Mission Zero
Powered by Holland


Eneco Group
TU/e

Mission Zero

The Dutch ambition is to extend the leading position that it has assumed in the field of electric transport further, to inspire and motivate others in taking the road to zero emission, and to accelerate along it; because the further we all go together today, the nearer we will be tomorrow to the future that we have in mind.

© SOLAR TEAM EINDHOVEN | BART VAN OVERBEEKE

Share knowledge.
Everyone you meet knows something you don't.

Encourage easy use.
Your customer drives your innovation.

Support entrepreneurship.
Business gives power to the possible.

Connect sciences.
Interdisciplinary thinking makes good ideas better.

Commit to zero emission.
Transition starts with ambition.

Index

Leading the way to a zero-emission future	7
The Netherlands at a glance	8
Faster and smarter charging	18
Vehicles and components from the Netherlands	22
The Netherlands, a world of services	34
The government as the driving force	40

Leading the way to a zero-emission future

While the road to a zero-emission future is long and full of challenges, it does not prevent the Dutch from pressing on – fully committed to achieving our goal, one step at a time.

Since 2010, we have been working hard – and successfully – to roll out electric transport. Today, we have one of the world's densest charging infrastructure networks and are a European leader in electric driving. By 2030, all new passenger vehicles sold in the Netherlands will have to be zero-emission. Whether they are hydrogen fuel cell cars or battery electric vehicles, they will all have to make the greatest possible use of renewable energy sources such as wind and solar.

The transition to zero-emission transport offers clear benefits – now and in the future. First, it helps make our towns and cities smarter, greener and safer. It also offers new economic opportunities. Our objective is nonetheless ambitious. We can only achieve it by embracing new knowledge, new standards and a new world; by thinking not of limits but of opportunities; and by sharing what we know. Together, we can make the impossible possible and create a liveable world for everyone.

The Netherlands is keen to extend its leading position in electric transport further. This ambition has resulted in all kinds of partnerships as well as innovative products and new services. For instance, we are currently the leading player in the standardisation and rollout of infrastructure, including smart charging projects featuring bidirectional charging devices that allow for renewable energy storage. Another example is Dutch-made heavy-duty electric vehicles such as buses and lorries, which are now finding their way to international transport companies.

"Together, we can make the impossible possible; cooperation is as essential as it is desirable"

In short: to achieve our ambitions we've embarked on a voyage of discovery and exploration. This attitude has shaped Dutch history and our identity. Sometimes it means taking a leap in the dark. We see many opportunities because we want to move forward and expand our horizons, and because we believe that change does not happen of its own accord. To that end, the Dutch business sector, knowledge institutions and government agencies have joined forces to accelerate the transition to zero-emission transport.

However, the Netherlands cannot do it alone: cooperation is as essential as it is desirable. After all, we don't want zero-emission transport and e-mobility to stop at the border. New international alliances also create new opportunities. For this reason, we are pleased to invite you to join us on our journey to a zero-emission future.

Mariëtte van Empel
Director Sustainable Mobility for Infrastructure and Water Management

The Netherlands at a glance

© ELAADNL

2.1 Establishing in the Netherlands

In the Forbes ranking of 'Best Countries for Business', the Netherlands has been in the top five for many years already. What makes the Netherlands such an attractive place for companies that are active in electric transport to set up shop?

1. Charging and other infrastructure

The Netherlands has top-tier infrastructure, including sea ports, airports, and extensive road and rail networks. Moreover, the Netherlands has one of the densest charging networks in the world with hundreds of fast-charging stations and tens of thousands of regular charging stations.

2. Home

The Netherlands is home to more than 15,000 international businesses, including 300 businesses in the automotive sector. Their strategic locations allow 160 million European customers to be reached within 24 hours from Amsterdam or Rotterdam. Foreign and domestic businesses that are active in electric transport from the Netherlands currently employ thousands of people.

3. Highly trained, multilingual population

The working population matches the companies' requirements: a large proportion of the graduates from research universities and universities of applied sciences have specialised in technology and economics. Ninety per cent of Dutch people speak English, while many speak German and/or French

4. Campuses

There are a number of campuses in the Netherlands, such as the High Tech Campus Eindhoven and the Automotive Campus, where researchers, developers as well as entrepreneurs work on future technologies and products. The Automotive Campus in Helmond has more than 1,250 people working on mobility solutions for the future. Within the space of 15 years, this campus has come to be a hotspot in the fields of green mobility and smart mobility.

5. Leading player in electric transport

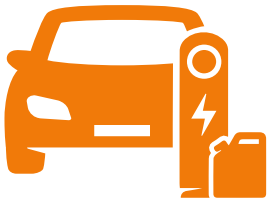
The Netherlands has been one of the leading players in electric transport for many years now, not only in the roll-out of vehicles and charging infrastructure but also in the development of new technologies and services. The Netherlands has removed countless obstacles in Europe to EV drivers travelling internationally.

© VDL BUS & COACH

2.2 Market figures and ambitions

For more than ten years, the Netherlands has been investing in the roll-out of electric vehicles.
The number of electric passenger vehicles, buses and charge points has grown exponentially since 2010.
Moreover, there is an ambitious target for the coming years, supported by the national climate policy. Below is a summary of performances achieved and aspired.

2.2.1 Histrorical development of electric vehicles and public charging infrastructure in the Netherlands



Electric passenger vehicles (PHEV, BEV and FCEV), at end of calendar year

2010 • 266
2014 • • • • 43,762
2018 • • • • • • • • • • • • 142,736

Public charging points and fast-charging points for electric passenger vehicles

2010 • 400
2014 • • • • 12,114
2018 • • • • • • • • • • • • 37,707

Electric commercial vehicles

2010 • 63
2014 • • • • 80
2018 • • • • • • • • • • • • 404

Electric buses (public transport)

2010 • 86
2014 • • • • 1,258
2018 • • • • • • • • • • • • 3,196

2.2.2 Ambitions

Electric passenger vehicles

In the coalition agreement, the Dutch government committed to the target of all new passenger vehicles sold in 2030 being zero-emission, whether hydrogen-electric or battery-electric. As a result, an annual average of 400,000 electric passenger vehicles will enter the Dutch roads from 2030.

