



Electromobility in the Netherlands

Highlights 2014

Electric driving is an innovation that offers economic opportunities for the Dutch business community. The e-mobility areas in which Dutch companies operate include charging infrastructure, charging services, parts manufacturing, and the production of light electric vehicles, including electric scooters. The Ministry of Economic Affairs has tasked the Netherlands Enterprise Agency with the stimulation of electromobility in the Netherlands.

Dutch companies, social institutions, knowledge centres, and public authorities are working in national and international partnership to accelerate the growth of electric driving and to capitalise on the associated economic opportunities. And electromobility is thriving! The number of electric cars in the Netherlands has grown dramatically in the past year — in an auto market that is shrinking across the board. The number of companies active in the sector is also increasing. This growth in commercial activity is particularly apparent in the areas of vehicle manufacturing (including custom-made vehicles), drive train technology, mobility services, and sales.

The past year saw many new and maturing initiatives and important achievements. This document contains a selection of the year's major events: the highlights of 2014. For additional information and the latest news, please visit www.nederlandelektrisch.nl.

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Economic opportunities in electromobility

Between 2008 and 2013, employment quintupled in the e-mobility sector: that is the major conclusion in a report by the Netherlands Enterprise Agency about cashing in on electric driving's economic potential. The number of full-time jobs (FTEs) rose from 300 in 2008 to 1,600 in 2013. Most new jobs are related to chargingpoint installation; the development of custom vehicles and drive train technology, sales, and mobility services also create ample employment. In five years' time, the sector's gross value added rose from ≤ 20 million to ≤ 120 million. According to interviewed members of the Vereniging DOET (Dutch Organisation for Electric Transport), employment, revenue, and export will continue to follow this upward trend for the coming four years, ultimately doubling by 2017.

CE Delft: 'Employment six times higher in 2020'

In 2020 the Dutch electromobility sector will be home to between 5,000 and 19,000 FTEs, with an average estimate of 10,000 FTEs, assuming the government achieves its goal of 200,000 electric vehicles by 2020. So states a report by research consultants CE Delft, commissioned by the Netherlands Enterprise Agency to estimate employment in the Dutch e-mobility sector in 2020. These figures portray six times the number of jobs in 2020 as in 2013. The majority of that employment is expected in the 'charging infrastructure and smart grids' subsector. The number of charging points in the Netherlands is expected to grow significantly in the coming years, generating substantial additional employment in this sector for Dutch companies. Strong job growth is also expected in the 'drive train technology and parts, battery management and information systems' subsector.

Electromobility innovation vouchers a success

More than fifty companies redeemed an innovation voucher at a knowledge centre this year. Fifty-six percent of these projects will continue on to a second phase, and at least half the companies feel the innovation vouchers have made it easier to gain access to these centres of expertise. These are the major results achieved by the electromobility innovation vouchers the Ministry of Economic Affairs awarded to SMEs. The programme encourages SMEs to make greater use of the e-mobility expertise present in knowledge centres.



Education

'Stella Goes USA' and 'Tesla meets Stella'

Taking first place twice and third place once, the student teams from the Eindhoven, Delft, and Twente Universities of Technology made an impressive showing during the World Solar Challenge in the fall of 2013. They expanded on this success in 2014. The Eindhoven University of Technology (TU/e) sent its solar car, Stella, on a ten-week summer trip through the United States. During the tour, Americans received a taste of the textbook example of Dutch innovation: the first family car to run on solar energy. Stella drove past hallowed and emerging meccas of the American auto industry. The solar car also took part in a series of demonstrations, test drives, and expos during America's National Drive Electric Week, during which it also visited the Tesla Factory.

Earlier, in the spring of 2014, those attending the Hannover Messe in Germany had a chance to admire Stella as part of the 'Tesla meets Stella' exhibit, which championed the theme 'Where high-tech meets energy and automotive'. Organisations from the Netherlands, Germany, and other countries came together at this major industrial technology trade show to explore the latest innovations spanning the interface between high-tech, energy, and automotive systems, with Stella at the centre of attention. The Solar Team Eindhoven, which is responsible for Stella's design and construction, is already hard at work designing Stella's successor: an improved version of the solar car. Stella is also in the race for a Crunchie, an industry award presented by global technology websites TechCrunch and VentureBeat that is often styled 'the technology Oscar'. Stella is up against projects from Apple, SpaceX, Bitcoin, and the European Space Agency in the Best Technology Achievement category.

STORM

A new group of students reached a milestone this year in its own ultimate adventure: the 80 Day Race. In 2016, the students of STORM Eindhoven will traverse the world in eighty days using the electric motor they designed and presented the previous year. The race challenges teams to travel round the world in eighty days using only renewable resources, without fossil fuels or internal combustion engines. The race comprises eight legs that take the teams from one major metropolis to the next. What's more, the race isn't a student competition, making STORM Eindhoven a striking and unique entrant.

lsa

In March 2014, students at the TU/e presented the Netherlands' most fuel-efficient urban car: Isa. The full electric two-person car is extremely economical. Converted to its petrol equivalent,

Isa's fuel efficiency is 500 kilometres per litre (1,176 miles per gallon). The urban e-car has taken part in the Shell Eco-Marathon and other races and has been approved for public road use.

