Netherlands Enterprise Agency

Report

Economic significance of the electric mobility sector in the Netherlands 2020-2022

Commissioned by the Ministry of Infrastructure and Water Management

>> Sustainable. Agricultural. Innovative. International.

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Content

Preface

The energy transition has begun to accelerate. Not only are we seeing a strong increase in the number of solar panels on the roofs of houses and in the number of wind farms on both land and sea, changes in the use of energy are also taking place fast. This applies not in the least to mobility. The number of electric vehicles has increased significantly in recent years. Not only with passenger cars, but also with commercial vehicles, both light and heavier. Strong growth is also visible in buses. Fossil car fuels are gradually being phased out and replaced by electricity as an energy source.

This strong growth in electric mobility contributes to the reduction of CO2 emissions and also leads to reduced import dependence on fossil fuels. This benefits both the climate and the security of energy supply. Electric mobility naturally also contributes to cleaner air, especially in inner cities. The greater demand for electric vehicles also provides an impetus for the economic importance of the electric mobility sector. Employment in this sector has increased in recent years to around 30,000 full-time jobs, which is comparable to the number of jobs in the solar energy sector. At the same time, the added value of the electric mobility sector has grown strongly and amounted to more than 3 billion euros in 2021.

At the same time, the increase in electric driving naturally poses challenges for the Netherlands. These mainly concern the available infrastructure. The use of the power grid is increasingly reaching its physical limits, so that expansion will be necessary, not only for the electrification of mobility, but also that of other sectors. However, electric mobility can also contribute to using scarce transport capacity as smartly as possible. Smart solutions allow charging to be tailored to the available grid capacity. The charging techniques developed for this can also be used at other locations on the electricity grid to use the available grid capacity more efficiently.

The growth in electric mobility will only continue in the coming years, supported by climate policy measures from both Europe and the national government. The economic importance of the electricity sector will therefore increase further, but it is just as important that CO2 emissions from transport will decrease significantly, as a result of which this sector will make a significant contribution to combating further climate change.

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Abstract

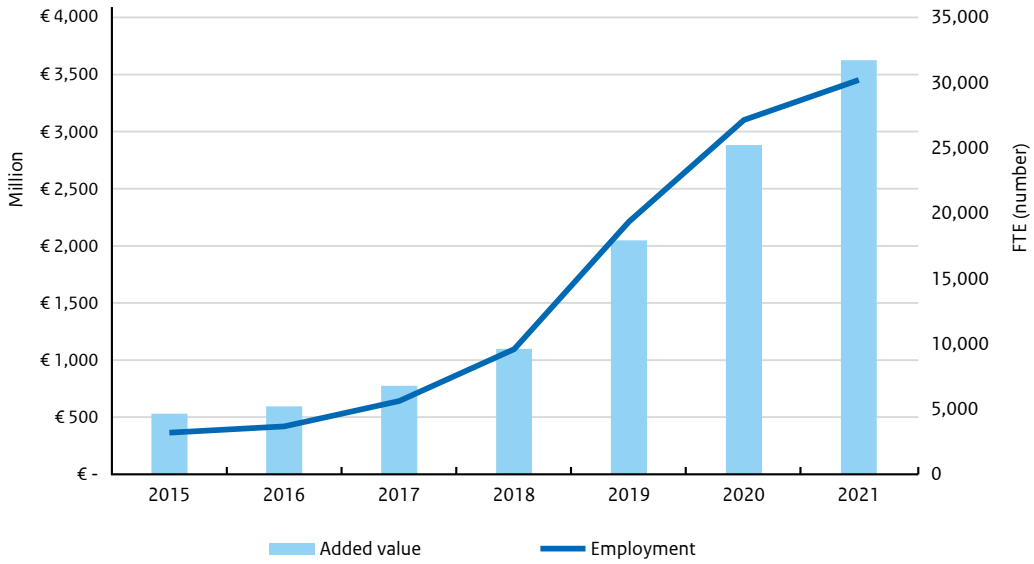
The electric mobility sector is increasingly contributing to the economic position of the Netherlands

Globally, the Netherlands is one of the countries with the greatest market penetration of electric vehicles and availability of charging infrastructure. The Netherlands is a leader in the field of charging infrastructure and is well advanced in developing solutions for issues surrounding capacity problems on the electricity grid through solutions such as smart charging. The sector builds on the knowledge and experience gained in the early developing Dutch electric mobility ecosystem. At the same time, new activity is emerging in young markets such as electric mobile equipment and battery technology. The electric mobility sector is therefore increasingly contributing to the Netherlands' strong economic position.