Public charging stations and fast-charging stations for electric passenger vehicles

In the coalition agreement, the Dutch government has committed to the objective of refuelling and charging infrastructure having to be ready for the electric fleet of the future. When doing so, the supply and operation of the charging equipment principally remains the responsibility of market parties. Market parties as well as the government foresee a charging requirement of 1.8 million public, semi-public and private charge points for the year 2030.

Electric commercial vehicles in the city

The Zero-Emission City Logistics Green Deal started with a several dozen signatories in 2014, from central government and municipalities to transporters and shipping companies, and from car manufacturers and research institutes to sector organisations and interest groups. Since then, it has developed into an initiative that has over 100 participants. The goal is to realise optimum zero-emission city logistics by 2025. As part of the approach, the local pilots – also called living labs – will be translated into a large-scale roll-out from 2020. Some major cities such as Rotterdam, The Hague and Utrecht have taken the first steps towards introducing a zero-emission zone.

Electric buses

From 2025, all new buses used in public transport will emit zero harmful exhaust gases. In 2016, all transport authorities active in the Netherlands had already signed the Administrative Agreement on Zero-Emission Regional Public Transport by Bus in cooperation with central government. As part of this agreement, the transport authorities require all public bus transport in their concessions to be 100% zero-emission by 2030 and all new buses entering service from 2025 to be zero-emission at the onset. All energy required by these battery-electric and hydrogen-electric buses is fully renewable and is generated regionally through solar panels or wind turbines where possible.

© JUMBO

Electric target group transport

In mid-2018, 32 municipalities signed the Administrative Agreement on Zero-Emission Target Group Transport with the Ministry of Infrastructure and Water Management. Target group transport is the transport for people who cannot travel independently, either temporarily or permanently, as a result of physical or mental disabilities. The signatories agreed in this administrative agreement that the target group transport which they provide will be 100% zero-emission from 2025. Moreover, an additional group of transporters, vehicle suppliers, the Association of Netherlands Municipalities, network operators and the Agricultural Research Service Foundation have signed a covenant, which states that the parties will cooperate in the field of knowledge development, the use of economies of scale and the involvement of the transport sector in all developments.

Zero-emission cleaning vehicles

There are almost 6,000 cleaning vehicles in the Netherlands, ranging from large lorries for collecting domestic waste to smaller street cleaners used to clean the Dutch inner cities. Spearheaded by Rijkswaterstaat (the Directorate-General for Public Works and Water Management), dozens of Dutch municipalities have signed a letter of intent to ensure that all of these cleaning vehicles will be zero-emission and run on renewable energy by 2030.

2.3 The Dutch approach

The much-acclaimed Dutch polder model is synonymous with a government that works via partnerships, where well-considered and supported policy is created through consultation with private parties. This fact also applies to electric transport. The Netherlands has had the Formula E-Team public-private partnership since 2010, which has formed the groundwork for various Green Deals that accelerated the roll-out of electric transport and placed the Netherlands in the international vanguard, among other things. It has led to the development of one of the densest charging networks in the world and to a fleet already in excess of 200,000 electric vehicles. The key success factors are cooperation, knowledge development and regional anchoring.

2.3.1 Cooperation

The **Formula E-Team** – which comprises the business sector, governments and knowledge institutions – was set up in 2010 by the Dutch national government to stimulate developments associated with electric transport. It also has to ensure coordination with developments abroad and capitalise on opportunities for green growth. From the beginning, the Formula E-Team has laid the foundation for many new partnerships and market initiatives.

One of the best-known partnerships to which the Formula E-Team has contributed is the **Netherlands Knowledge Platform for Charging Infrastructure** (Nationaal Kennisplatform Laadinfrastructuur, NKL). The aim of this initiative is to reduce the costs for the public charging infrastructure. Achievements include the Laadpaalnodig.nl request portal where members of the public can request a charge point in public spaces, the AndersLaden.nl knowledge portal where municipalities can find information about the roll-out of charging infrastructure, and the Uniform Standards for Charge Points (Basisset Afspraken Laadpaal) which municipalities can use in case of tenders and permits for public charging infrastructure.

As a consultative body, the Formula E-Team has also helped to shape a large number of **Green Deals and administrative agreements** which paved the way for the roll-out of electric transport. For instance, work is being carried out on the electrification of heavy transport in cities through the Zero-Emission City Logistics Green Deal and the Administrative Agreement on Zero-Emission Regional Public Transport by Bus. In addition, the Car-sharing Green Deal is ensuring the roll-out of 100,000 electric or other shared cars by 2021. Moreover, many thousands of charging stations are being rolled out in public spaces through the Publicly Accessible Electric Charging Infrastructure Green Deal.

The **E-mobility Innovation and Acceleration Programme** (IAP) is one of the Formula E-Team's latest initiatives. This integrated research and innovation programme aims to strengthen the Dutch position as a leading player in the field of electric transport.

2.3.2 Knowledge development

One of the best-known Dutch knowledge centres for electric transport is **ElaadNL**. This partnership of network operators made an important contribution to the installation of the first charging stations in the Netherlands and ensured standardisation of charging infrastructure in partnership with the market. One of its key accomplishments was its role of co-investor in the development of the Open Charge Point Protocol (OCPP), which describes how communication should take place between the electric car charge point and the back-office system. Moreover, it has recently contributed to the Open

Charge Point Interface (OCPI), which gives EV drivers access to real-time and correct information about charge points as well as charging costs. ElaadNL has also launched a host of innovation projects in the field of smart charging and smart grids.