Delft's racing team wins British championship

In 2014 a group of roughly eighty students at the Delft University of Technology (TU Delft) built an electric Formula Student car in a single year. The car took part in international competitions that drew more than three thousand student participants in total. The group won the UK's Formula Student competition on the famed Silverstone Formula 1 circuit, reinforcing its global number-two ranking.

Student racing teams rewarded

At the Ecomobiel 2014 e-mobility trade show, D-Incert (the Dutch Innovation Centre for Electric Road Transport) presented innovation cheques worth €7,500 each to seventeen student racing teams from Dutch universities. "Young people are the future," said Frank Rieck, D-Incert's chairman. "For years, the Netherlands has put in an exceptional performance in a variety of races. These are world-class teams. In that regard, the Netherlands has a bright future in electric mobility." During the presentation, each team had one minute to pitch itself. Solar passenger cars, boats, motorcycles, threewheelers, and go-karts all passed in review.



International

- A collective of more than thirty Dutch companies and public authorities presented the Holland e-Mobility House at the Hannover Messe 2014 in Germany. Companies had the opportunity to take part in matchmaking sessions. The Dutch delegation was also invited to participate in exchanges with several German states.
- The Partners for International Business (PIB) programme, which targets groups of companies that want to collectively enter a foreign market and use PIB support to create a tailored strategy rather than pursuing isolated activities, achieved several successes in 2014. The PIB-funded Coast-to-Coast EV Connection, a partnership between the US West Coast and the Netherlands, has generated new opportunities for Dutch companies through several activities. Among other things, the TU/e's Stella, the world's first solar family car, was a big hit and enjoyed a successful tour along the American West Coast. This tour spun off the 'Coast-to-Coast EV Connection goes NL' e-mobility tour by California energy commissioner Janea Scott. Ms Scott and her advisor visited fifteen companies in the Netherlands. The

Coast-to-Coast EV Connection also organised two conferences and a series of workshops in 2014. Another measurable result of the project's efforts are the dozens of new contacts in its network, all of whom enrich the opportunities available to Dutch companies and help ease their entry into the market. Moreover, several Dutch businesses have received orders from the US totalling hundreds of thousands to a few million euros.

- The PIB project East Coast Electric, begun in December 2013 and targeting the US East Coast, organised a government-togovernment mission in 2014. Dutch government representatives spoke with local distribution system operators and officials at the state and city levels in Massachusetts, Connecticut, and New York. The mission resulted in a concrete list of action items for further international collaboration between the Netherlands and the American East Coast.
- The Netherlands is a member of the international Implementing Agreement for co-operation on Hybrid and Electric Vehicle Technologies (IA-HEV) run by the International Energy Agency. The Netherlands and Belgium are heading up an IA-HEV project launched in 2014 and running through 2015 which will capture the e-mobility value chain in several countries and determine where national and international opportunities lie.

- Several meetings titled 'NRW meets NL' and 'NL meets NRW' took place in 2014 between Dutch companies, knowledge centres, and public authorities and their counterparts in the German state of North Rhine-Westphalia. The meetings explored the opportunities available to Dutch companies during the rollout of electric driving in Germany. During Electromobility Week in Aken and other events, attendees generated ideas for border-crossing projects. Additional meetings on the central theme of greening logistics and on information technology's role in e-mobility also took place. The highlight of the event's kick-off was the initial meeting to explore a potential PIB project with Germany.
- In October 2014 a Latin American delegation visited the Netherlands to learn more about electromobility. Ten politicians from Ecuador, Mexico, and Columbia thoroughly examined the Dutch approach. All those involved hope the visit will generate opportunities for Dutch companies in Latin America.



Regional incentives

Utrecht is the first city to adopt an environmental zone for passenger vehicles

Since 1 January 2015, diesel passenger and delivery vehicles manufactured before January 2001 are no longer permitted in downtown Utrecht. The city is the first in the Netherlands to usher in this type of environmental zone. Lorries were already banned from the city centre; the measure has now been extended to diesel passenger and delivery vehicles manufactured before January 2001. The vehicles are excluded from the environmental zone because they emit highly polluting exhaust. According to the city, the ban dramatically improves air quality, and with it, urban residents' health. In connection with the environmental zone's adoption, the city has also decided to grant subsidies to individuals and companies that want to scrap their vehicles and possibly replace them. The city worked hard in 2014 to set up the demolition and subsidy programme. A total of \in 10.7 million in subsidies will be available until 1 July 2015.