Employment in the electric mobility sector increased by more than half between 2019 and 2021

The added value of the electric mobility sector in the Netherlands grew by 77% in the period 2019-2021; from € 2.05 billion to € 3.62 billion. In the same period, direct employment in the electric mobility sector increased by 56% from 19,340 full-time equivalents (FTE) to 30,210 FTE in 2021. The electric mobility sector is a growing source of income for the Netherlands. For comparison: the country had approximately 27,000 FTE in the solar energy sector in 2021.[1] Total employment in the Netherlands grew by 2.6% between 2019 and 2021.[2]

Development of the economic significance of the electric mobility sector in the Netherlands 2015-2021



Of the total employment in the electric mobility sector, 17% comes from companies where all business activities are focused on electric mobility, such as CPOs (Charge Point Operator, a company that installs and operates charging points), charging point manufacturers, and manufacturers and convertors of electric vehicles or equipment. The remaining 83% falls under existing industries that generate an increasing share of their income from electric mobility, such as the automotive sector and the installation sector. Of the added value in the electric mobility sector, 29% comes from companies where all business activities are focused on electric mobility and the remaining 71% comes from industries with partial electric mobility activities.

[1] Solar Power (2021), EU Solar Jobs Report

[2] https://www.clo.nl/indicatoren/nl0002-bruto-toegevoegde-waarde-en-werkgelegenheid

The Netherlands is a leader in smart, integrated charging solutions

The Netherlands is leading the way in charging infrastructure and smart charging solutions. Smart charging solutions such as Vehicle-to-Grid (V2G) in combination with sustainable generation and stationary applications are developments that many companies in the Netherlands are working on. The limited grid capacity in the Netherlands is now an urgent problem that can hinder the rollout of electric mobility in some areas, but at the same time can be an incentive for companies to look for smart solutions in the field of energy management. This means that the electric mobility sector is becoming increasingly intertwined with the energy system while at the same time creating common ground with other sectors: think of techniques for storing electricity, energy generation in - and energy use by - the built environment and the services surrounding it.

Emerging markets include transportation, mobile equipment and the battery sector

In the period 2020-2022 it has become clear that after passenger cars (of the new cars sold in 2022, more than 24% were electric and almost 4% of Dutch cars now run electric) and buses (25% of public buses run electric), the electrification of other modalities is now also underway. In the period 2020-2022, the number of electric commercial vehicles - including trucks (>3.5 tons) - has more than doubled. As of August 2023, almost 1,000 electric trucks are in operation in the Netherlands, a threefold increase compared to 2022. Electric inland shipping is still a small sector, but has great potential for sustainability, which is already being worked on in various research and development (R&D) processes.

An important development is also the strong rise of electric mobile equipment. The Netherlands is a leader in the use and conversion of mobile equipment in Europe. With strict nitrogen standards, the use of sustainable mobile equipment is necessary to realize the ambitious construction task for the coming years.

Electric mobility is a major driver for the battery sector. Several studies show that there are major opportunities for the Netherlands in the production, maintenance and recycling of batteries. This industry is still relatively young and making the right investments at this time can ensure high earning potential. With, among other things, the National Growth Fund, the Netherlands is responding to the growth potential in markets such as battery technology or electric inland vessels.

What a small country can be great at: capitalizing on our lead internationally

The Netherlands has an ambitious construction task and is struggling with scarcity on the electricity grid, while the challenges in the field of climate and quality of life are piling up. The electric mobility sector is responding smartly, supported by a strong R&D infrastructure. This also provides opportunities from an international perspective: the Netherlands is already developing and testing many (potential) solutions for issues that will also be relevant to other countries in a number of years. By then, opportunities for Dutch companies will have arisen to remove the obstacles to electric mobility adoption in other countries by supplying products and services. Not only concrete products and services for end users, but also consultation in areas such as strategies for smart charging and smart sustainable construction sites.

By strengthening international agreements and collaborations and organizing international events, the Netherlands can benefit from its early lead and widely spread and capitalize on its knowledge and experience.