The **Living Lab Smart Charging** is an open platform in which parties collaborate on the energy system of the future. On an ever-increasing scale, the various research partners test how they can improve the applications of smart charging. One of the achievements to which the living lab has contributed is the development of the transparent charge point. This application allows users to see on a display how power is intelligently shared between electric cars that are being charged simultaneously. Another example is the Living Lab Last Mile, in which users at the Delft university campus are encouraged to complete the final kilometres of their journey zero-emission using electric vehicles.
eViolin is the Dutch association of charge point operators and service providers, which is working towards national roaming using open standards. The association concludes agreements for standardising the technical aspects of interoperability. By doing so, eViolin attempts to keep the total system costs low, which keeps the market accessible to new entrants and prevents unnecessary costs for EV drivers. Moreover, eViolin is tasked within the Benelux with ID issuing: the issue and management of unique ID codes for charging stations, which ensures that charging stations can be found throughout all of Europe, including their availability status.

The **Dutch-INCERT** consortium, which is the Dutch Innovation Centre for Electric Road Transport, came into being in 2008 as a partnership between research universities – later including universities of applied sciences – working on research and innovation in relation to electric transport. One of the members of Dutch-INCERT, Amsterdam University of Applied Sciences (AUAS), has accumulated an impressive track record of research projects on electric transport. The eye-catcher is IDO-laad (the Intelligent Data-driven Optimisation of Charging Infrastructure research project). In this project, the university of applied sciences has examined almost 2.7 million charging transactions. By doing so, it became clear that vehicles are usually charged as quickly as possible. However, according to the researchers, it would be better to spread the charging of electric vehicles across the day in order to make optimal use of renewable energy and avoid overloading the electricity grid.

A large number of consultancy firms in the Netherlands are working on electric transport. Examples include EVConsult, APPM Management Consultants, OverMorgen and FIER Automotive. These companies help government agencies, network operators and companies with research as well as advice when switching to electric transport. Their activities vary from policy design and the substantive preparation of tenders for charging infrastructure – including roll-out strategy – to the realisation of innovations in the field of smart charging.

© ELAADNL

© E-TRUCKS EUROPE | MARTIN VONK

2.3.3 Regional anchoring

Most Dutch municipalities have a policy for the roll-out of electric transport. In recent years, a number of Dutch cities already introduced environmental zones to support the roll-out of clean modes of transport. Provinces and government agencies have high ambitions when it comes to the roll-out of electric charging stations. The Central Government Real Estate Agency has concluded a contract for the installation of 2,000 charge points, for instance. It is one of the largest contracts in the world for charge points on private property.

Provinces and municipalities are drawing up tenders for public charging infrastructure in which innovations such as smart charging are the norm. Municipalities often choose to accelerate the installation of charging stations hand in hand with the number of electric cars in a district. When residents buy an electric car, they can submit a request to have a charge point installed in a public space. The roll-out and operation of public charging stations is now increasingly taking place without additional government investment. Below is a map showing the scale and the location of the various tenders for public charging infrastructure from Dutch government agencies.

1 Provinces of Drenthe and Groningen

Number of municipalities participating: 28
Number of charging stations: 1,000
Number of charge points: 2,000
Completion of installation: 2022

2 Provinces of Gelderland and Overijssel

Number of municipalities participating: 43
Number of charging stations: 2,250
Number of charge points: 4,500
Completion of installation: 2021

3 Provinces of North Brabant and Limburg

Number of municipalities participating: 63
Number of charging stations: 1,240
Number of charge points: 2,480
Completion of installation: 2019

Recent tenders for public charging infrastructure are shown below. The numbers included are the maximum numbers that are to be installed under these tenders.

4 MRA-Elektrisch (North Holland, Utrecht and Flevoland)

Number of charging stations: 10,000
Number of charge points: 20,000
End of tender period: 2021

5 Municipality of Amsterdam

Number of charging stations: 2,000
Number of charge points: 4,000
End of tender period: 2021

6 Municipality of Utrecht

Number of charging stations: 2,500
Number of charge points: 5,000
End of tender period: 2023

7 Municipality of Rotterdam

Number of charging stations: 1,800
Number of charge points: 3,600
End of tender period: 2019

7 8 Rotterdam and The Hague Metropolitan Region

Number of charging stations: 2,200
Number of charge points: 4,400
End of tender period: 2019

8 Municipality of The Hague

Number of charging stations: 1,500
Number of charge points: 3,000
End of tender period: 2019

Faster and smarter charging

© FASTNED

The Netherlands is Europe's leading player in the roll-out of charging infrastructure. Nowhere else is the charging network as dense as it is here. How did we achieve this success?

3.1 Roll-out strategy

The Dutch roll-out strategy for public charging infrastructure evolved over the last decade. Municipalities started to increase collaboration on the roll-out of charging infrastructure in recent years. This approach has enabled new public charging infrastructure to be rolled out without additional government investment.

The first Dutch charge points were primarily rolled out strategically, at prominent, popular locations such as supermarkets, car parks and shopping centres. This practice gradually changed to installation at the request of EV drivers. The approach is nowadays increasingly data-driven, where charging infrastructure is installed on the basis of predictions about where electric cars will be charged in the future.

Within the Netherlands, the concession model is the main type of contract. Here, one or more parties are given the right to install and operate charging stations in public spaces at no cost to government agencies. Some municipalities also issue permits to install and operate charging stations in public spaces.

3.2 Fast-charging infrastructure

There are more than 200 fast-charging stations in the Netherlands, where EV drivers can use over 1,000 fast-charge points. ElaadNL researchers expect significant growth in the number of fast-charge points for electric cars over the coming years, to a maximum of 8,000 by 2025. This trend will lead to a gradual increase in the capacity of fast chargers to 350 kilowatts, because new vehicles will be able to charge ever more quickly.

While the world of fast chargers was originally the domain of new companies such as Allego and MisterGreen, traditional energy companies are increasingly moving into this market segment as well. For instance, Shell oil company has started rolling out fast-charging infrastructure in strategic locations at its petrol stations off Dutch motorways. Vattenfall energy company is also providing fast-charging stations at all McDonald's branches with McDrive in the Netherlands.

The largest player in the Dutch market for fast chargers is Fastned. This company has obtained hundreds of permits from the Dutch government to roll out fast-charging stations alongside Dutch motorways. There are also partnerships with Albert Heijn supermarket chain and Van der Valk hotel chain for rolling out fast-charging stations at these companies. Fastned's aim is a European network of 1,000 fast-charging stations at A locations, where all electric cars can charge using solar and wind power exclusively. To this end, Fastned has now also spread its wings to the United Kingdom, Germany and Switzerland.