'Slim Laden' approach to smart charging launches in Noord-Brabant Province

In the first quarter of 2014, Noord-Brabant Province installed one hundred innovative public charging points for electric cars in the province's five largest cities. Breda, Eindhoven, Helmond, Den Bosch, and Tilburg welcomed the charging stations as part of the 'Smart Charging, Brabant Style' pilot project. The project's goal is not only to create full public charging coverage, but also to further reduce the cost of charging points, smart charging, and smart grids and to create efficient processes. To date, 70 percent of the province's municipalities have signed uniform agreements on installing and managing public charging points. This forms the basis for rolling out another 155 charging points starting on 2 February 2015. For the pilot project, distribution system operator Enexis and other market players developed a charging point that is 50 percent cheaper than existing stations. Moreover, it smart-charges electric cars, thereby distributing local clean energy effectively and safely. The distribution system operator and municipality workflows have been optimised and aligned. What's more, the electric-car driver can choose whether to use power provided by the charging point's supplier or by his own service provider. This free choice of supplier is unique in the Netherlands.



A unified work cycle was also developed in 2014, in which the contractor not only installs the charging point, but also connects it to the electrical grid. The contractor may also convert the parking space to make it EV-ready. In the past, all these tasks were carried out by different parties. In practical terms, this means that from now on, only one contractor van will be parked in the street and the charging point's installation will be completed faster.

Other regional incentives

- In 2014, the City of Utrecht once again provided €400,000 in subsidies to increase the appeal of electric driving. The city's residents and businesses could request funds to install charging points and to purchase or lease electric scooters.
- Through October 2014, companies and institutions in The Hague could apply for a grant to install charging points, to a maximum of €5,000 per location.

- Rotterdam residents who scrapped their nine-years-old-or-older diesel cars in 2014 and then bought an electric car received €9,000 in subsidy from the city.
- In 2014, MRA-E began preparations to install 1,200 additional charging points in the provinces of Noord-Holland, Flevoland, and Utrecht. In addition, the number of charging points in Amsterdam will expand to 2,000 by 2016.
- Since the summer of 2014, Gelderland Province has installed the first of 1,500 additional charging points.
- Freight transport in Rotterdam must be fully emissions-free by 2020. The City of Rotterdam and freight companies confirmed this ambition in the Area Code 010 Zero Emission Urban Logistics Green Deal. Among other things, shop deliveries must take place using primarily electric vehicles by 2020.

- GVB, the Amsterdam Metropolitan Area public transportation authority, is working to deploy trolleybuses in the capital city starting in 2017. Because its conventional buses are scheduled for replacement in 2017, GVB will start deploying trolleybuses step by step then. Forty buses will be replaced that year.
- At the end of 2015, the Netherlands was ten hydrogen-electric buses richer. The national government granted subsidies to the metropolitan areas of Arnhem-Nijmegen, Eindhoven, and Rotterdam and the provinces of Zuid-Holland and Groningen to buy ten new hydrogen-electric buses and two additional filling stations.





Market developments

- The number of electric vehicles on Dutch roads grew from 30,211 to 46,111 in 2014. Car manufacturers Audi, Volkswagen, BMW, and Nissan were among those who brought out new electric models in 2014: respectively, the A3 e-tron, e-Golf, i8, and e-NV200 delivery van. Several manufacturers will be launching new electric models in 2015 as well.
- The new portal www.e-bestelbus.nl helps businesses explore the features of electric delivery vans. MRA-E (the Amsterdam Metropolitan Area Electric project) and the cities of Rotterdam, Utrecht, and Amsterdam have joined forces with the ANWB (Royal Dutch Touring Club), the European Life+ programme, and a variety of market players to encourage cleaner transport among Dutch businesses. The initiative helps companies navigate the purchase of an e-delivery van.
- Car2Go expanded its fleet of electric cars in Amsterdam to 350 vehicles. The 300 Smart cars that had been in use since 2011 were replaced by 350 new Smart Fortwos. In three years' time, the original fleet drove eight million electric kilometres. Other electric shared-car projects also launched in 2014. In October, eCARSHARE deployed the first ten electric cars to be shared

among companies, institutions, and residents in the town of Sittard-Geelen. This number will substantially increase in 2015. Since November, residents of Terschelling can also make use of electric shared cars. There are sixty-five Nissan Leafs available on the island, and the intent is to expand that number to one hundred.

- Tesla Motors Europe opened a showroom in Tilburg, adding to its existing distribution centre and assembly plant there. The new location marks the company's fifth Dutch showroom. Two more are slated to open in 2015, in Rotterdam and Utrecht.
- In 2014 the Natuur & Milieu foundation and Project A15 initiated the very first private leasing project for electric cars. In the Electric Now programme, consumers pay a fixed amount each month and there are no extra expenses for maintenance, insurance, or repairs. Participants can choose from four full electric car models. The goal is to encourage one thousand additional residents of the Netherlands to drive electric in 2014 and 2015.

 The Formula E-Team has drafted a roadmap for the consumer electric car market. The team's goal is to enhance electric driving's consumer appeal; the roadmap clarifies opportunities and obstacles.