In conclusion

Electric mobility is a sector in which much further growth can be expected, but in which it is also desperately needed. By August 2023, approximately 405,000 battery-electric (BEV) cars were on the road in the Netherlands out of a total of 9 million. This will (and should) increase considerably as we move towards the zero-emission goal of 100% new sales of BEV passenger cars in 2030. In the meantime, competition is increasing with other (large) electricity demanders and the lack of technical personnel is acute. This requires continued attention and investments to perpetuate and further expand electric mobility activity in the Netherlands. The various electric mobility initiatives in the National Growth Fund are a good example of this.

1 About the monitor Earning Potential electric mobility

1.1 How is the Dutch electric mobility sector developing?

Electric mobility in the Netherlands is growing at an accelerated pace. Globally, the Netherlands is one of the countries with the greatest market penetration of electric vehicles and availability of charging infrastructure. This also means that electric mobility activity is increasing for the Dutch market and beyond. The Netherlands is a leader in the field of charging infrastructure and is well advanced in developing solutions for issues surrounding capacity problems on the electricity grid through solutions such as smart charging. The electric mobility sector is therefore increasingly contributing to the Netherlands' strong economic position.

Reason for the Ministry of Infrastructure and Water Management (IenW) and the Netherlands Enterprise Agency (RVO) to closely monitor developments in electric mobility and its economic value in order to maximize its earning potential. Since 2015, a monitor has been published every two years on the earning potential of the electric mobility sector in the Netherlands. This report describes the developments in the electric mobility sector between 2020 and 2022.

1.2 What do we mean by the electric mobility sector?

This report focuses on the electric mobility sector. It is likely that the growth of the electric mobility sector will (in the long term) be at the expense of other sectors, such as the traditional automotive, the oil and gas industry and filling stations, but that is not the subject of this report.

In this report, we include all business activities in the Netherlands that are directly related to electric mobility in the electric mobility sector. Electric mobility-related activities by governments and educational institutions are not included, nor are derivative activities (think of a cleaner, accountant or caterer for a company that produces electric buses). Companies that are merely users of electric mobility (such as public transport operators, companies with electric lease cars, taxi companies) are also not included in the electric mobility sector. For the earning potential of the Dutch bicycle sector, including the electric bicycle, we would like to refer to the International Earning Potential of the Dutch bicycle sector report (RVO, 2022).

1.3 From earning potential to economic significance

Earning potential is 'potentially available earning capacity'; an estimate of what additional money can be earned (in the future). At a time when an activity is still very small in scale but has a great opportunity to grow quickly, it is useful to explore how large that growth could become. This is the earning potential of that sector.

The economic significance of a sector is a snapshot of the size of the sector (in economic terms such as added value, turnover, employment, exports). When a sector is more developed, its economic significance can be regularly measured, for instance how large the sector's employment or added value is/was in a given year. With the growth of the electric mobility sector, the emphasis of this monitor is increasingly shifting to the broad economic significance of the electric mobility sector.

The economic significance is measured in this report by determining the combined value - with data from Statistics Netherlands[3] - of Dutch companies that are included in the electric mobility sector, for the indicators employment (in FTEs) and added value (in euros).

[3] https://www.cbs.nl/nl-nl/maatwerk/2023/43/economische-indicatoren-elektrisch-vervoer-2015-2021

1.4 Research approach

Statistics Netherlands collects these economic indicators per industry. However, the electric mobility sector cannot be captured in one or more industries, but moves across them: both in sectors (e.g. construction and installation, traffic and transport) and types of activities (including manufacturing industry, trade, services and knowledge).

The challenge of the electric mobility economic significance monitor is therefore to arrive at a good approach for determining those companies that are included in the electric mobility sector. In this report we distinguish two electric mobility company populations that complement each other:

1. Fully electric mobility companies where all business activities of a company are focused on electric mobility;
2. Partial electric mobility companies: companies that are partly engaged in electric mobility activities, but also undertake other activities. These are mainly companies in the automotive sector and the installation sector. For these companies, an estimate has been made of the share of business activities that can be attributed to the electric mobility sector.

Chapter 4 further explains how the electric mobility company population is defined and on the basis of which the economic significance of the electric mobility sector is determined.
In addition, interviews were held with representatives of the electric mobility sector to explain the developments. See Appendix 3 for the organizations and individuals consulted.

Difference from previous reports
The figures in this report on the economic significance of the electric mobility sector cannot simply be compared with the figures in previous reports because a different approach has been used in this report. This has had consequences for both the scope of the monitor and the clusters of electric mobility activity that have been distinguished. This year, for the first time, the electric mobility activities of the automotive sector (car importers, dealers and repair companies) and the installation sector have also been included. This has created a better overall picture of the electric mobility sector. This year, for data technical reasons, the clusters have been divided into modalities and charging infrastructure instead of market clusters, as before. As the electric mobility sector expands, there will be more and better opportunities for clustering in a way that illustrates the different facets of economic growth.