3.3 Open standards

The Netherlands advocates open standards and protocols. Ten years ago, the argument for a universal charging plug was the Netherlands' first achievement when it comes to open standards. The Netherlands has since shown itself to be a true champion of standardisation also outside of the Netherlands. Through the efforts of the eViolin partnership, for instance, it is possible to charge at any public charge point in the Netherlands with a single charging pass. As this initiative is gaining ground internationally through e-clearing.net, the Netherlands is advocating the implementation of this interoperability elsewhere in Europe as well so the 'borders' for electric vehicles will disappear.

In the meanwhile, various results have been achieved in the field of protocols. The Open Charge Point Protocol (OCPP), the Open Charge Point Interface

protocol (OCPI) and the Open Smart Charging Protocol (OSCP) came into being successively in as well as because of the Netherlands.
First, the OCCP was designed and developed to standardise communication between a charge point and a back office, which is used to operate and manage charge points. Second, the OCPI is an independent roaming protocol that facilitates the exchange of data. It can be used both by companies mutually and as a roaming hub or platform. Third, the OSCP communicates predictions about the available capacity of the electricity grid to other systems. The Netherlands is also making an important contribution to the creation of the ISO/IEC 15118 protocol, which is used to facilitate bidirectional charging. Apart from these efforts in the field of protocols for electric passenger vehicles, the Netherlands is focusing on other market segments such as electric buses as well. For instance, ElaadNL, Heliox and VDL are actively involved in the standardisation of charging infrastructure for buses. The OppCharge protocol standard should be completed within the foreseeable future.

3.4 Smart charging

The smart charging of electric vehicles provides significant potential for the optimal use of charging infrastructure, the electricity grid and renewable energy. Under the banner of such parties as the Living Lab Smart Charging, experiments with the smart charging of electric vehicles are under way in numerous places within the Netherlands. A good example is the Smart Charging field trial in Overijssel and Gelderland. The 4,500 new charge points in 43 municipalities will be used over the years ahead for the largest practical research into smart charging in history. When there is a strong demand for renewable energy, EV drivers can charge less quickly, unless they use an override function to indicate that they need more power. Conversely, EV drivers are offered higher capacities outside of these peak times.

In turn, high-voltage grid operator TenneT uses smart charging to maintain the balance in the electricity grid together with Vandebron. By temporarily slowing down, stopping or resuming the charging of electric cars, EV drivers are given the chance to earn money in a trial and the high-voltage grid becomes more balanced. Another notable example is LomboXnet, which combines an energy storage system from Tesla with 200 solar panels and 20 electric car charge points to apply smart changing and vehicle-to-grid (V2G).

The smart charging experiment in the provinces of Groningen and Drenthe focuses on free choice of energy supplier. All energy suppliers can supply energy to the charging stations installed in these provinces. In this way, the supply of energy is not reserved to the owner and operator of the charging infrastructure, but all suppliers can develop a client base of EV drivers. Users are also given the opportunity to load energy that they generated themselves from solar panels or wind turbines onto public charging infrastructure.

© ELAADNL

3.5 Research

ElaadNL, the Dutch knowledge centre that made an important contribution to the international standardisation of charging infrastructure in recent years, has had a hyper-modern testlab since the spring of 2018. This test location has all the different types of charging stations used in the Netherlands available for tests with electric cars. Among other things, this facility enables the testing of the effect that the charging of new types of cars has on the electricity grid with regard to three elements: smart charging, power quality and interoperability.

In turn, bus manufacturer VDL has a testlab for heavy electric vehicles such as lorries and buses. The test charging site has a modular construction, which allows various autonomous systems, solutions and charging equipment to communicate or work together with each other. It has the latest charging equipment from the major suppliers, which is linked up with the various fast-charging connections. In addition to the standard and liquid-cooled charging plugs, various pantograph solutions are available.

Made in Holland

© CARVER

4.1 Cluster organisations

The stakeholders in the Dutch automotive sector who are active in zero-emission mobility are united at the national level in two cluster organisations.

AutomotiveNL is the partnership between the automotive industry, mobility sector and automotive education sector. Its main objective is to encourage a strong sectoral network, to stimulate innovation to expand the Automotive Campus in Helmond as a national hotspot for innovation.

The substantive focus areas are smart mobility, green mobility, manufacturing and materials.

The Dutch Organisation for Electric Transport, or DOET, is the Dutch sector association for businesses active in electric transport.
This organisation addresses topics such as charging infrastructure, know-how and light electric vehicles. In addition to organising the network and the political lobby, it focuses on the facilitation of knowledge sharing, access to subsidies and internationalisation, among other things.

4.2 Businesses and sectors

The electric transport sector in the Netherlands comprises a wide range of start-ups, established SMEs and a number of internationally operating OEMs. They often develop pioneering and high-quality vehicles, components and services. What is striking here from a global perspective are the businesses that excel in smart charging technology as well as zero-emission public transport and urban mobility. The map below highlights some of the major players within each segment; the summary is not exhaustive.

1. VDL Bus & Coach – Electric buses
2. EBUSCO – Electric buses
3. E-Trucks Europe – Electric refuse collection vehicles
4. VDL-DAF – Electric lorries
5. Spierings Mobile Cranes – Mobile electric crane
6. SHERPA – Electric mini-loaders
7. Carver – Electric urban vehicle
8. Picnic – Electric delivery van
9. Allego – Charging solutions
10. Ecotap – Charging stations
11. GreenFlux – Smart charging
12. Heliox – Heavy-duty charging solutions
13. Port-Liner – Electric inland vessel
14. Blue Boat Company – Electric tour boats
15. NXP – Chips for electric vehicles
16. Alfen – Second-life applications for car batteries

VDL Bus & Coach
Electric buses

VDL Bus & Coach is one of the largest bus manufacturers in Europe. The company's objective is to make a significant contribution to the electrification of public transport in the Netherlands. By now, this objective has resulted in various new products and orders from home as well as abroad. VDL has delivered 100 Citea SLFA Electric buses to Connexxion, for instance. As a result, the public transport company has one of the largest electric bus fleets in Europe. The Citea buses are used on the bus routes around Schiphol and on bus rapid transit (high-value public transport) routes. They operate 24 hours a day and travel more than 100,000 kilometres per year.