Charging infrastructure

- Dutch EV charging infrastructure also grew substantially in 2014. The number of public charging points rose from 3,521 to 5,421. Semi-public charging points grew most rapidly, from 2,249 to 6,439. Private charging points rose from 18,000 to 28,000. Finally, the number of fast-chargers rose from 106 to 254.
- Several provincial and regional authorities made charging infrastructure progress in 2014. In its project 'Smart Charging, Brabant Style', Noord-Brabant Province commissioned the installation of 155 dual-port charging stations across 70 percent of its municipalities. Gelderland Province awarded a concession to Cofely Nederland to install and operate a network of 1,500 public charging points in 62 of its municipalities. MRA-E has plans to install 1,200 charging points in the provinces of Noord-Holland, Flevoland, and Utrecht. Finally, the cities of The Hague and Utrecht subsidised the installation of several dozen public and semi-public charging points in 2014.



- The rapid growth in fast chargers is attributable in part to FastNed's new stations. The company is currently installing one new fast-charging station per week at rest areas along Dutch highways. The European Union has granted FastNed €2 million to install a corridor of 94 fast-charging stations for electric cars along major Northern European highways in Germany and other countries.
- Tesla owners can now fast-charge their Teslas at no cost at three places in the Netherlands. Tesla opened its third Dutch Supercharger station in the fall of 2014. Across Europe, there are now more than fifty Supercharger locations.
- The National Charging Infrastructure Knowledge Platform
 Foundation (NKL) was founded at the end of 2014. The NKL's goal
 is to lower the cost of public infrastructure for all stakeholders
 through shared projects. To that end, the foundation is working to
 optimise the installation process, which involves the distribution
 system operator, charging point operator, and municipality.
- According to a Natuur & Milieu foundation survey among 166
 Dutch municipalities, 82 percent have received requests to install
 public or private charging points yet 75 percent lack the budget
 to honour those requests. The Natuur & Milieu foundation has
 calculated that the projected e-mobility growth will necessitate
 roughly 30,000 public charging points in the next three years.

Taxi

- Since October 2014, travellers can take an electric taxi at Schiphol Airport. BBF Schipholtaxi (96 e-taxis in 2015) and BIOS-groep (71 e-taxis in 2015) have been awarded a concession to provide passenger transport in 167 Tesla Model S sedans. With so many Teslas and access to several dozen charging points, Schiphol may rightly call itself the electric taxi paradise among European airports.
- At the end of 2014, public mobility authority RDW counted 246 registered electric taxis active on Dutch roads.
- The provinces of Noord-Holland and Zuid-Holland are the country's e-taxi frontrunners; Utrecht Province comes in a distant third behind them.
- Strikingly, only seven plug-in hybrid vehicles (PHEVs) are being used as taxis in the Netherlands; the rest are full electric vehicles (BEVs).

E-distribution

- Eight large and eighteen small municipalities have signed on to the Zero Emission Urban Logistics Green Deal to maximise urban distribution via CO2 emission-free vehicles such as electric delivery vans and lorries. Over the next five years, participants will work to accelerate new technologies using living labs.
- Since November 2014, the Heineken brewery's hotel, restaurant, and catering customers have received their deliveries by electric lorry. Heineken and the City of Amsterdam are participating in the European FREVUE project to stimulate electric freight services in cities. In the coming years, Heineken will deploy at least four electric lorries in the capital city. The goal is to reduce emissions to zero for all hospitality industry transport in the major cities and the Randstad region by 2020.
- Since the end of 2014, home meal delivery service Thuisbezorgd. nl has had access to 200 electric GOVECS scooters in Utrecht. The subsidiary of Takeaway.com counts more than 5,000 member restaurants in the Netherlands. Hungry customers can order meals at these restaurants using the company's website or app. Thuisbezorgd.nl's members deliver more than one million orders each month in the Netherlands. Member restaurants can lease the use of an electric scooter for a fixed daily amount.



Financial incentives

- Several tax benefits ensured that the number of electric vehicles in the Netherlands continued to grow in 2014.
- The 2014 fiscal stimulus package was as follows:
- exemption from BPM (motor vehicle purchase tax)
- exemption from MRB (motor vehicle road-use tax)
- 4 percent company-car addition to taxable income for people leasing BEVs and 7 percent addition for people leasing PHEVs with 1–50 grams of CO2 emissions
- A maximum MIA (environmental investment allowance) of 36 percent, to a maximum of €50,000
- In the fall of 2014, state secretary for finance Eric Wiebes announced that the 'Autobrief 2.0' proposing revised fiscal measures for motor vehicles would be delayed until mid-2015. As

a result, new vehicle taxes will not go into effect until 1 January 2017; 2016 will be a transitional year, and the RAI Association, BOVAG, the Natuur & Milieu foundation, and car-leasing company association VNA have agreed with the government on a broadly supported alternative plan:

- The number of addition-to-taxable-income categories will drop from five to four in 2016.
- The addition-to-taxable-income rate for BEVs will remain 4 percent in 2016.
- The MRB exemption for BEVs will remain in 2016.
- The addition-to-taxable-income rate for PHEVs will increase to 15 percent in 2016.
- Through the Netherlands Enterprise Agency, the Ministry of Infrastructure and the Environment granted a €3,000 subsidy

on the purchase of electric taxis and delivery vans in 2014. In Amsterdam, Rotterdam, The Hague, Utrecht, and the Arnhem-Nijmegen Metropolitan Area, the subsidy was \in 5,000 per vehicle. Several local governments followed this example and provided an additional stimulus throughout 2014, such as the City of Amsterdam (\in 5,000 extra subsidy until 1 January 2016), Limburg Province (\in 3,000 extra subsidy until 1 October 2015), and the City of Tilburg (\in 3,000 extra subsidy until 1 June 2015).



