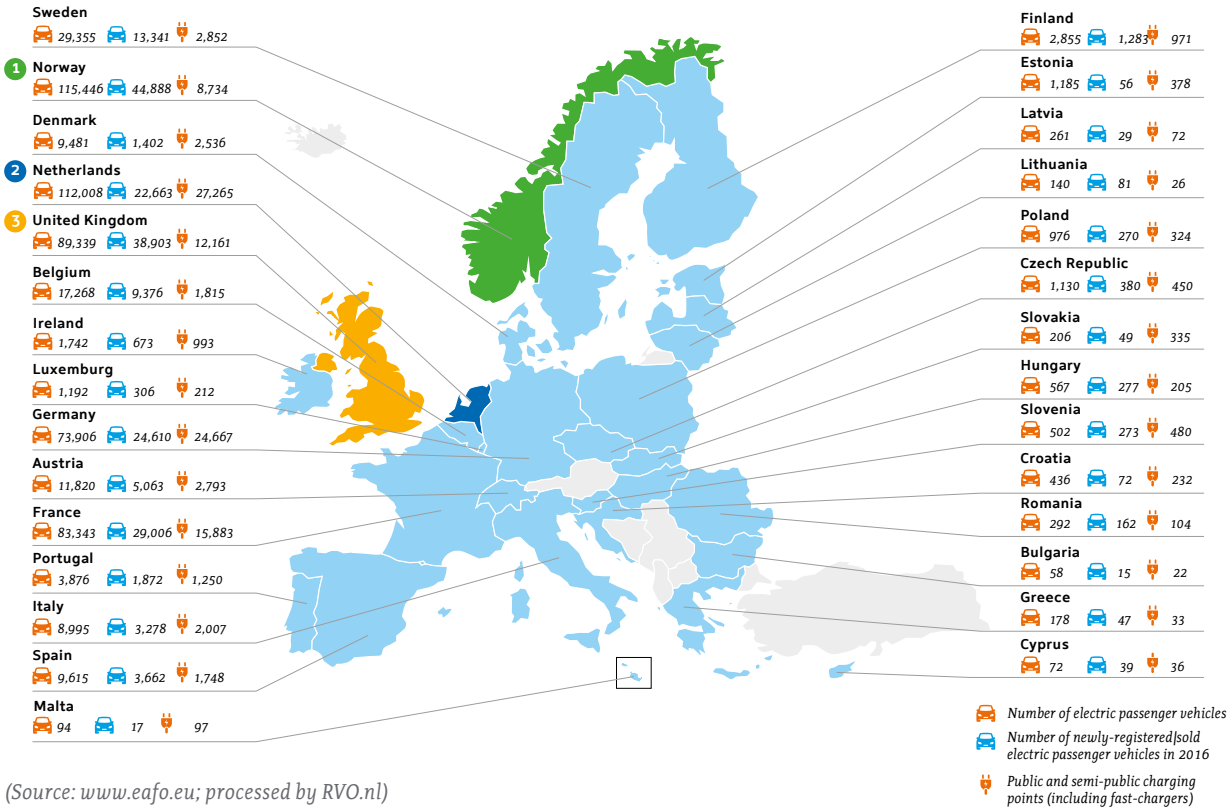
The Netherlands Enterprise Agency (RVO.nl) has been commissioned by the Netherlands Ministry of Economic Affairs to promote electric transport.

In 2016, a lot of activities took place and important results were achieved. This annual report contains a selection of the most important events – in other words, the highlights of 2016. The most up-to-date information can be found online, at **www.nederlandelektrisch.nl.**

Contents

1. The year 2016 in figures and images

International benchmark: the Netherlands compared to Europe



(Source: www.eafo.eu; processed by RVO.nl)

International benchmark

Country	2016*	Total 2011-2016*
Canada	11,459	28,545
China	283,247	442,939
Japan	20,563	145,461
Korea	6,019	6,019
USA	158,240	550,734

* New registrations passenger vehicles: plug-in hybrid electric vehicles (PHEVs) and full electric vehicles (BEVs)

(Source: Bloomberg New Energy Finance)

Countries where EVs were above 1% of total passenger vehicle sales

Year	Country
2014	
2015	
2016	

(Source: Bloomberg New Energy Finance)

The year 2016 for electric transport in figures

Electric vehicles on the road

2015:
90,275

2016:
115,223

New jobs and vacancies

73 new jobs every month and **2,699** job openings in the electric transport sector since January 2014

(Source: Joblift)

Fast-charging points

2015:
465

2016:
612

Newly-registered electric passenger vehicles

2015:
43,769

2016:
22,663

Additional tax liability for BEV

4%

Public and semi-public charging points

2015:
17,786

2016:
26,088

Market share in number of new registrations

2015:
9.7%

2016:
6.4%

Exemption of registration and road tax

(Source: Statistics Netherlands (CBS), Dutch Road Authority, Oplaadpalen.nl; processed by RVO.nl)

Share of electric passenger vehicles

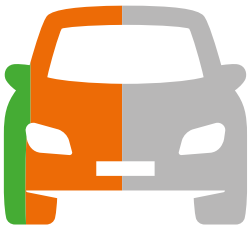
Share of electric passenger vehicles among new registrations

In 2016, 18 parties (including the Dutch central government, the Formula E-Team and various market players – Eds.) signed the 2016 – 2020 Electric Transport Green Deal. The Green Deal has the ambition that, by 2020, 10% of newly-sold passenger cars must have an electric powertrain.

Between 2016 and 2020

- Percentage of new registrations in 2016: 6.4% (BEVs: 1% and PHEVs: 5,4%)
- Ambition percentage of new registrations by 2020: 10%

Number of electric passenger cars in 2016



BEV 1%

PHEV 5,4%

Ambition for 2020 set by Green Deal parties: 10%

(Source: Dutch Road Authority; processes by RVO.nl)

(Image copyright: Renault)

2. The Netherlands as a business location and exporting country

Renault will supply 150 Renault ZOE models for the 'vehicle-to-grid' project

King Willem-Alexander and Queen Máxima next to an electric Ebusco bus in Paris

The Netherlands as a business location

- ***Segway to open European office in Amsterdam:*** from this base in the Dutch capital, the company will serve not only the European market, but also the Middle East and Africa. In addition to distribution, the Amsterdam office will also be undertaking service and marketing activities.

- ***Royal couple endorses Renault joining Utrecht's 'vehicle-to-grid' project:*** King Willem-Alexander and Queen Máxima have officially endorsed car manufacturer Renault joining the city of Utrecht's 'vehicle-to-grid' project. The project aims to put in place a regional energy system with 1,000 charging points, 1,000 electric cars and 10,000 linked solar panels. Electric cars can charge using the solar energy or store it for later use.

The Netherlands as an exporting country

- ***Dutch fast-chargers for electric buses in Luxembourg:*** Helios has supplied fast-charging systems for electric buses, to be used in the city of Differdange. Helios is part of a consortium with Volvo and Sales-Lentz, and will be completing the installation of the three fast-charging systems during the first quarter of 2017.