1.5 Reading guide

Chapter 2 first briefly discusses electric mobility developments per modality in the Netherlands, including a look across the border. Chapter 3 provides a brief summary of the most important drivers for the identified developments in 2020-2022. These chapters are the prelude to Chapter 4, which focuses on the developments in the economic significance of the electric mobility sector, the core of this report. Chapter 5 concludes the report with the most important conclusions and the identified opportunities for the Dutch electric mobility sector in the coming years.

To make the general trends identified more concrete, specific companies and initiatives are described throughout the report (the blue boxes) that illustrate the most important developments.

2 Electric mobility growth continues at an accelerated pace

2.1 Introduction

This chapter describes the most important trends and developments in the electric mobility sector in the Netherlands. We make a distinction between the different electrical modalities on the one hand (section 2.2) and on the other hand between different forms of charging infrastructure (section 2.3). This was largely based on the figures about electric mobility that RVO collects. At the end of this chapter we also pay attention to electric mobility developments abroad (section 2.4).

2.2 Developments in electric mobility adoption

The growth of electric mobility continues in all modes

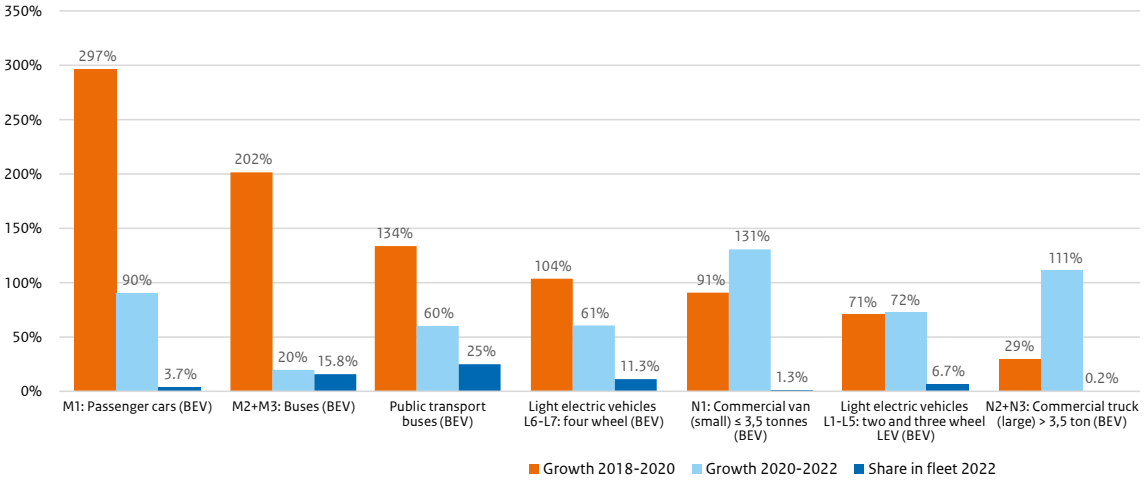
The figure below shows the growth of the various electric modalities[4] in the Netherlands, both for the period 2018-2020 and the period 2020-2022. The share of battery electric vehicles (BEV) in the relevant modality is also shown.

The following becomes visible:

- Electrification continues to increase for every modality (a positive growth rate), but for a number of modalities the growth rate decreases (particularly public transport buses and passenger cars);
- The growth in light and heavy commercial vehicles has actually increased sharply, although this is still a relatively small electric mobility share in the commercial vehicle fleet;
- Buses and light electric vehicles (LEVs) have the largest electric mobility share (>10%), with the outlier being public transport buses (25%);

In Chapter 3 we will discuss all developments per modality in more detail.

Figure 2.1: Percentage growth and share of electric vehicles per modality in the Netherlands



Source: RVO, Statistics Electric Vehicles in The Netherlands, last updated July 12, 2023.

[4] The categories presented in this chapter follow the vehicle categories used by RDW, see https://www.rdw.nl/particulier/paginas/mobielcategorieen.