Green Deals

The Dutch government is helping local authorities, citizens, companies, and organisations to achieve environmental initiatives that are difficult to get off the ground. One way it does that is to close a Green Deal with the initiators of sustainable projects and ideas. Several electric mobility Green Deals have been signed in recent years; we present here the 2014 Green Deal highlights.

10,000 charging points installed

The EV Infrastructure Green Deal completed in the summer of 2014, having achieved its intended result: the rollout of 10,000 smart charging points and 100 fast-charging points for electric cars. Thanks to its success, the Green Deal — concluded between The New Motion and the national government — was even rewarded with the very first Green Deal Award. The Green Deal also generated proposals on more flexible ways to implement the Energy Act and on the financing of public charging infrastructure.

Accelerating SME innovation

The SME Innovation Acceleration Green Deal completed in 2014. Its objective was to strengthen the innovative capacity of the Dutch economy and SMEs' economic potential by stimulating cross-pollination between the SME community and knowledge centres. For this Green Deal, D-Incert, the Vereniging DOET, Syntens, and Automotive NL worked with the Ministry of Economic Affairs and the Netherlands Enterprise Agency to launch a voucher scheme. More than fifty companies redeemed an innovation voucher at a knowledge centre, and at least half of them feel the innovation vouchers have made it easier to gain access to these centres of expertise.

Emissions-free freight transport in Dutch urban areas

Over the next ten years, eight large and eighteen small municipalities will work to eliminate air pollution generated by freight distribution within their borders. In November 2014, they signed the Zero Emission Urban Logistics Green Deal with freight companies, interest groups, and the Ministries of Infrastructure and the Environment and Economic Affairs. The municipalities taking part in the Green Deal are Delft, Groningen, Maastricht, Rotterdam, Utrecht, Zutphen, Arnhem, Nijmegen, and the eighteen smaller municipalities in the Arnhem-Nijmegen Metropolitan Area. The Green Deal stems from the SER (Social and Economic Council of the Netherlands) Energy Agreement for Sustainable Growth. The municipalities' objective is to maximise urban transport via CO2 emission-free vehicles such as electric delivery vans and lorries. Over the next five years, participants will work to accelerate new technologies using living labs. Successful projects will be expanded in 2020–2025 within and beyond these municipalities. The national government is providing practical support and working to remove legislative barriers.



Stop de stekker

EV-wijzer

Formula E-Team

The Formula E-Team is a public-private partnership uniting the business community, knowledge centres, and the Dutch government. The Formula E-Team ensures that electric driving further evolves in the Netherlands and aligns with developments in other countries and opportunities for sustainable growth.

Helping to shape the 'Autobrief 2.0'

The Formula E-Team is advising the national government as it drafts the 'Autobrief 2.0' on tax measures related to electromobility. Consistent fiscal policy is one of the Formula E-Team's central priorities for developing an electric transportation market. In 2014, the team joined forces with the RAI Association, BOVAG, the Natuur & Milieu foundation, the VNA, and others to create a widely supported alternative plan to the delayed 'Autobrief 2.0', including a 4 percent addition to taxable income for BEVs and 15 percent for PHEVs. The Formula E-Team will continue to provide the government with input on the 'Autobrief 2.0' in 2015.

More electric kilometres in PHEVs

Through its plug-in hybrid steering group, the Formula E-Team is striving to increase the percentage of electric kilometres driven in the Netherlands. Its approach includes the Plug-in Coalition, a group of leading companies that are taking technical and financial measures to reduce the burden on drivers. The group presented the 'Guide to EV' and other initiatives during the Ecomobiel e-mobility trade show. The guide contains best practices for employers and car-leasing companies on how to ensure efficient use of PHEVs in company-car schemes. The VNA and the RAI Association, both Formula E-Team members, also signed a mutual declaration at the show. The declaration outlines how car-leasing companies and importers can encourage drivers to log more electric kilometres in PHEVs.

Sustainable fuels for transport: A vision and action plan

In June 2014, state secretary Wilma Mansveld of the Ministry for Infrastructure and the Environment was presented with the report 'A vision on sustainable fuels for transport'. Members of the Formula E-Team made a substantial contribution to the subreport on sustainable electric road transport, which is an important cornerstone of the vision. The subreport's creation was led by Formula E-Team chairman Bert Klerk. Among other things, the report declares that every passenger vehicle will have an electric powertrain by 2050. The subreport also states that electromobility will enable a 19 percent tank-to-wheel reduction in C02 by 2030, rising to 61 percent by 2050.