© SCHIPHOL BART BRUSSEE

© EBUSCO

EBUSCO
Electric buses

EBUSCO is a pioneer in the field of electric bus transport. The company was the first manufacturer to receive European type approval for electric buses. Since 2010, it has gained extensive practical experience through and in the use of more than 300 buses that drive 325 kilometres per day under a regular timetable. Public transport companies abroad have taken note as well; in Germany, for instance, MVG Münchner Verkehrsgesellschaft has all-electric zero-emission EBUSCO 2.1 buses running just as its fellow organisation in Bremen. Another example is Paris, where eight EBUSCO electric buses are operating.

E-Trucks Europe
Electric refuse collection vehicles

E-Trucks Europe is stimulating the demand for hydrogen-electric mobility by making customers familiar with this type of transport. In addition, it is creating a brand-independent concept for maintaining and repairing the hydrogen-electric systems of lorries and cars. E-Trucks Europe's electric power train has now been further developed into a high-quality product. For its refuse collection vehicle, the company has expanded this system with a Hydrogen Range Extender through the European Interreg project 'Hydrogen Region Flanders-South Netherlands', in such a way that it can operate the whole day long without having to be 'plugged in'. Several refuse collection vehicles have now been delivered throughout the Netherlands.

VDL-DAF
Electric lorries

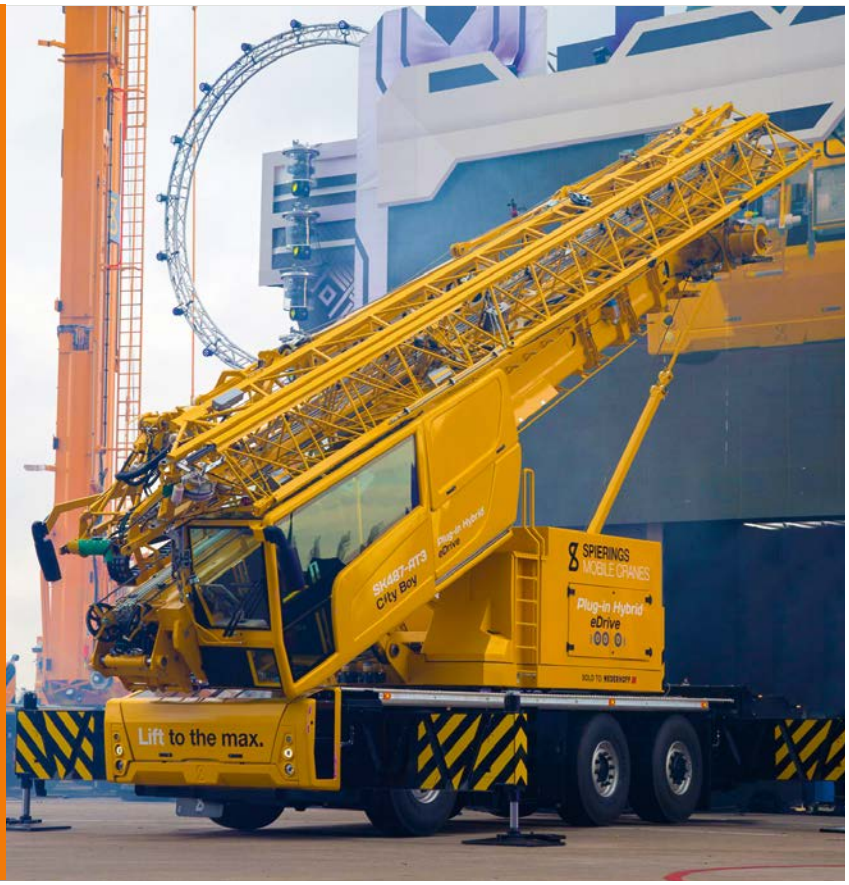
Since 2019, the first all-electric lorry from VDL Groep and DAF Trucks has been running on Dutch roads. It is used by Jumbo supermarket chain. The DAF CF Electric VDL E-Power is used every day to supply 80 supermarkets in North Brabant from the distribution centre in Veghel. This lorry has an approximate range of 100 km. It allows this e-lorry to make deliveries in a radius of 50 kilometres without emitting harmful substances and with minimum noise nuisance. Albert Heijn supermarket chain has also started practical testing of three all-electric DAF lorries and two plug-in hybrid DAF tractor units.

© DAF TRUCKS

Spierings Mobile Cranes

Mobile electric crane

Crane manufacturer Spierings produces the world's first hybrid mobile crane. The undercarriage of the SK487-AT3 City Boy is fully electric. As a result, it can drive into and out of town silently with zero emissions, as well as hoist for several hours using its own battery pack. The crane has a small diesel engine for motorway driving. This vehicle stores braking energy and can drive away from stationary on battery power. The mast extends to 30 metres, while the boom reaches a length of 40 metres, achieving a hoisting capacity of 1.7 tonnes at the tip.



© SHERPA

SHERPA

Electric mini-loaders

SHERPA develops and builds small machines and associated ancillary equipment. It brought an all-electric mini-loader onto the market in 2010. This first was followed a year later by the introduction of the first Dutch-made electric mini-loader, with an average of 6 hours' use, 76 centimetres wide so it can pass through door openings and equipped with a battery pack that is easy to change. A new notable project is the development of the heavier and programmable SHERPA-EHD within a consortium of nine demolition companies.