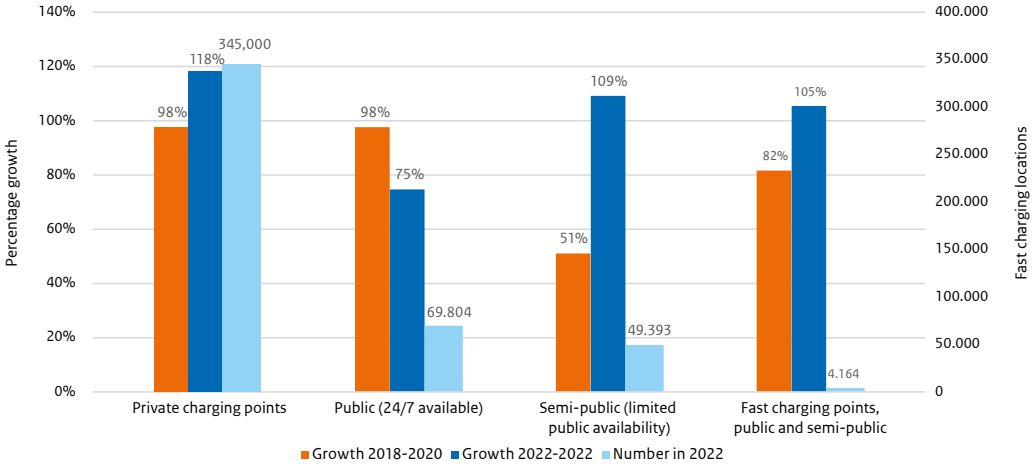
2.3 Developments in charging infrastructure

The number of charging points is growing at an accelerated pace

The number of charging points in the Netherlands is growing rapidly. An acceleration of growth is visible across the board between 2020 and 2022 compared to 2018-2020. The growth of charging points at semi-public locations in particular is accelerating rapidly. Within the total of public and semi-public charging points, the share of semi-public charging points has increased slightly, from 37% in 2020 to 41% in 2022.

The (semi-)public charging infrastructure follows the growth in the number of plug-in vehicles. The ratio of plug-in vehicles per (semi-)public charging point is fairly stable, but has increased slightly in recent times. When private charging points are also included, the number of plug-in vehicles per charging point is stable.[5]

Figure 2.2: Development of the number of charging points in the Netherlands



Source: RVO, Statistics Electric Vehicles in The Netherlands, last updated July 12, 2023.

The rise of (ultra) fast charging

Fast charging is on the rise; There are more and more charging points with a capacity above 43 kW, up to 350 kW. In December 2022, there were 518 (semi-) public fast charging points in the Netherlands of 250 kW or higher. In 2020 this was only 150.

Quickly recharge on the go

Fast chargers appear to be an important link in the charging need, especially for longer distances and intensive use. For both private electric mobility drivers and entrepreneurs with an electric fleet.[6] In 2013, Fastned opened its first fast charging stations. The pace of construction has steadily increased in recent years. It took about 4 years to build the first 50 stations, but more than 50 stations are now being built per year and the construction pace will be accelerated even further in 2023. At the end of 2022, Fastned put its 150th fast charging station into use in the Netherlands.

The vast majority of current fast charging locations are now inaccessible to electric trucks. Considerable progress still needs to be made in this regard. According to European guidelines (AFIR), the Netherlands

5 NAL Progress Report 2023
6 https://nklnederland.nl/aan-de-slag-met-snelladers/

must have 73 fast charging locations (>350 kWh) on the core network by 2025 where electric trucks can (also) charge.[7] A number of market parties, both electric mobility parties and fossil fuel suppliers, are responding to this and are now working on a market proposition to operate fast charging locations.

Within five years, Europe could become the world leader in battery-electric freight transport

In December 2022, Commercial Vehicle Charging Europe - the joint venture of Volvo Group, Daimler Truck and TRATON GROUP - officially launched under the Milence brand. Milence will initially focus on charging locations in the Netherlands, Germany, France, Belgium, Spain, Italy, Norway and Sweden. Within 5 years, Milence wants to have realized at least 1,700 fast charging stations in Europe. The new Megawatt Charging Systems (MCS) makes it possible to charge a 40-ton truck in 30-45 minutes while drivers take their mandatory break. With the increasing influx of electric trucks, an increasingly favourable Total Cost of Ownership (TCO), and the rollout of a European megawatt charging network, Milence expects battery-electric trucks to transform the road transport industry in the coming years.