- ***EV-Box opens Belgian office:*** the Dutch charging-station manufacturer EV-Box has opened an office in Antwerp. The company wants to focus more on the Belgian and Luxembourg markets. The company sees opportunities resulting from the growing efforts by the Belgian government to promote electric transport.

- ***Ebusco exports electric buses to France:*** in 2016, Ebusco exported a large number of electric buses to various countries in Northwestern Europe. For example, the city of Paris asked the Helmond-based company to supply it with ten electric city buses. These buses can drive 300 kilometres without having to recharge. The development of the city bus that will be used in Paris was made possible by an 'Innovation Credit' loan from RVO.nl.

- ***Allego to commence installation of 25 ultra-fast chargers in 4 different countries:*** since the autumn of 2016, a consortium of European parties, headed up by the Dutch company Allego, has been working together under the umbrella of the 'ultra-E' project. As part of this project, 25 ultra-fast chargers will be installed across 4 different countries: the Netherlands, Belgium, Germany and Austria. These ultra-fast

Allego is working on 25 ultra-fast chargers as part of a European partnership (image: BMW Nederland & Klijn Fotografie)

The Electric Nation project is one of the biggest smart charging projects in Europe

chargers will only require 20 minutes to charge for 300 kilometres of driving.

- ***GreenFlux launched partnership to further electric transport in Germany:*** GreenFlux and the German IT system integrator CIS Solutions have established a partnership to implement GreenFlux's charging solutions in the electric transport markets in Germany, Austria and Switzerland.

- ***Dutch companies supply charging points in the United Kingdom:*** two Dutch companies have joined the Electric Nation project in the United Kingdom. Together with Greenflux, which is developing the protocol for smart charging, charging-station supplier Alfen/ICU Charging Equipment will have installed 500 to 700 smart charging points by 2018. The project will achieve £2.2 billion in savings that would otherwise have been used for laying new cables and opening roads between now and 2050.

- ***PIB Austria and US West Coast|Midwest established:*** two new PIBs in the domain of electric transport were launched as part of the Partners for International Business (PIB) programme. In October, the PIB Smart Mobility Solutions for Connected, Clean and Autonomous Transportation Needs (S4C) was launched. This programme focuses on knowledge development and the exchange of innovations between the US – more specifically the US West Coast and the Midwest – and Dutch knowledge institutions and government agencies. The plan is for the programme to result in at least five different projects with an expected market value of €5 million. The second PIB is the PIB E-mobility Austria, established to promote the growth of the e-mobility sector through cooperation with Dutch and Austrian organisations. The objectives are the development and deployment of electric vehicles for transportation and distribution, along with the development of the associated smart infrastructure and the development of sustainable tourism with e-mobility and sub-systems.

The signatories to the PIB Austria (credit: RVO.nl)

3. Regional incentives

The province of North Brabant is aiming to have 12,000 public and semi-public charging points in place by 2020

The Municipality of The Hague subsidises electric cars and smooths the way for fast charging points

As of 1 July 2016, the Municipality of The Hague has a subsidy scheme for fully electric cars, for both residents and businesses. Both new and second-hand vehicles are covered under the scheme, but only passenger cars, delivery vans and taxis that are fully electric are eligible. The Municipality of The Hague gives a €3,000 subsidy for the purchase of a second-hand car and a €5,000 subsidy for the purchase of a new car. A €300,000 budget was available for passenger cars, with the same amount being available for taxis and delivery vans. In 2016, 60 new and 19 second-hand electric cars were subsidised. Due to the success of the scheme, The Hague intends to make subsidies available for the 2017 calendar year as well. In addition, The Hague smoothed the way for the introduction of fast-charging points in the city centre in 2016.

North Brabant launches tender procedure and forges ahead with smart charging

In 2016, the province of North Brabant, in partnership with the province of Limburg, launched a tender procedure for the installation of 2,500 charging points. The tender procedure will be completed in early 2017. However, it was already clear in 2016 that this is the largest regional tender to date. In addition, it will result in new charging points being put in place without any investments from government authorities. The province of North Brabant aims to have 12,000 public or semi-public charging points in place by 2020 to enable an increase to 100,000 electric vehicles. Under this tender procedure, during the years leading up to and including 2019, charging stations which comply with the latest smart charging standards will be installed in both provinces. Because the contractor will allow third parties to provide services through their charging stations, they will be suitable for charging using locally-generated sustainable energy. In future, for example, this will enable e-drivers in North Brabant and Limburg to charge their cars using energy generated from their own solar panels.

In addition, in the summer of 2016 the province of North Brabant and Enexis presented the results of the “Smart Charging in North Brabant” pilot project. As part of this project, 255 new smart charging stations

Half of all EvnetNL charging points will change hands in 2017

were installed in 35 municipalities in North Brabant. The pilot of the scheme for smart charging outside peak hours using the Enexis electricity grid was successful. The pilot project will continue until 2020. By then, the province wants to have 100,000 electric cars on its roads that can use local sustainable energy and smart technology and services.

Only emission-free taxis at Amsterdam Central Station by 2021

In 2016, the Municipality of Amsterdam decided that, as of 2021, it will only allow emission-free taxis to use the taxi rank at Amsterdam Central Station. The Municipality of Amsterdam and the licenced taxi organisations (the so-called 'Toegelaten Taxi Organisaties', or TTOs) have set this out as part of the 'Clean taxis for Amsterdam' agreement. All licenced taxi organisations have signed the agreement, which also includes agreements about measures to ensure that more electric taxis will hit the road in the city in order to contribute to cleaner air. Clean taxis are currently already given priority at the taxi rank.

Partly due to these agreements on clean taxis, the city of Amsterdam won its second E-Visionary Award during the Electric Vehicle Symposium & Exhibition 29 (EVS29) in Montreal, Canada. This prize is awarded to the city with the best vision on electric transport. The jury members unanimously chose Amsterdam for its 'long and solid track record of promoting the use of electric vehicles in the city, putting an effective charging infrastructure in place and promoting in general the transition to electro mobility'.

Half of EVnetNL charging stations to change hands

In the spring of 2016, EVnetNL gave local governments the opportunity either to take over management of the public charging stations installed by EVnetNL themselves, or continue the partnership with EVnetNL. In late 2016, it was announced that half of all EVnetNL charging stations will change hands in the first half of 2017. Nearly 40% of local governments have elected to take over the operation of the charging stations. Those municipalities which have opted to do so have an above-average number of charging stations. Together, they account for about half of the total number of EVnetNL charging stations. The Municipality of The Hague took the lead: it was the first municipality to decide to take over 43 charging stations.

Before the charging stations are transferred to the various local authorities, EVnetNL undertook the task of making all the charging stations suitable for smart charging. This will make it possible to gain experience with smart charging on a large scale over the coming period. To this end, research institutes, businesses and government agencies will work together in the Smart Charging Living Lab, alongside the knowledge and innovation centre ELaadNL. The municipalities that opted to take over the EVnetNL charging stations themselves will make them available to the Smart Charging Living Lab.