LIGHT ELECTRIC VEHICLES

Carver
Electric urban vehicle

The Carver is an urban vehicle of the future: an enclosed three-wheeler with a tilting body. While the company put this concept car onto the market in 2003 as a petrol vehicle, it has now moved on from the petrol age. They are focusing on an all-electric relaunch; the Carver as a light electric urban vehicle. It will be produced at a totally new site in the province of Friesland. The Asian market will be serviced by a manufacturing site in China

Picnic
Electric delivery van

They have become ubiquitous in many Dutch cities: the E-workers of Picnic online supermarket. The company was set up in 2015 and developed this all-electric vehicle that is only 1.3 metres wide specifically for delivering customers' shopping in residential areas. In 2019, there are more than 600 vehicles on the roads, which number is growing rapidly. Following on from the success, the company is developing a new electric last-mile commercial vehicle together with VDL Steelweld under the title Development of an Urban E-truck for Last-mile Logistics (DUELL). This vehicle will enter production in 2020.

© ALLEGO

Allego
Charging solutions

In under a decade, Allego has developed into one of the leading-edge European suppliers of charging solutions. With more than 10,000 charge points and fast-charge points, the company has a European-wide presence. For instance, Allego realised the first public ultra-fast charging station in Europe, where long-distance electric cars can charge for a range of 100 kilometres within 5 minutes. As a charge point operator (CPO), the company helps EV drivers to reach their destinations. Allego's services are very broad, from charge point management and operation to load balancing and smart charging.

Ecotap
Charging stations

Ecotap is known for its Homebox: a home charger which has developed into a complex piece of technology with many functions, such as automatic settlement, off-peak charging, and visualisation of various data about the car and the charging process. The company is the largest producer of public charging stations in Europe. In 2018, the National Metrology Institute of Germany (PTB) awarded the Baumusterprüfbescheinigung for all of Ecotap's public charging stations. The award was the first time that Eichrecht (certification) had been issued to this type of infrastructure. It should guarantee customers an honest, transparent and traceable charging transaction.


© ECOTAP

GreenFlux
Smart charging

Growing from a start-up to an established business can happen quickly. GreenFlux has proven this point by developing into an international leading player in smart charging technology over less than a decade. It was the first Dutch company with a white-label cloud-based platform, through which services can be supplied independent of the charging station, while the company also realised a national charging network together with ANWB. It currently has clients spread across a network of 18,000 charge points in 15 countries within Europe, America and Asia. In addition, it sells its platform-independent cloud-based Smart Charging Controller to charge point manufacturers worldwide.

Heliox
Heavy-duty charging solutions

Heliox was originally a specialist in power conversion solutions. As a result, it has unique knowledge and experience which can accelerate the realisation of Dutch ambitions in the field of electrification. They proved as much in 2013 by building their first fast-charging system with pantograph for heavy vehicles and equipment. Over 80% of the heavy-duty fast chargers in Europe are currently designed and built by Heliox. They have a 50-strong development team and are growing exponentially, as is the number of countries in which they have branches, including Germany and the United States.

© PORT-LINER

Port-Liner
Electric inland vessel

Port-Liner provides the first all-electric inland vessels for the Netherlands, Belgium and Germany. Three different classes are being developed and built by Port-Liner, which has ambitions to be a game-changer for sustainability in its sector. The small ships are equipped with a lithium battery pack the size of a 20-foot container, providing a 15-hour range. Larger ships have four battery packs on deck, which enable 35 hours of sailing. There is space for 270 containers on board, which makes them suitable for specific sailing routes, such as transporting bulk and containers between De Kempen Terminal and Antwerp.

Blue Boat Company
Electric tour boats

Blue Boat Company has a long history in electric sailing. The company experimented with an electric riverboat and the hire of electric sloops as early as 1991. It built the first two electric tour boats in 2007 after years of testing and installing the necessary charging infrastructure; they are now in full-time use. A third tour boat has since been delivered, which marks an important step towards the greening of tourist shipping in Amsterdam. The entire Amsterdam fleet must be electric in 2025.

© BLUE BOAT COMPANY

NXP
Chips for electric vehicles

NXP semiconductors is the international market leader in the development and production of chips for the automotive industry. It focuses on the car entertainment, advanced driver assistance systems, in-vehicle networking and car access & immobilisation segments. One of the key areas is its work on innovative solutions that facilitate vehicle-vehicle and vehicle-infrastructure communication. The company is also investing in the creation of technology for electric and autonomous driving. For example, the development of the NXP S32S microprocessor – a solution that ensures even better and safer starting, stopping and steering of cars – is a response to the growing demand for new, relevant, smart computer solutions aimed at intelligent vehicles.

Alfen
Intelligent grid solutions

Alfen designs, develops and builds intelligent electricity grids, energy storage systems and charging systems for electric cars, uniting them in integrated systems. Among other parties, it does so in partnership with the ElaadNL knowledge centre, which focuses on connected charging technology and integration into the Dutch power network. As a result, Alfen has become a supplier of charging stations, a charging plaza solution and a transformer station. Lately, it has supplied an integrated energy storage system to ElaadNL's test lab, which could provide a solution to peak demand for electricity.

THE NETHERLANDS
A WORLD OF SERVICES

© WE DRIVE SOLAR

The Netherlands is focusing on technological innovation through public-private partnership. For instance, it is focusing closely on the development and roll-out of new types of services in terms of vehicles, charging infrastructure and components. Three prominent themes are car sharing, private lease and the introduction of renewable, sustainable city distribution concepts.

5.1 Car sharing

CROW knowledge platform estimates that some 400,000 Dutch citizens nowadays use shared cars. They only do so a couple of times a year, however. The Netherlands is nevertheless setting changes in motion within this area. For instance, the ambition of the Green Deal on Car-sharing is 100,000 electric or other shared cars on the Dutch roads in 2021. With this regard, the main opportunities can be found in the major cities. As parking is expensive and permits are limited here, traffic becomes gridlocked in many areas and the environmental burden is significant.

City Deal

Until 2021, Amsterdam, The Hague, Rotterdam, Utrecht, Amstelveen, Amersfoort and Apeldoorn are rolling out pilot projects in the electric car-sharing field. These projects are set out in the so-called Shared E-mobility in Urban Planning and Development City Deal concluded by the Ministry of Infrastructure and Water Management, the province of South Holland and these seven cities. Together, they aim to gain experience in sharing electric cars combined with the generation of solar energy on the roofs of houses. At least two building projects in each participating city are affiliated with the City Deal programme, which comprises a total of more than 5,000 dwellings and 200 electric shared cars. The introduction of shared cars will save parking spaces. Moreover, the energy for the electric cars will be generated sustainably using solar panels. A number of projects will see the batteries play a role in providing energy within the district by storing the solar power generated. Sharing the knowledge gained will allow further innovations and upscaling to be used in more Dutch building projects.