Smart charging and smart grids

Charging points are becoming increasingly intelligent and adapt charging to circumstances. We call this smart charging. With smart charging, the charging point knows when the car's battery needs to be full again and when it can be charged at the lowest rate, or when it can use its own generated electricity. The user thus saves on electricity costs and at the same time peak loads on the electricity grid are prevented. This is also called load balancing. Because load balancing ensures optimal charging within the available capacity, a higher grid connection is less likely to be required. Companies, homeowners' associations and households benefit from this, but smart charging is also used at public charging points. Among others, Allego and Vattenfall are conducting trials with smart charging in regions that they operate.

With a smart charging point, locally generated energy can also be temporarily stored in the vehicle's battery. We then talk about bidirectional charging. The technology behind it is often called vehicle-to-grid (from car to network) or V2G for short, but vehicle-to-building (V2B) or vehicle-to-home (V2H) is also possible.

However, this technique is not yet widely used for several reasons. For example, not only is a special charging point required, but the car must also support bi-directional charging. Currently, few car models exist with this option, but developments are moving quickly. A special Smart Charging program for everyone aims to make at least 60% of charging sessions 'smart' by January 1, 2026.

Flexible charging for a lower energy price and less burden on the energy network

Heliox, market leader in the field of fast charging systems, especially for electric buses and electric trucks, and Recoy, developer of solutions for energy flexibility, entered into a strategic partnership in 2022. Recoy's Real-time Optimization Platform ensures that Heliox customers can charge at the lowest possible prices. The platform uses advanced algorithms and real-time electricity price forecasts to take advantage of increasing price volatility in energy markets and maximize use of renewable energy. At the same time, transmission and distribution system operators can use the charging flexibility thus introduced to keep the system in balance and better deal with congestion in the electricity network. For Heliox, the collaboration provides a springboard for implementing flexible solutions in multiple countries. Heliox was recently acquired by Siemens.

7 Stratelligence (2023), financiële implicaties AFIR

2.4 International comparison of electric mobility adoption

The Netherlands is leading the way in Europe

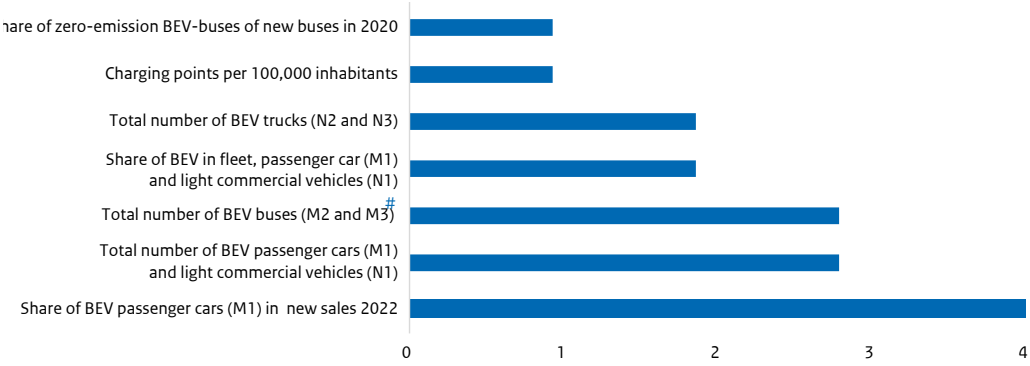
In 2022, the share of battery electric passenger cars (BEVs) in new passenger car sales was almost 24% in the Netherlands.[8] This makes us one of the frontrunners in Europe. Only in Norway (80%), Iceland (41%) and Sweden (33%) was the share of BEVs in new registrations higher. In absolute numbers of BEVs and electric light commercial vehicles, the Netherlands ranks third, after Germany and France.

The Netherlands is leading globally in terms of charging infrastructure: the Netherlands has the most public charging points per 100,000 inhabitants and per electric mobility driver in 2022. For every 2.7 electric mobility drivers, 1 public charging point will be available.[9]

The Netherlands is a European frontrunner with regard to the adoption of zero-emission bus transport, partly thanks to the Administrative Agreement Zero Emission Regional Public Transport by Bus (BAZEB), in which the parties involved jointly strive for completely emission-free regional bus transport by 2030. More than 80 percent of the new Public transport buses purchased in 2020 were zero-emission, which puts the Netherlands far above other EU countries.[10] When it comes to the absolute number of zero-mission buses, we are in third place after Germany and France.