The pilot of inductive charging has been launched (credit: Rogier Bos | Municipality of Rotterdam)

Amsterdam and Utrecht are moving forward on environmental zones

As part of their ultimate aim of banning polluting vehicles, the cities of Amsterdam and Utrecht decided to introduce environmental zones starting in 2016. On 1 January 2016, Utrecht was the first municipality in the Netherlands to introduce an environmental zone free of old diesel cars. In addition, the city intends to ban all non-electric scooters from the city centre from 2020. Initial research is currently being undertaken into ways of using licence-plate scanners to distinguish between polluting and clean two-wheelers. This research will also examine whether such a measure will be practicable for residents.

Amsterdam has announced that, as of 2018, it will ban two-stroke and four-stroke scooters that were first authorised for use prior to 1 January 2011 from the inner city. Finally, as of 1 January 2017, diesel cars that were first authorised prior to 1 January 2000 will be no longer be permitted within the A10 ring road.

All buses to and from Amsterdam Airport Schiphol to be fully electric from 2018

From 2018, all buses going to and from Amsterdam Airport Schiphol as part of the new concession will be fully electric. This is one of the requirements stipulated in the new Amstelland-Meerlanden concession; Schiphol Airport falls within this concession area.

The City Region of Amsterdam – like virtually every other region in the Netherlands – aims to have fully switched over to zero-emission buses by 2025. As Amsterdam Airport Schiphol's bus network lends itself particularly well to a fast transition to zero emissions, this change will be implemented here immediately. On the other bus lines, the transition will take place gradually, and tenderers are being asked to prepare a transition plan.

Rotterdam launches pilot for the wireless charging of electric vehicles

In the autumn of 2015, the first wireless charging system for electric passenger vehicles using an induction plate was put into operation in Rotterdam. Using this induction plate, suitable cars can be charged in public spaces. The induction plate is part of a pilot project with which the Municipality of Rotterdam intends to gather knowledge to be prepared for the rollout of wireless charging. The intention is that the experiences gained in this project will contribute to the future wide-scale application of the technology. The pilot project will explore issues of safety, user-friendliness and interoperability. One of the objectives is to figure out how to charge two different vehicles on the same charging system. The pilot will come to an end in the first quarter of 2017.

(image copyright: Renault)

4. Firsts and noteworthy achievements

More and more businesses, government agencies and non-profit organisations are opting for electric fleets. These are just some of the noteworthy achievements and firsts in electro mobility for each market segment.

State Secretary Dijksma accepts the keys to a hydrogen electric car

Passenger cars

- ***Dutch government buys two hydrogen electric cars:*** Ms. Dijksma, State Secretary for Infrastructure and the Environment, accepted the keys to two new Toyota Mirai electric cars with fuel cells. This makes Dijksma the first politician at the national level in Europe to be driving a hydrogen electric car. A full tank lasts around 500 kilometres, and filling up takes 3 minutes.
- ***26 fully electric cars for Royal HaskoningDHV:*** engineering and project-management consultancy firm Royal HaskoningDHV has added 26 fully electric BMW i3s to its fleet. This purchase is part of a pilot programme, the aim of which is to fully electrify the company's fleet – consisting of over 625 lease cars – by 2020.

Other news relating to passenger vehicles in 2016:
Driving school Veronica and Renault have teamed up to launch **a fully electric driving course**, as part of which candidates immediately join a car-sharing scheme in Utrecht. Participants take the course after first having had a series of simulator lessons in an electric car. The course not only covers driving skills, but also decisions relating to mobility after completion of the course.

An electric shovel in Amsterdam's city centre (credit: AT5)

The world's first electric hearse

Special vehicles

- ***Amsterdam is working with an electric shovel:*** the Municipality of Amsterdam is exploring ways to "carry out emission-free work in the city". As part of this, they have started using an electric shovel in the city centre for road works. Rutte Wegenbouw is a trailblazer in this regard: as far as is known, it is the first electric digger in Europe to be used full-time in road construction.

- ***The world's first electric hearse:*** coach-builder RemetzCar has developed the world's first fully electric hearse, commissioned by Van der Lans & Busscher Staatsievervoer, a company based in The Hague. The vehicle is based on an electric Tesla Model S, but has been extended by 80 centimetres to a length of 5.77 metres. The interior has a partition wall with a window, a floor that can be manually extended for a casket, built-in flower trays on either side and storage space.

- ***Albert Heijn delivers groceries on electric cargo bike:*** in Amsterdam, Albert Heijn has started delivering groceries by electric cargo bike. The supermarket chain has added 10 cargo bikes to its fleet, each of which is capable of transporting 30 crates of groceries. In the near future, Albert Heijn also plans to start using electric delivery cars, which will be developed in cooperation with logistics service provider Simon Loos and producer Ginaf.

Buses

- ***Largest electric bus fleet in Europe for southeast North Brabant:*** as of mid-December 2016, transport provider Hermes is responsible for public transport in Eindhoven and Helmond. The company is deploying 43 BEVs articulated city buses for this, making southeast North Brabant's fleet the largest electric bus fleet in Europe. The

One of Albert Heijn's electric cargo bikes in Amsterdam's city centre

One of the 43 electric VDL buses serving the Eindhoven region

Heineken aims to use emission-free transport in all major cities by 2020

De Bever has purchased 18 electric scooters (credit: emco)

Other news relating to electric buses in 2016:
The European bus manufacturers Irizar, Solaris, VDL and Volvo have signed an agreement to implement **a charging infrastructure which can be used to charge the electric buses produced by these manufacturers.** The charging infrastructure is being developed by ABB, Heliox and Siemens.

vehicles are model VDL Citea Electrics, 18 metres in length and with a capacity of 125 passengers. The bus's battery pack is charged using a pantograph at the bus depot, which takes only 5 to 20 minutes using the Heliox Fast Charger.

- ***'s-Hertogenbosch expands electric public transport:*** electric vans have been in operation in the capital of the North Brabant province for several years now. Now the buses running the transferium lines are also electric. This means the provincial capital is currently operating a total of seven electric buses. The municipality intends to learn from these experiences with a view to increasing this number to 14 by 2018.

Lorries

- ***Seven new electric lorries for Heineken:*** Heineken Wholesale is now operating 8 13-ton electric lorries in Amsterdam. This transition supports the beer company's ambition of using exclusively zero-emission transport in all the major cities in the Randstad conurbation for its on-trade distribution. The lorries, provided by logistics service provider Simon Loos, use electricity generated by the solar panels on the roof of the Heineken distribution centre in Amsterdam.
- ***Electric refuse lorry with hydrogen system for Breda:*** E-Trucks Europe has built a BEV refuse lorry for the municipality of Breda. The lorry has been configured for a hydrogen system so that, once the hydrogen fuel station in Breda is completed, the lorry will be able to switch to hydrogen immediately.