SHARE NOW

SHARE NOW originated from a fusion of Car2go and DriveNow. It operates from 30 cities in Europe and North America – including Amsterdam, which was the first Car2go city with an all-electric fleet – and has over 20,000 BMW, Mercedes-Benz, Smart and MINI cars available for over 4 million registered users. SHARE NOW is one of the five mobility services in a joint venture between the BMW Group and Daimler. It is the largest provider of electric free-floating car sharing. There are plans to expand the Car2go fleet and services.

We Drive Solar

Smart Solar Charging is already a proven concept in the Lombok district of Utrecht. During the day, a smart charging station stores local solar power in electric shared cars, while the excess energy is used

Amber

Amber is a national electric car-share system launched by a group of student friends from Eindhoven University of Technology. Their start-up quickly developed into a serious company that has national coverage. The services are based on providing certainty in advance. To this end, Amber works from hubs where users are guaranteed that they are able to pick up a BMW i3 and return it to another hub later. This concept is catching on; for instance, with employers who want to get away from traditional lease systems due to sustainability and cost considerations. The company now has 35 hubs in 10 cities. There should be at least one hub in every major city within the foreseeable future. In addition to electric shared cars, Amber also provides e-bike shares.

locally at other times thanks to vehicle2grid (V2G) technology. The expansion is leading to new energy services for diverse areas such as residential areas, business centres and station areas. Over the next four years, the experiences in Lombok will be further developed and tested in five linked testing grounds. Part of this innovation project is the positioning of 70 We Drive Solar cars with a range of 300 kilometres and a battery that provides the opportunity to develop Smart Solar Charging further into a sustainable district energy system.

5.2 Taxis

There is a large number of electric taxis in the Netherlands. It is estimated that 13% of all taxis in Amsterdam are fully electric, for instance. The municipality has signed a covenant agreeing that the sector will operate zero-emission in 2025, to which it will contribute by expanding the charging infrastructure in the city, among other things.

Another stimulus derives from the grant programme that partly reimburses the purchase price of an electric car. This money has already stimulated the purchase of many hundreds of electric taxis. The Hague has a similar scheme ..

5.3 Private lease

The Association of Dutch Car Leasing Companies has stated that 150,000 Dutch citizens are now opting for a private lease car. There were only 8,500 cars on the Dutch roads via a private lease structure in 2013. In light of this huge rise, there are opportunities for electric transport; for example, by giving used electric cars a new chance on the consumer market. In this way, private lease relieves individuals of the uncertainties and price barriers for electric cars.

MisterGreen

There are both established companies and new dedicated players in zero-emission on the private lease market for electric cars. One of the newcomers is MisterGreen. It started in 2008 by providing lease contracts for electric cars, with its priorities in this area being accessibility and transparency. The consumer can order a new electric lease car from MisterGreen in five minutes using a smartphone, for instance. Moreover, the company is committed to the roll-out of fast-charging infrastructure. For instance, it built a fast-charging station off the A2 motorway that has an energy storage system to store the solar power generated locally. This solution allows the cars to be charged sustainably at any time of the day.

5.4 City distribution and logistics

The annual increase in freight movements within the Dutch inner cities is two to five per cent. Among other things, this growth is due to digitisation and changing customer requirements. This trend has enormous consequences for the quality of life in cities as well as in the fields of safety, land use and air quality. The solution to this problem can be found in the combination of electrification and intelligent logistics systems. As a result, city distribution will be very diverse in the future. Where means of transport are concerned, part of it will switch to light-electric: bicycles, mopeds and compact vehicles with electric support or drive.

Mondial Aad de Wit Verhuizingen

Mondial Aad de Wit Verhuizingen presented the first all-electric moving truck of the world in 2011. The company's electric fleet now consists of four full-fledged moving trucks, all of which are operating in the Amsterdam area. In addition, the company has various electric delivery vans, passenger vehicles for employees and e-bikes. This way, the moving company is meeting the sustainability expectations to promote clean air in a sustainable and economically sound city as set out by the municipality of Amsterdam. It is not surprising that the company is now one of the municipality's regular moving partners.

© AAD DE WIT VERHUIZINGEN

PostNL

Logistic service provider PostNL delivers an average of 800,000 parcels and 7 million letters in the Benelux on an average day. In doing so, the company is keen on transitioning to sustainable transport as a result of its climate objectives. For instance, Leeuwarden is the first inner city where PostNL makes zero-emission deliveries. In 2018, the company replaced all its vehicles with electric delivery vans and small vehicles. The parcels are delivered from a central transhipment point in the city. PostNL's ambition is to make its deliveries totally zero-emission in 25 Dutch inner cities by 2025. To this end, PostNL has already replaced more than 60 car journeys in Amsterdam with electric cargo bikes. PostNL is now also aiming for totally zero-emission deliveries on the Wadden Islands.

© POST NL

© COOLBLUE

Coolblue

Coolblue is one of the Netherlands fastest-growing e-commerce companies. This online retailer of consumer products delivers its products seven days a week throughout the Netherlands. The company commissioned various all-electric delivery vans in 2019 for the delivery of televisions to customers in Rotterdam and Amsterdam. These vehicles run on solar power that the company generates itself with its own solar roof. Coolblue expects to expand deliveries using electric delivery vans further to other major Dutch cities in the next few years.

The government as the driving force

© BAS STOFFELSEN

Zero-emission from well to wheel – this aim is expressed by the national government for the entire Dutch fleet in the year 2050. As part of this endeavour, all sales of new passenger vehicles should be zero-emission from the year 2030.
The ambition is moreover to power these battery-electric and hydrogen-electric vehicles from renewable energy sources such as the wind and the sun in order to drive truly zero-emission.