The number of electric lorries (electric trucks) is still very limited (390 at the end of 2022). Only Germany is further along in this regard[11]. By 2022, more than 2,000 electric trucks would already be on the road.

Figure 2.3: Position of the Netherlands in Europe in 2022



On a global level, China is making great strides

Worldwide, the number of BEV passenger cars sold doubled in 2021 compared to 2020, from 3.2 million in 2020 to 6.6 million in 2021. The share of BEV passenger cars in 2021 in the total number of passenger cars sold worldwide was 9%.

In 2021, China took over the global leading position from Europe with a 48% share of the total number of BEV passenger cars sold in 2021.[12] Due to the sharp increase in wealth, China has seen a rise in the number of car owners. Many of those newly sold cars are electric (>20% in 2023), partly due to a stimulating government policy.

8 https://alternative-fuels-observatory.ec.europa.eu/transport-mode/road/netherlands/vehicles-and-fleet
9 ANWB, Elektrisch Rijden Monitor 2022.
10 https://think.ing.com/articles/all-aboard-europes-electric-bus-revolution-290921/
11 Figures for 2022 are not known, but in 2020 the number of BEV trucks in Germany was 0.1% of the fleet and therefore equal to the Netherlands (see https://www.acea.auto/files/ACEA-report-vehicles-in-use-europe-2022.pdf)
12 BloombergNEF, Elektric Vehicle Outlook, 2022.

The Chinese electric car is also on the rise in Europe. Figures from market researcher Inovev show that in 2021, 4 percent of all electric cars sold in Europe came from China and this year (2023) that has already grown to 8 percent. China is dominant in battery production and battery metal processing. In addition, the government supports the Chinese car industry with all kinds of subsidies. Chinese car manufacturers are therefore able to market electric cars at a lower price than European manufacturers.[13] According to research agency Jato Dynamics, a Chinese electric car in Germany is on average 29 percent less expensive than a non-Chinese one.

The European Commission recently (September 2013) started an investigation to determine to what extent 'dumping' of Chinese cars on the European market can be countered, for example by introducing import duties. It is possible that Chinese electric car manufacturers will open production facilities in Europe in the future to avoid levy upon entry.

[13] https://www.rtlnieuws.nl/economie/artikel/5399773/elektrische-auto-china-merk-nio-aiways-polestar-lynck-co-zeekr

3 A closer look at electric mobility developments

3.1 Introduction

Chapter two describes the developments in electric mobility adoption in broad terms. In this chapter we describe the developments per modality in more detail. We also pay attention to underlying (growth) factors that have partly determined the developments that have occurred. Consider, for example, government measures, technical and market developments that promote the supply and use of electric mobility. The growth figures come from RVO statistics on electric modalities.

3.2 Passenger cars

Stagnant growth

The number of BEV (M1[14]) again has grown in the period 2020-2022, but much less rapidly than in the previous period (2018-2020). In 2022, there are almost 516,000 BEV passenger cars registered in the Netherlands, of which 64% are BEV and 36% PHEV. Of the new cars sold in 2022, almost 35% were electric, versus 25% in 2020. In 2018, this share was only 6.3%.

Tax benefits have decreased

In the period 2020-2022, the purchase of BEV passenger cars was stimulated fiscally and with subsidies, but the financial benefits offered decreased: the additional tax rate for electric vehicles went from 8% to 16%, or the additional tax benefit was reduced by 8%. The amount on which this additional tax may be charged was also reduced. While this was still € 45,000 in 2020, this would become € 35,000 in 2022. The electric driver did not pay any purchase tax or road tax in the past period, which will continue to be the case until 2024.[15,16]

New: SEPP

The purchase subsidy for private individuals for BEV passenger cars (SEPP) started on June 4, 2020.[17] The subsidy amount was the same for the first two years and from 2022 the subsidy for the purchase or lease of new BEV passenger cars will decrease. The subsidy for the purchase or lease of a used BEV passenger car remains stable at € 2,000. In addition, the subsidy ceiling has been increased in recent years because demand exceeded the available budget. For example, in 2022 the subsidy ceiling was reached after just five months.[18]

The supply of electric cars has increased considerably

The Dutch Climate Agreement sets the ambition that all new BEV passenger cars in the Netherlands will be zero emissions by 2030. In June 2022, the European Parliament supported the Commission's proposal according to which only zero-emission cars and vans may be sold in the EU by 2035. Manufacturers are now fully committed to the development of BEV passenger cars.