Light electric vehicles

- ***18 electric scooters for De Bever Verhuur:*** De Bever Verhuur, which rents out holiday bungalows in Ouddorp, has purchased 18 electric scooters that can be rented by tourists. The scooters were supplied by emco Benelux.

Other news in 2016 relating to light electric vehicles:
The cabinet has decided that, as of 1 January 2017, speed pedelecs are to be considered mopeds. The same rules will apply to speed pedelec riders that apply to moped riders.
The maximum permitted speed is 45 km/h outside the inner city, and 30 km/h on the moped path within the city centre. If there is no designated path, speed pedelecs can be ridden on the road.

Fastned aims to install a total of 200 fast charging stations along the motorway

PitPoint will be operating 200 charging stations in Utrecht

Charging infrastructure

- ***Fast chargers for ten Lidl supermarkets:*** the German supermarket chain Lidl has installed fast chargers for electric cars at ten of its stores in the Netherlands. Cars can be charged almost fully – and free of charge – within 20 minutes while they are parked during a visit to Lidl. To install the charging stations, Lidl entered into a partnership with ABB.

- ***Q-Park substantially increases the number of charging points:*** in the autumn of 2016, Q-Park teamed up with The New Motion to increase the number of charging points in its car parks from 136 to 224. The 88 new charging points will be installed in 13 different locations. The operation will be completed in early 2017.

- ***Fastned opens 50th fast-charging station:*** Fastned is working on a Europe-wide network of fast charging stations powered by solar energy, on which all types of electric car will be able to charge. The 50th fast-charging station along the motorway was opened in the province of Zeeland. According to the company, this means the whole of the Netherlands is now covered. Fastned aims to install a total of 200 fast-charging stations along the motorway in the Netherlands over the next few years.

Charging infrastructure tenders

- ***PitPoint to operate 230 charging stations in Utrecht:*** the Municipality of Utrecht has chosen PitPoint to manage its existing network of public charging stations. The concession period in Utrecht started on 1 March 2016 and ends at the conclusion of 2023. PitPoint will be responsible for operation, maintenance and troubleshooting for the 230 charging facilities in Utrecht.

- ***PitPoint to double the number of charging stations for Amsterdam Metropolitan Area Electric:*** In September 2016, PitPoint started the process of doubling the number of charging points in the provinces of North Holland, Utrecht and Flevoland. This is the result of a tender procedure by Amsterdam Metropolitan Area Electric (MRA-e).

- ***Nuon-Heijmans partnership to double the number of charging stations in Utrecht:*** the Nuon-Heijmans partnership has been commissioned by the City of Utrecht to double the number of charging points in the city. In addition, the two companies will be responsible for the management of the new charging

The first charging point as part of the “doubling project” has now been installed.

stations. A minimum of 300 charging points will be installed, spread across 150 charging stations.

- ***500th charging station has opened in The Hague:*** in early 2016, the 500th charging point for electric cars was takin into operation in The Hague. The expectation is that by the end of 2017, more than 1,000 charging points will be available throughout the city.

- ***1,800 new charging points in Rotterdam:*** following a tender procedure, the Municipality of Rotterdam has chosen ENGIE Services as its partner to increase the number of charging points by 1,800 by 2018. EV-Box will be supplying the new charging stations – which are suitable for smart charging – over the next few years.

- ***Nuon-Heijmans partnership to install 4,000 charging points in Amsterdam:*** the Nuon-Heijmans partnership has been commissioned by the Municipality of Amsterdam to substantially increase the number of charging stations in Amsterdam. In addition, the two companies will be responsible for the management and operation of all new and existing public charging points over the next seven years. Amsterdam wants there to be 4,000 public charging points in the city by 2018.

The Hague welcomed its 500th charging point in early 2016

Number of public charging points per region

Region	Charging points as of the end of 2016	Target number of charging points as of the end of 2018
Amsterdam	2,081	4,000
The Hague	1,006	2,400
Limburg	211	880
MRA-e	2,073	4,146
North Brabant	1,236	3,200
Rotterdam	1,499	3,299
Utrecht	600	1,200

(Source: Oplaadpalen.nl)

Other news in 2016 relating to charging infrastructure:
Since May 2016, near Haarrijn along the A2 motorway between Amsterdam and Utrecht, **old batteries from electric cars** are being used as part of a storage system for fast-charging points by MisterGreen Electric Lease that can be used to charge electric cars. | In 2016, the **Open Charge Point Information (OCPI) protocol 2.1 by e-Violin** was launched. This universal, independent protocol connects service providers and charging-station operators in order to allow them to exchange information. The protocol has been accredited at the European level. It is important to have an independent, high-quality interface. In order to achieve this, the National Knowlegde Platform for Charging Infrastructure (NKL) will ensure technical support and realization of OCPI, guarantee independent management and further development and allow for support from other countries. | The Province of North Brabant was the first to include **new requirements relating to cybersecurity for charging stations**, developed by ElaadNL in conjunction with ENCS, in its new call for tenders for charging stations. Compliance with these requirements is an important step towards making charging stations more secure.

(Image copyright: Bart van Overbeeke)

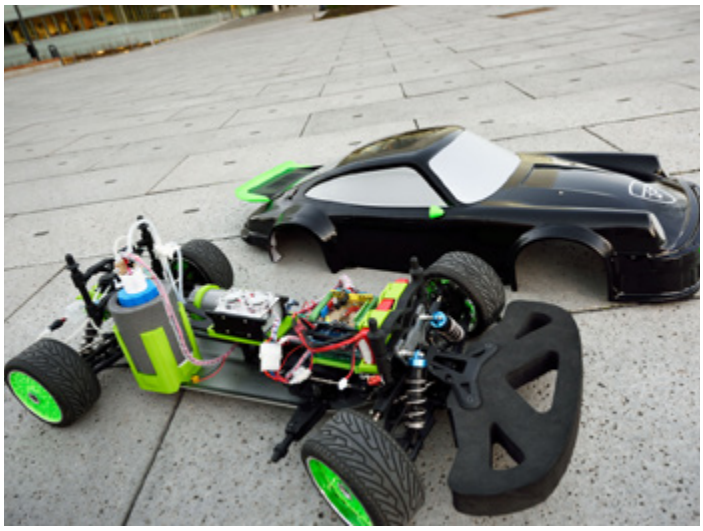
5. Dutch student teams conquer the world

Just like previous years, 2016 will go down as an auspicious year for Dutch student teams, especially for the unveiling and development of new vehicles and technology.

STORM's electric motorcycle in the US (copyright: Bart van Overbeeke)

Competitions

- ***Electric motorcycle by STORM completes its journey around the world:*** STORM Eindhoven, a team of 23 students from Eindhoven University of Technology, has completed a journey around the world in 80 days on an electric motorcycle they built themselves. The students travelled 23,000 kilometres on 2 electric touring motorcycles which had a maximum speed of 160 km/h and a range of 380 kilometres. The bikes' batteries were charged every day on the local electricity grid, at businesses, universities or in private homes. The only delay they incurred was on the second day of the journey, when the engine briefly cut out. After it had been repaired, they continued their journey without a hitch, travelling via Europe, Central Asia, China and the US and then back to Eindhoven via Paris. In the Netherlands, the students from STORM Eindhoven were welcomed by Prime Minister, Mark Rutte.