The vision on sustainable fuels for transport is not limited to a visioning process and document, however: in the second half of 2014, the parties involved began working on an action plan. The plan will be presented to the Cabinet in the spring of 2015 and also contains action items related to electric transport, formulated under the Formula E-Team's leadership.

Bert Klerk also represents the Formula E-Team on the SER's transport and mobility table, where all progress related to action items within this category are discussed.



Research

E-drivers exhibit regular and routine-based charging behaviour, whereby the battery level plays very little meaningful role in deciding to charge the vehicle: so states a report by University of Utrecht master's student Jop Spoelstra. Working with the Netherlands Enterprise Agency, Mr Spoelstra analysed data on one million charging transactions and interviewed electric drivers on their vehicle-charging experiences, behaviour, and motivations. According to Mr Spoelstra's report, e-drivers have much less range anxiety than was previously assumed. The report recommends capitalising on the potential present in existing charging behaviour to implement smart charging and avoid placing peak demand on the electrical grid. Additional recommendations include better use of semi-public charging stations and the reduction of unnecessary charging-point use: 88 percent of charging transactions last three or more times longer than is theoretically required.

Rising confidence in charging

The 2014 National Driver Survey reveals that an increasing number of e-drivers have confidence in the EV charging process. Confidence in the number of charging points rose 9 percent relative to 2012, to 34 percent. What's more, an increasing number of people are considering the purchase of an electric car. Of those surveyed, 3 percent currently drive a hybrid car and 1 percent a full electric car. Among people who will buy a new car in the future, 26 percent indicate they are considering the purchase of a full electric or hybrid car.

Opportunities for inductive charging

The Netherlands Enterprise Agency commissioned APPM Management Consultants to conduct a study on inductive charging's potential. According to the report, inductive charging is at the start of the adoption lifecycle, exactly where e-mobility was five years ago. Whether inductive charging will take off depends on the degree to which it provides a full-featured EV charging alternative, say the report's authors. Inductive charging is expected to become part of the electric vehicle charging proposition, complementing alternatives such as plug charging and conductive pantograph charging. Pilot projects and small-scale use cases are expected to dominate this market in the coming years. The advantages of inductive charging relative to alternative charging technologies are its ease of use, suitability for different vehicle types, and limited effect on public spaces. The challenges include the cost, charging standardisation and normalisation, a lack of safety data, and the difficulty in moving inductive infrastructure

(such as induction coils beneath the road). If the Netherlands hopes to be a frontrunner in inductive charging, the report advises it to set up pilot projects and examine the tasks, responsibilities, roles, and powers of each party in the inductive charging chain.

Monitoring plug-in hybrids

In 2014, the Plug-in Coalition — an initiative of the Formula E-Team comprising the VNA, the RAI Association, The New Motion, the Vereniging DOET, and the Natuur & Milieu foundation — began setting up a monitoring system for PHEVs. A pilot project is using refuelling data, monthly bills, driver groups, and vehicle types to gain useful insights into the use of plug-in hybrids. To minimise variable expenses for these vehicles, it is crucial to monitor and analyse real-world PHEV user data for use in decision making.



Safety

- Through two meetings for professionals, the EV Safety for Civil Services working group has completed an important phase. Most of the information is now available on the website www.infopuntveiligheid.nl/Publicatie/Dossier/85/veiligoptreden-bij-moderne-voertuigen.html, including the fact sheet on EV safety published in October 2014 by research organisation TNO and the Dutch government.
- Protocols have been developed to assist emergency services in handling incidents involving modern vehicles. The protocols describe how emergency responders should proceed step by step: how to approach the vehicle, secure the vehicle, and so on. In addition to electric vehicles, the protocols address fuel cell, LNG, and CNG vehicles.
- An instructional video on responding to incidents involving modern vehicles was created in collaboration with all Dutch

civil services that are involved with safety and vehicles. The film is available (in Dutch) on the Infopunt Veiligheid (Safety InfoPoint) website: www.infopuntveiligheid.nl

- During the Ecomobiel e-mobility trade show, the EV Safety for Civil Services working group held a seminar on electric vehicle safety. The seminar covered the aspects of electric transport that must be considered when designing public spaces and parking garages, and the information that emergency responders need to know.
- A new framework directive is being developed for two- and three-wheeled electric vehicles. The directive will take effect in approximately three years. To this end, the Vereniging DOET and six Dutch electric scooter manufacturers have asked research organisation TNO to draft a list of criteria to ensure and enhance electric scooter safety and guality.



Communications

In 2014, 1,129 articles on e-mobility appeared in national newspapers and 5,662 articles appeared in regional newspapers. In 2013 those numbers were 750 and 4,987, respectively.

Hot topics included charging points, tax advantages, Tesla, RVO.nl's report on monetising economic potential, the Natuur & Milieu foundation's lease plan, the Prestige GreenCab taxi project, new fast chargers, and the electric taxis at Schiphol Airport.

More than 90,000 messages appeared in social media, primarily Twitter. Twelve percent of the messages about electric mobility were positive in tone, and 4 percent were negative.