6.1 Local incentives

Municipalities, inter-urban partnerships and provinces all embraced electric transport over the past decade. As a result, the various government agencies have developed various incentive schemes to accelerate the roll-out of electric transport.

Municipalities and regions

A large number of Dutch cities and regions are deploying initiatives and operating policies to accelerate the roll-out of electric transport. For instance, Amsterdam, Utrecht, Rotterdam and The Hague have or had purchase subsidies for electric passenger vehicles, lorries and taxis for commercial use. Moreover, there are demolition grants for old vehicles with an internal combustion engine.

Provinces

Private individuals can request a charge point to be installed at no cost to the EV driver in almost all Dutch provinces. Provinces organised large-scale tenders in recent years together with municipalities. As a result, residents in hundreds of municipalities who do not have their own parking space can have a charge point installed in a public place to meet their charging requirements. As part of the smart charging policy, the existing charging infrastructure is being prepared to charge electric passenger vehicles more intelligently. The Dutch provinces are also responsible for the public transport concessions. Since electric buses are a standard part of these concessions, all public bus transport is to be totally zero-emission by 2030 and all new buses entering service from 2025 must be totally zero-emission at the onset.

6.2 National incentives

One of the instruments that the Dutch government is using to stimulate the roll-out of electric vehicles is **tax incentives**. This instrument means in practice that lease drivers of all-electric cars can count on a lower additional tax liability, while all-electric vehicles will be exempt from purchase tax and road tax until 2020. Entrepreneurs can also count on various investment deductions. The tax breaks will be reduced in future years as the cost price of electric vehicles falls, in order to avoid over-stimulation.

Supplementary to the international Climate Agreement, the Netherlands is working on a **National Climate Agreement**. This agreement includes measures to reduce CO2 emissions within the Netherlands in the period until 2030, with the aim of a 49% reduction compared to 1990.

The **National Charging Infrastructure Agenda** will be part of the Climate Agreement. In the years ahead, this agenda should ensure that the charging infrastructure is not an impediment to the roll-out of electric transport. To this end, agreements have been made on accelerating the process and specification of the basic conditions for the roll-out of public charging infrastructure, among other things.

6.3 International cooperation

The Dutch government is not only rolling out national policy for the benefit of electric transport, it is also committing to international partnerships and alliances in order to accelerate the roll-out of electric transport. For example, the national government and partners from the business sector are participating in a large number of international networks. Moreover, through its Partners for International Business (PIB) programmes, the Dutch government actively encourages Dutch businesses to enter new markets, among other things.

PIBs

Groups of Dutch businesses target foreign markets that they want to enter together through various PIBs. The Dutch government helps them by removing trade and investment obstacles though economic diplomacy.
PIB programmes have since been formed for the United States, Germany, France, Austria and India, some of which have already been completed. Dozens of businesses are participating. The various large orders for intelligent charging infrastructure from abroad are the most significant achievement.

EVI

Through the Ministry of Infrastructure and Water Management, the Netherlands is a member of the Clean Energy Ministerial's Electric Vehicle Initiative (EVI). The objective of this global partnership, in which 16 countries participate, is to accelerate the introduction and adoption of electric vehicles. There are various activities, such as the cities network EV Pilot City Programme and the EV30@30 campaign, which strives for a global market share of electric vehicles in new sales of 30 per cent by 2030.

IEA HEV-TCP

The International Energy Agency's Hybrid and Electric Vehicles – Technology Collaboration Programme (HEV-TCP) is a partnership between 18 countries in the field of electric transport. HEV-TCP aims to promote international research and the exchange of knowledge about everything to do with electric transport, such as implementation, technology, energy and policy.

IDACS

The Netherlands is the coordinator of the ID & Data Collection for Sustainable Fuels in Europe (IDACS) consortium, in which organisations from 15 countries participate.
The aim of this project is encouraging consumers to use alternative fuels such as electricity, hydrogen or other renewable varieties. In the project, agreements are concluded on making available information such as the price, location and availability of charging infrastructure as well as refuelling points for alternative fuels. A market approach is also being developed for a European system of assigning ID codes to charging infrastructure. This system is needed to allow roaming and consequently the sharing of data for such matters as payment.

TDA

The Transport Decarbonisation Alliance (TDA) is a Dutch, French and Portuguese initiative.
TDA brings together the 3Cs – Countries, Cities and Companies – to accelerate the global reduction of CO2 emissions from transport and to put the topic high on the international political agenda.
The ultimate objective is to achieve zero-emission mobility by 2050. Through the alliance, affiliated cities cooperate more intensively with national governments and the business sector, while providing opportunities for trial projects.

ZEV Alliance

The Netherlands is one of the founders of the International Zero-Emission Vehicle Alliance.
The ZEV Alliance is accelerating global ZEV adoption. Countries and subnationals from around the world are leading the transition with effective policies. Members are asked to support the 2015 ZEV Alliance Announcement and contribute to discussions and decision-making. Members are encouraged to provide financial support.

Published by:

Netherlands Enterprise Agency (RVO.nl)
Croeselaan 15 | 3521 BJ Utrecht
PO Box 8242 | 3503 RE Utrecht | The Netherlands

T: +31 (0)88 042 42 42
E: klantcontact@rvo.nl www.rvo.nl

Photo cover: Schiphol | Bart Brussee

This publication was commissioned by the Ministry of Infrastructure and Water Management. The Netherlands Enterprise Agency (RVO.nl) promotes entrepreneurship in sustainable, agricultural, innovative and international business, offering assistance with grants, finding business partners, know-how, and compliance with laws and regulations. RVO.nl works for the Dutch government and the European Union and is an agency of the Ministry of Economic Affairs and Climate Policy.

This document was drawn up on the instructions of RVO.nl. Please contact us if you are experiencing access problems.
www.rvo.nl/over-rvonl/contact/alle-contactmogelijkheden-op-een-rij
We shall be happy to resolve the issue for you!

For more information: elektrischrijden@rvo.nl

Work with the Dutch to create smart, sustainable solutions for a more liveable, prosperous and secure world.