A scale model of the electric car that runs on formic acid

The new Formula Student car developed at Delft University of Technology (copyright: TU Delft)

Vehicles and market value

- A new student team from Eindhoven University of Technology (TU/e), Team FAST, has presented the prototype for an electric car that runs on formic acid. Through a chemical reaction, hydrogen with CO_2 can be rapidly converted to formic acid and vice versa. This is done using a cylinder containing formic acid which is converted into hydrogen and carbon dioxide in a reactor using a catalyst. The carbon dioxide is then filtered out, and the hydrogen goes to a fuel cell which converts it into energy for the electric engine. The team has taken the first concrete step with the presentation of a one-metre scale model. Team FAST is now looking to develop the world's first car that runs on formic acid in 2017. The team intends to achieve this by converting an existing electric car with fuel cells.
- Students from Solar Team Eindhoven are joining forces with energy company Eneco to make the solar family car Stella available to the general public. In 2017, Solar Team Eindhoven will once again be taking part in the World Solar Challenge in Australia. On the last two occasions, in 2013 and 2015, the team from Eindhoven became world champions with their two family cars, Stella and Stella Lux. The team is currently developing the new car, which will be presented in June 2017.
- The Formula Student Team from Delft University of Technology has unveiled its new electric racing car. The car, which weighs only 160 kilos, has 177 HP and accelerates from 0 to 100 km/h in 2.3 seconds. In 2016, the Dutch team won the Formula Student design and racing competition. This competition, which took place at the motor racing circuit in Hockenheim, Germany, was considered the unofficial World Championships, as all the leading teams from all over the world took part in it.

(Image copyright: Elaad NL)

6. Financial incentives

A range of tax benefits were in force in 2016, resulting in an increase of nearly 25,000 electric vehicles.

2016 fiscal stimulus package

In 2016, the fiscal stimulus package included the following components:

- exemption from purchase tax on passenger motor vehicles and motorcycles (BPM) for zero emission vehicles. Vehicles with carbon emissions from 1 to 79 grams fell in the lowest tax category (start off € 175 plus € 6 per gram CO_2 emission.
- exemption from road tax (MRB) for vehicles with carbon emissions of 0 gram per kilometre, and a 50% exemption for vehicles with carbon emissions of 1 to 50 grams per kilometre;
- a 4% additional tax liability for drivers of lease BEVs and a 15% additional tax liability for drivers of lease PHEVs with carbon emissions of 1 to 50 grams per kilometre;
- an environment-investment deduction (MIA) of a maximum of 36%, capped at €50,000 for BEVs, and an environment-investment deduction of a maximum of 27%, capped at €35,000, for PHEVs with carbon emissions of no more than 30 grams per kilometre.

Subsidies

In municipalities including Amsterdam, Rotterdam, The Hague, Utrecht and Tilburg, various subsidies were available in 2016 for the purchase of electric cars, taxis and lorries, for business purposes or otherwise. In addition, a number of municipalities offered various subsidies for the installation of charging stations and the scrapping of polluting passenger vehicles and delivery vehicles.

(Image copyright: TAXI-E)

7. Green Deals

The signatories to the Electric Transport Green Deal for 2016 – 2020

The rollout of public charging infrastructure grew to record heights in 2016 (credit: Bas Stoffelsen | Smart Charging Living Lab)

With the Green Deal approach, the government is giving scope to innovative community-based initiatives in order to accelerate the transition to a sustainable economy. When implementing sustainable initiatives, businesses, local authorities and community groups sometimes find themselves running up against obstacles. The Green Deal approach aims to remove these obstacles. The role the government plays in this is different for each initiative. In the field of electric transport, too, a number of Green Deals were concluded over the past few years. An overview of the most important highlights of the Green Deals entered into in 2016 is presented below.

Electric Transport Green Deal 2016 – 2020 focuses on Green Growth

The Dutch Minister of Economic Affairs, Kamp, signed the Electric Transport Green Deal for 2016 – 2020 along with 17 other parties in April 2016. The objective of this Green Deal is to bring together those initiatives that relate to electro mobility, in order to accelerate the transition to electric transport. As part of the Green Deal, 18 parties – including, in addition to central government, the Formula E-Team, a number of government agencies, market players and civil society organisations – are working together to promote electric transport and green growth.

The Netherlands is one of the world leaders in the field of electric transport. The aim of the Green Deal is to maintain this leading position over the next five years. The target for 2020 is that 10% of newly-sold passenger vehicles should have an electric powertrain and plug. In addition, 75,000 private individuals should be driving an electric car by 2020, with 50,000 of these being second-hand and 25,000 being new vehicles. Finally, by 2025, 50% of newly-sold cars should have an electric powertrain. A minimum of 30% of those, i.e. 15% of all newly-sold cars, must be fully electric.

In addition, the signatories will focus on improving and expanding the charging infrastructure, the linkage with sustainably-generated energy, developing the consumer market, capitalising on the international earning potential of companies in the electric-transport sector and supporting innovation. The Formula E-Team (FET) has responsibility for implementing the Green Deal. The signing of the Green Deal marks a five-year extension for the Formula E-Team. **More information about the Green Deal can be found here.**

Budget allocated to Charging Infrastructure Green Deal nearly exhausted after record year

As part of the Publicly Accessible Electric Charging Infrastructure Green Deal concluded in 2015, the Dutch central government made €5.7 million in public funding available in order to co-fund the installation of up to 8,000 additional public charging stations. In 2016, this Green Deal made a significant contribution to a record growth in the number of public and semi-public charging points. Where 6,137 public or semi-public charging points (including fast charging points) were installed in 2015, in 2016 this number went up to 8,449. By the end of the 2016 calendar year, the total number of public and semi-public charging points (including fast charging points) in the Netherlands was 26,700.

The rollout of these public and semi-public charging points (including fast charging points) was heavily reliant on Green Deal funding. The provinces of Gelderland, North Brabant and Limburg, the cities of Amsterdam and Utrecht, and the Amsterdam Metropolitan Area and the Rotterdam The Hague Metropolitan Area all received government funding. While it was expected that the budget would not be used up until 2018, the end was already in sight by the end of 2016: only €420,000 of the budget remains. The Ministry of Economic Affairs has announced that it will make an additional €1.5 million available.

In addition to the Charging Infrastructure Green Deal, in November 2016 Minister Kamp, the Minister of Economic Affairs, informed the Dutch House of Representatives by letter about the cabinet's vision for the charging infrastructure for electric transport. The cabinet's vision is based on elements from a scenario study undertaken by Ecofys and Eindhoven University of Technology. The key principle underlying this vision is that electric transport should be promoted to the fullest extent, in particular by ensuring that an adequate charging infrastructure is in place. According to the minister, over the course of the next few years the Netherlands should be working towards a situation in which the business case for charging infrastructure is a profitable one. The aim is to further reduce the cost price through innovation, efficiency improvements and the promotion of rollout and scaling-up.