 In January, the Formula E-Team's portal, www.nederlandelektrisch.nl, celebrated its first anniversary.
 In 2014 the website had an average of 2,147 unique visitors per month. On the website, public authorities, trade associations, and companies share their knowledge and vision with a broad online audience.

- The Ministry of Economic Affairs, the Ministry of Infrastructure and the Environment, public works agency Rijkswaterstaat, and the Netherlands Enterprise Agency made a joint appearance at the Ecomobiel e-mobility trade show. Their stand presented national and international visitors, including municipalities, companies, and organisations, with information on sustainable mobility and the support available to national and international initiatives. The governmental delegation also held countless sessions and workshops on environmental themes such as the climate, air quality, accessibility, clean cities, and sustainable growth. A wealth of topics passed in review, from the 'lorry of the future' to the safety of innovative vehicles and the government's vision on sustainable fuels for transport.
- 2,500 test drivers and 200 showrooms: that was the result of the national Test Drive Day organised by the Natuur & Milieu foundation. The test drivers, all private individuals, were able to take another person's electric car for an exploratory spin, with the goal of jump-starting growth in the consumer market. Thanks to Test Drive Day, 68 percent of the test drivers said they planned to buy an electric car (someday).
- 390 teams totalling more than 1,000 electric drivers: that was
 the result of the Clean Air Rally, an event to promote e-mobility
 in seven Dutch municipalities. Almere, Amsterdam, Eindhoven,
 Enschede, Rotterdam, Tilburg, and Utrecht-De Bilt were the
 participating cities. Throughout the day, potential EV drivers were
 inundated with information on electric driving.

Vehicle type	Electric driving	E-car	E-bike	E-scooter	E-boat	E-taxi
2014	1,052	3,025	3,007	201	89	137
2013	1,094	2,912	2,804	296	119	151

Publications

'Charging behaviour of Dutch EV drivers'

For his master's thesis, University of Utrecht student Jop Spoelstra worked with the Netherlands Enterprise Agency to analyse the data from one million charging transactions. He also interviewed EV drivers on their vehicle-

charging experiences, behaviour, and motivations.

'Cashing in on electromobility's economic potential'

On behalf of the Ministry of Economic Affairs, the Netherlands Enterprise Agency tracks the monetisation of electric mobility's economic potential in the Netherlands. This annual report

captures the current state of developments.

Only in Dutch ('Rapportage verzilvering verdienpotentieel')

'Inductive charging quick scan'

The Netherlands Enterprise Agency commissioned APPM Management Consultants to conduct a study on the opportunities and potential for inductive charging.

'A vision on sustainable fuels for transport'

The sustainable fuel vision stems from the Energy Agreement for Sustainable Growth, which sets ambitious long-term goals to reduce transportation-related emissions of harmful greenhouse gases in the Netherlands. The vision describes

the sustainable fuels that can be used and how modes of transport can be made more efficient.

'The EV guide'

In this guide to electric vehicles, the Plug-in Coalition, comprised of car-leasing companies and other businesses, shares best practices and concrete recommendations for logging more electric kilometres with plug-in hybrid vehicles.

Only in Dutch ('De EV-wijzer')

'Employment in electric transport in 2020'

The Netherlands Enterprise Agency commissioned research consultants CE Delft to estimate employment in the Dutch e-mobility sector in 2020. The report predicts anticipated gross employment, assuming the government achieves its goal

of 200,000 electric vehicles by 2020.

Summary only; full article in Dutch ('Werkgelegenheid door elektrisch vervoer in 2020')

'Enevate 2.0: Accelerating e-mobility'

This final report contains full information on the six regional e-mobility pilot projects conducted in the Netherlands, Germany, Belgium, and the UK as part of the European innovation project ENEVATE 2.0.

Growth in vehicle types and numbers

National Action Plan for Electric Driving goals and actual vehicle numbers

Goal	Electric vehicles on the road (three wheels or more)	Programme phase
2015	15,000 tot 20,000	Startup, Innovation
2020	200,000	Acceleration, Growth
2025	1,000,000	Stabilisation
Actual		
2011-12	1,579	
2012-12	7,311	
2013-12	30,086	
2014-12	45,915	

Number of electric vehicles per type

Vehicle type	Number as of 31-12-2011	Number as of 31-12-2012	Number as of 31-12-2013	Number as of 31-12-2014
Passenger car (FEV)	1,124	1,910	4,161	6,825
Passenger car (E-REV, PHEV) #	17	4.348	24,512	36,937
Commercial vehicle < 3500kg	158	494	669	1,258
Commercial vehicle > 3500kg	22	23	39	46
Bus *	68	67	73	80
Three-wheeled	181	469	632	769
Motorcycle	88	99	125	196
Total**	1,658	7,410	30,211	46,111

At the start of 2014, there were 30,086 electric vehicles (with three wheels or more) registered in the Netherlands. At the end of 2014, this number had grown to 45,915. This is an increase of 15,829 electric vehicles, or 53%.