According to the cabinet, in a few years' time public charging infrastructure will be capable of continued development without direct government support. Minister Kamp refers to the findings of the Netherlands Knowledge Platform for Public Charging Infrastructure (NKL), which estimates that the business case for public charging infrastructure will be profitable by 2020. To identify a trend line from 2013-2020, a benchmark study was carried out to show the cost and revenue of public charging infrastructure in 2016. Compared to 2013, the cost for public charging infrastructure has decreased by around 30%. Moreover, the usage at the public charge point increased over the same period from 5 to 8,5 kWh per day.

More information about the Green Deal can be found here.

Administrative agreement on emission-free buses signed

In April 2016, State Secretary Dijksma (Infrastructure and the Environment), together with 14 transport authorities, signed the administrative agreement "Zero Emission Regional Public Transport by Bus". The agreement stipulates that, from 2025, all new buses must be free from harmful exhaust emissions.

The provinces of North Brabant and Limburg led the way for this agreement, as bus companies from these two provinces will already be operating BEVs fleets within a few years. By signing the agreement, the Association of Provincial Authorities (IPO) and the metropolitan areas have committed to including, as one of the requirements in the so-called public transport concessions for bus services, that all buses must be emission-free. Another requirement will be that the energy that powers the buses must be sustainably generated, using solar panels or wind turbines from within the region, by 2025 at the latest.

One of the benefits of greening the bus market is that competition will lead to innovation in new and more affordable technologies. The Dutch companies VDL and Ebusco are important suppliers of electric buses, selling them both in the Netherlands and abroad. In addition, BYD has established its European head office in the Netherlands. This Chinese company previously supplied 35 electric buses to Amsterdam Airport Schiphol to transport passengers to and from the terminal.

Zero Emission City Logistics Green Deal to start living labs

The end goal of the Zero Emission City Logistics Green Deal is to reduce harmful emissions – i.e. CO_2, NOx and particulate matter – and noise from city logistics to zero by 2025. Local experiments are being undertaken to explore how effective contributions can be made to this reduction. As part of this effort, the more than 100 participants in the Green Deal launched so-called Living Labs in 2016.

These testing grounds are used to explore which combinations of logistics, regulations, vehicles and behaviour can make an effective contribution to reducing harmful emissions. In these Living Labs, new expertise with logistics concepts and the corresponding business models is being developed. Areas of focus include new vehicle technologies, the use and loading of lorries, establishing innovative logistical routes, finding solutions to barriers in relevant laws and regulations and promoting and implementing adjustments to regulations. The six core topics in the Living Labs are: "fresh in the city"; post, parcels and pallets; smart deregulation; demolition and construction in the city; facility flows in the city; and the business case for innovative vehicle technologies.

More information about the Green Deal can be found here.

One of the new signatories to the Zero Emission City Logistics Green Deal

8. Formula E-Team

The Formula E-Team (FET) is a public-private partnership between the business sector, knowledge institutes and the government. The Formula E-Team ensures that electro mobility in the Netherlands continues to develop, keeps pace with developments abroad and seizes opportunities for green growth.

Minister Kamp has extended the Formula E-Team by five years

Formula E-Team signs Electric Transport Green Deal for 2016 – 2020

By signing the Electric Transport Green Deal, Minister Kamp extended the Formula E-Team's existence by five years. In the context of the Green Deal, 18 parties, including government agencies, market players and civil society organisations, are working to promote electro mobility and green growth.

Private consumers

With the motion submitted by Mr Groot, the House of Representatives asked the Government to develop a plan, in cooperation with the Formula E-Team, to make electric vehicles more attractive and affordable for individuals. The report was drawn up under the direction of the Formula E-Team.

The document contains eight measures intended to make electric vehicles accessible and attractive to private individuals, in order to achieve one of the targets from the Electric Transport Green Deal for 2016 – 2020. One of the initiatives involves an extensive network of charging points in order to ensure that electric vehicles can be charged anywhere in the Netherlands. The Formula E Team also proposed a purchase subsidy for BEVs and a charging credit for PHEVs.

Commissioned by the Ministry of Economic Affairs, research organisations PBL and CE Delft reviewed the report. PBL and CE Delft concluded that purchase subsidy and charging credit are not the most effective tools. To achieve future growth, according

to the government it is important to make it compulsory for car manufacturers to bring a larger share of hybrid and electric cars on the European market. With the Green Deals Public Accessible Charging Infrastructure and Electric Mobility 2016-2020, the government is investing in electric mobility in the coming years, in cooperation with companies and organisations such as consumer associations/ organisations and local governments. These actions are in addition to the existing tax benefits for individuals.

Formula E-Team establishes new working groups

In order to achieve the targets set out in the Electric Transport Green Deal for 2016 – 2020, the Formula E-Team has established several working groups. The following new working groups were launched in 2016:

- ***Internationalisation:*** this working group focuses on areas including coordination at the strategic level, the organisation of events such as trade missions and networking events and the establishment of new Partner in Business programmes. They will also establish and sustain an agenda of international activities.
- ***Charging Infrastructure:*** in 2016, this working group made ten recommendations to central government for ways to speed up the rollout of public charging infrastructure. Examples include the establishment of a national loan or guarantee fund that can further drive down the costs associated with funding charging infrastructure, and making electric transport a standard component of urban-planning policy.
- ***Light Electric Vehicles (LEV):*** this working group promotes initiatives that aim to market new types of vehicles (hybrids that lie somewhere between a bicycle and a car) that are part-electric. One of the goals of the working group is to establish a Living Lab to explore the best way to incorporate LEVs into conventional traffic, for example by allowing them onto bicycle paths, setting speed limits and deciding on parking locations.

First AVERE E-mobility Conference was a major success

In April 2016, Amsterdam hosted the first-ever AVERE E-mobility Conference. A total of 300 representatives from the international electro mobility sector convened in the Royal Tropical Institute. The conference featured many leading speakers, ranging from Diarmuid O'Connell (Vice-President of Tesla Motors) to Tom Turrentine (Director of the Plug-In Hybrid Electric Vehicle Research Center at ITS-Davis) and Guillaume Berthier (European Electric Cars Sales & Marketing Director at the Renault Group).

The "Make Electric Driving Great" report contains eight measures to promote the uptake of electric transport by private individuals

At the conference, various partnerships were announced in the outdoor Living Lab with the presentation of a range of electric vehicles. Bert Klerk, chairman of the Formula E-Team, summarised the day as follows: "Today, we learned that we should have no hesitation when it comes to the rollout of electric transport. Or as Tesla put it: we have a plan, and the plan says we will succeed."

The outdoor Living Lab and a networking moment during the AVERE E-mobility Conference (copyright: Misteli)

9. Communication, research and publications

Communication

National Knowledge Platform for Electric Vehicle Charging Infrastructure presents public charging infrastructure wiki: the National Knowledge Platform for Electric Vehicle Charging Infrastructure (NKL) has developed a digital database to aid municipalities in their search for accurate and independent information. The information on charging infrastructure will be offered in the form of a "wiki". The articles are sorted according to the policy processes municipalities go through: from the initial spur to action to well-evidenced proposals, strategy and implementation. Municipalities will use the wiki to set their policy on electric transport.

NKL developed the **Dutch standards for charge points**. A practical summary of the requirements regarding electric vehicle charging infrastructure. A point of departure for future public tenders and permits. Useful in the development of policy and for entering into agreements and signing contracts.

The public charging infrastructure wiki developed by the National Knowledge Platform for Electric Vehicle Charging Infrastructure

Research and publications

"Factsheet on Five Years of Pilot Projects Involving Hybrid and Electric Vehicles"
This factsheet contains the most important insights, lessons learned and recommendations from five years of pilot projects with hybrid and electric vehicles. This publication was commissioned by RVO.nl and drawn up by researchers from Eindhoven University of Technology and Rotterdam University of Applied Sciences as part of the Dutch-INCERT partnership. In the final evaluation, Dutch-INCERT placed the experience gained in the pilot projects in the context of the autonomous market developments that have taken place since the pilot projects were completed. One of the most important insights from the pilot projects pertains to the range of hybrid and electric vehicles. When electric vehicles are matched up with the right end users and market applications, it turns out that many companies can replace up to 50% of their conventional fleet with electric vehicles.

"Electric Transport Guide – Promoting Plug-In Vehicles"
The Electric Transport Guide ("EV Wijzer") is an initiative by the Formula E-Team. It is a tool employers can use to ensure that their employees use their plug-in hybrid car as intended, i.e. that they maximise their mileage on electric power as much as possible. The guide answers questions such as: for which types of employees is a PHEV suitable? What charging facilities are required? And what agreements can an employer make on fuel use and monitoring?

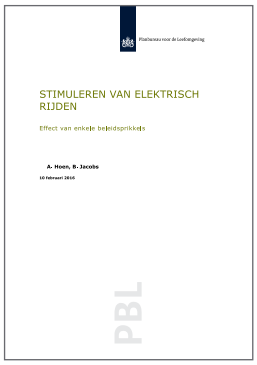
"Running municipalities on electric power – A statistical study into the effectiveness of local electric-transport policy"
Research conducted by Decisio and APPM Management Consultants for RVO.nl has revealed that the number of charging points has a positive impact on the number of electric cars in a municipality. In addition, the study demonstrates that using a subsidy scheme for the purchase of electric cars has a positive impact on the number of fully electric cars within a given municipality.

"Sustainable solar charging"
This guide – commissioned by RVO.nl and drawn up by EVConsult, DDK and Eversheds – explains how the charging of electric cars can be combined with solar energy from solar panels. This brochure is intended for businesses, institutions and government agencies.

"Installing Extended Private Charging Stations" and "Factsheet on Extended Private Charging Stations"
Energy sustainability firm HetEnergieBureau and engineering firm Movares were commissioned by RVO.nl and the City of 's-Hertogenbosch to take stock of the existing expertise on, and experiences with, the installation of extended private charging stations in five municipalities. These publications provide local governments with information on the possibilities for installing extended private charging stations. The report covers developments relating to extended private charging stations, points of attention, policy decisions and experiences in practice.

"The value of flexible charging"
This report was drawn up by Movares for ElaadNL and is about the value of the flexibility of electric vehicles to the electricity markets. One of the main conclusions is that, by using flexible charging, the electricity price excl. VAT can be reduced by between 35% and 60%.

"Opportunities for electric motorcycles"
The Directorate-General for Public Works and Water Management and APPM Management Consultants joined forces to put together the publication "Opportunities for electric motorcycles". The document discusses the question of the extent to which government services can make use of electric motorcycles, now and in the future. The publication contains the findings of an exploratory study into the possibilities for electric motorcycles, and also discusses comparable small vehicles and electric two-wheeled vehicles such as electric bicycles, electric mopeds and speed pedelecs.



"Promoting electric transport | The impact of policy incentives"
This report, drawn up by the PBL Netherlands Environmental Assessment Agency (PBL) discusses the impact of a number of policy measures relating to electric transport. The study demonstrates that the private and business markets are two clearly distinct markets, and that they appear to be in different stages where the transition to electric transport is concerned. Although conventional cars are still valued most, according to the Netherlands Environmental Assessment Agency, business drivers are on average more likely to opt for an electric car than private car buyers.

10. The development of electric transport in figures

In early 2016, 90,275 electric vehicles were registered in the Netherlands. By the end of 2016, that number had increased to 115,223.

Distribution of the number of electric vehicles by different types of vehicle

Type of vehicle	Number as of 31 December 2012	Number as of 31 December 2013	Number as of 31 December 2014	Number as of 31 December 2015	Number as of 31 December 2016
Private car (BEV)	1,910	4,161	6,825	9,368	13,105
Private car (E-REV, PHEV)*	4,348	24,512	36,937	78,163	98,903
Private car (FCEV)					30
Company car <3500	494	669	1,258	1,460	1,628
Company car >3500	23	39	46	50	66
Bus**	67	73	80	94	168
Three-wheeled	469	632	769	872	1.007
Motorcycle	99	125	196	268	316
Total* **	**7,410**	**30,211**	**46,111**	**90,275**	**115,223**

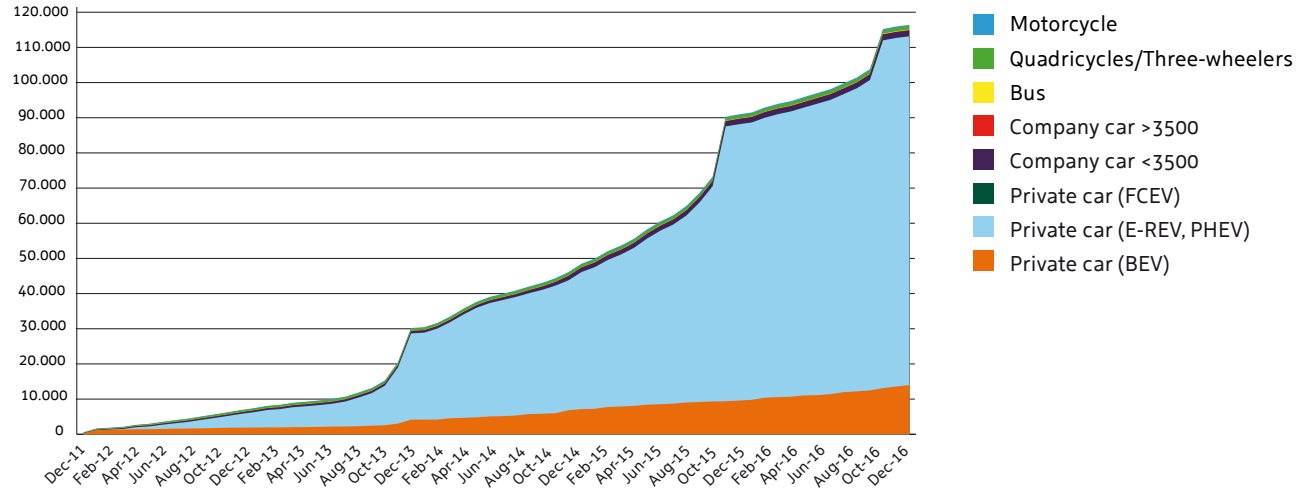
** Excluding fully hybrid vehicles*

*** Including trolley buses*

**** This total includes motorcycles*

(Source: Dutch Road Authority; processed by RVO.nl)