* Including trolleybuses

** This total includes motorcycles

Excluding full hybrid vehicles



Electric vehicle growth curve from the end of 2010 through the end of 2014

In 2014, the following electric models (BEV, PHEV, E-REV) were among those active on Dutch roads:

Passenger cars Full electric	Passenger cars Plug-in hybrids/range extenders	Commercial vehicles Fullelectric
BMW i3	Audi A3 Sportback e-tron	Citroen Berlingo
BYD E6	BMW i3 (range extender)	Ford Transit Connect
Citroen C-Zero	BMW i8	Mercedes Vito E-cell
Kia Soul	Chevrolet Volt	Nissan E-NV200
Mercedes E-cell	Fisker Karma	Peugeot Partner
Mitsubishi I-MIEV	Mercedes-Benz S500 Plug-in Hybrid	Piaggio Porter E
Nissan Leaf	Mitsubishi Outlander	Renault Kangoo Express Z.E.
Peugeot Ion	Opel Ampera	
Renault Fluence Z.E	Porsche Panamera S-E-Hybrid	
Renault Twizy	Porsche Cayenne S-E-Hybrid	
Renault Zoe	Toyota Prius Plug-in	
Smart Fortwo E	Golf GTE Plug-in Hybrid	
Tesla Model S	Volvo V60 Plug-in	
Tesla Roadster		
Th!nk City		
Volkswagen Up		
Volvo C30		

Despite the strong growth in electric vehicles, their number still accounts for only a modest share of all Dutch automobiles. In 2014, an average of 4 percent of new purchases were electric (adding full electric and plug-in hybrid models together), with a peak of nearly 8 percent in April. The table below compares the month-by-month figures for all new-vehicle purchases with those for full electric and plug-in hybrid vehicles.

Period	Total new passenger cars registered	New BEV and PHEV passenger cars registered	BEV and PHEV as percentage of all new registrations
Jan-14	44,568	221	0.50%
Feb-14	33,625	1,158	3.44%
Mar-14	29,530	1,866	6.32%
Apr-14	28,479	2,149	7.55%
May-14	31,092	1,904	6.12%
Jun-14	32,950	1,336	4.05%
Jul-14	29,867	859	2.88%
Aug-14	25,722	895	3.48%
Sep-14	30,214	1,050	3.48%
Oct-14	35,424	945	2.67%
Nov-14	32,507	1,185	3.65%
Dec-14	36,424	1,521	4.18%
Total 2014	390,402	15,089	3.86%

Source: total registrations: BOVAG/RAI via www.bovag.nl, BEV and PHEV: RDW, edited by RVO.nl

The diagram below displays the monthly change in new registrations as a bar chart.



- New BEV and PHEV registrations Source BOVAG/RAI via www.bovag.nl
- New passenger car registrations excluding BEV and PHEV Source RDW/RVO.nl



The diagram below compares the change in new full electric passenger car registrations with those for plug-in hybrid vehicles (including range-extended vehicles).



- Plug-in + range extender
- Full electric

Number of electric vehicles compared with total Dutch fleet (per segment), as of 31-12-2014

Vehicle category	Number full electric	Number plug-in hybrid	Total number of vehicles in the Netherlands	Electric as percentage of total
Bicycles	1,100,000	-	19,000,000	5.8%
Scooters (including mopeds)	27,291	-	1,122,000	2.0%
Motorcycles	169	-	653,000	0.02%
Passenger cars	6,825	36,937	8,154,000	0.54%
Delivery vans	1,258	-	890,000	0.14%
Public transport buses*	80	-	5,000	1.6%
Lorries	46	-	137,000	0.03%

* Including trolleybuses (59 in total). (Source: RDW, CBS, RAI/BOVAG and RVO.nl)

Number of charging stations¹

Number installed as of	31-12-2011	31-12-2012	31-12-2013	31-12-2014
Charging stations				
Public (freely accessible 24/7)	1,250	2,782	3,521	5,421
Semi-public (limited public access)	576	829	2,249	6,439
Private		4,500-5,500*	18,000**	28,000**
Fast-charging stations Semi-public	14	63	106	254

* Based on research conducted in 2012.

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

The number of charging stations is steadily growing. In addition to the public and semipublic charging points that are easy to monitor, there are private charging points. The Netherlands has approximately 0.9 charging stations per vehicle. According to European guidelines, this must increase to 1.0 per vehicle. In addition, the guidelines require a minimum of 10 percent publicly accessible charging points. The Netherlands has well exceeded this percentage.

¹ Based on figures provided by the E-Laad Foundation, EV-Box B.V., NUON and Essent, The New Motion (figures through 31 Oct 2012), and Oplaadpalen.nl (figures as of 30 Nov 2012). The data from Oplaadpalen.nl does not yet indicate whether the charging stations are public (or semi-public). In this report, we assume that the E-Laad, Nuon, and Essent charging stations are public and that the remaining charging points in the file are semi-public.



www.nederlandelektrisch.nl

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NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs that implements government policy for Agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

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