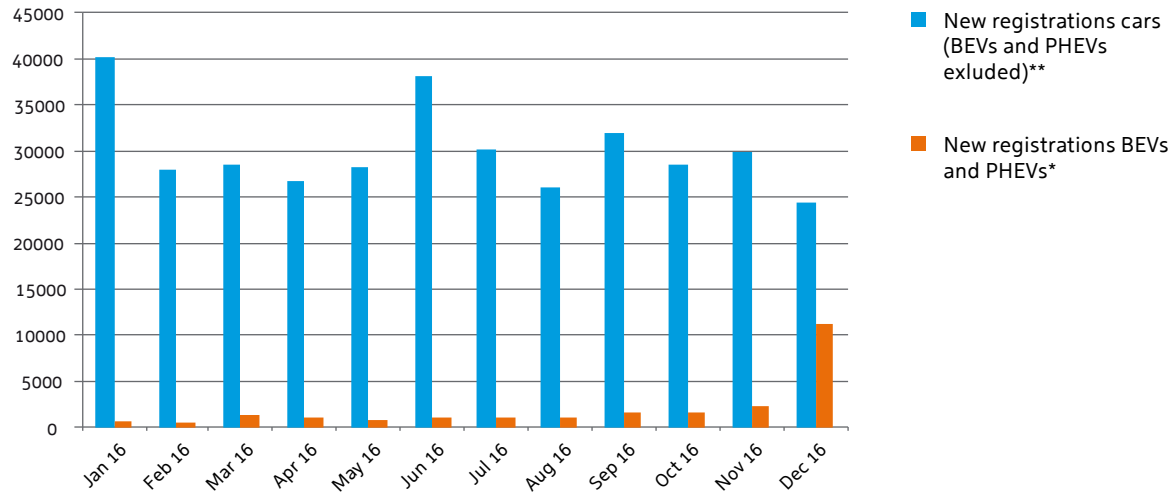
Growth curve of electric vehicles between the end of 2010 and the end of 2016



(Source: Dutch Road Athority; processed by RVO.nl)

In 2016, as a result of the lower additional tax liability for PHEVs, the growth in the number of electric vehicles was lower than in 2015. However, the number of newly-registered electric vehicles in the Netherlands was still higher than in 2014. In 2014, an average of 3.9% of new registrations were electric (combined figure for BEVs and PHEVs), whereas in 2015 this percentage had risen to 9.7% and in 2016 it was 6.4%. In concrete terms, this means that 24,477 of the 382,825 newly-registered passenger vehicles are powered electrically.

The image below shows the development of the new registrations in graph form

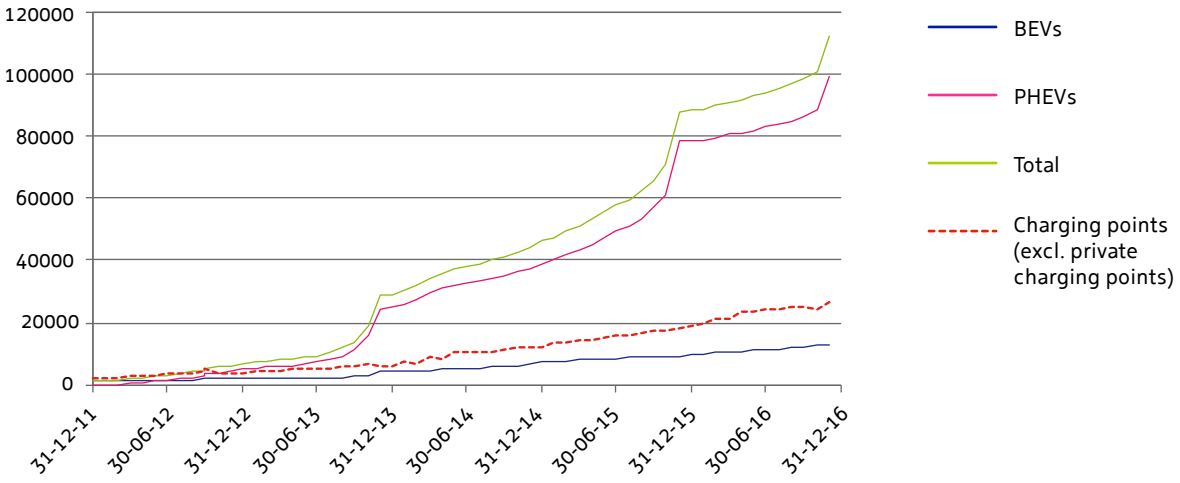


(Source: Dutch Association of Car Dealers (RAI) and Garage Owners (BOVAG)*

*(** Source: Dutch Road Authority; processed by RVO.nl)*

In the image below, the development of the registrations of BEVs is contrasted with that of PHEVs (including range-extended vehicles).

Development electric passenger cars and charging points



(Source: Dutch Road Authority, Oplaadpalen.nl; processed by RVO.nl)

Number of charging points

	31 December 2012	31 December 2013	31 December 2014	31 December 2015	31 December 2016
Public (publicly accessible 24/7)	2,782	3,521	5,421	7,395	11,768
Semi-public (limited public accessibility)	829	2,249	6,439	10,391	14,320
Private (estimate)	4,500– 5,500*	18,000**	28,000**	55,000**	72,000**
Semi-public fast-charging points	63	106	254	465	612

** Based on research conducted in 2012.*

*** Based on research conducted in 2012, supplemented by the estimated increase based on the registered number of electric vehicles.*

(Source: Oplaadpalen.nl processed by RVO.nl)

The number of charging points is growing at an increasingly rapid pace. In 2016, a record number of public and semi-public charging points (including fast-charging points) was installed: 8,449. In addition to the number of public and semi-public charging points – which is comparatively easy to monitor – there are also private charging points. The Netherlands has about 0.9 charging points per vehicle.

The information is based on figures by the foundation e-laad, EV-Box B.V., NUON and Essent, The New Motion (figures up until 31 October 2012) and Oplaadpalen.nl (figures up until 30 November 2012). For the figures prior to 28 February 2014, it has been assumed that the charging stations provided by e-laad, Nuon and Essent are public and that the other charging stations on file are semi-public. As of 31 March 2014, Oplaadpalen.nl's data specifies whether charging stations are public, semi-public or private.

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