In the Netherlands, the number of available models has grown from 32 in 2016 to approximately 150 in 2021.[19] This means that in 2021, the Dutch had the most models at their disposal after China, Germany and France.

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[14] Motor vehicle with 4 or more wheels, designed and constructed for the carriage of persons, having a maximum of 9 seats including the driver's seat

[15] https://www.rijksoverheid.nl/onderwerpen/belastingen-op-auto-en-motor/aanschafbelasting

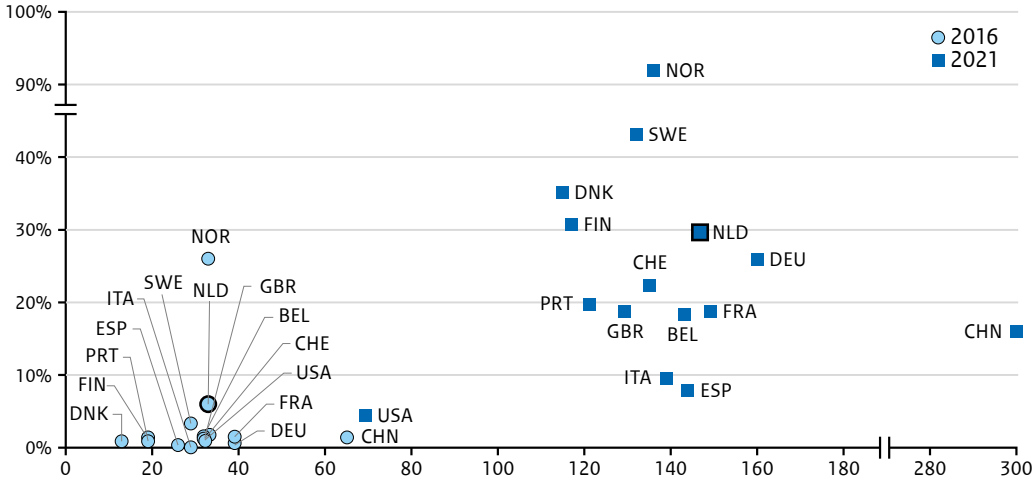
[16] https://www.rijksoverheid.nl/onderwerpen/belastingen-op-auto-en-motor/motorrijtuigenbelasting-auto-mrb

[17] https://wetten.overheid.nl/BWBR0043600/2023-01-01

[18] https://www.rijksoverheid.nl/ministeries/ministerie-van-infrastructuur-en-waterstaat/documenten/kamerstukken/2022/05/31/subsidieplafond-2022-nieuwe-elektrische-personenauto-s-particulieren-bereikt

[19] IEA, Global electric mobility Outlook 2022 Securing supplies for an electric future

Figure 3.1: The number of available electric car models per country in 2016 and 2021



Source: IEA, Global Electric Vehicle Outlook 2022

More models are coming onto the market and the average range of BEV passenger cars is increasing every year. Research by the ANWB shows that the supply of models in the low-cost segment (up to € 35,000) is still limited.[20]

The common BEV car is cheaper than its petrol equivalent

Comparison of the total car costs between an common BEV passenger car and petrol car shows that despite the higher purchase price, a BEV passenger car may costs less monthly than the petrol equivalent (based on 4 years of use and 15,000 km/year).[21] This advantage increases with higher annual mileage.

Shared cars are more often electric than privately owned cars

Shared cars are more often electric than privately owned cars: in 2021, approximately 21% of all shared cars were fully electric. In 2022, the share increased further to 31% to 48% in 2023.[22] All community-based shared cars[23] have been electric since 2020.

Car-sharing providers are accelerating the transition

GreenWheels and MyWheels have the ambitious goal of being completely CO2 neutral by 2025 and are currently taking steps to electrify their offering. Other car-sharing providers, such as We Drive Solar and Sixt Share, already have a fully electric offering. In 2023, We Drive Solar entered into a partnership with MyWheels. They mainly focus on bidirectional charging.

[20] ANWB, Elektrisch Rijden Monitor 2022, Rapportage consumenten perspectief elektrisch rijden.
[21] https://www.anwb.nl/auto/elektrisch-rijden/wat-kost-het
[22] https://www.crow.nl/over-crow/nieuws/2023/oktober/autodelen-2023-aantal-deelauto-s-stijgt-met-23
[23] Offer of shared cars where a fixed group of people use one or more shared cars in a closed pool

3.3 Commercial vehicles

The influx of electric vans and trucks is starting

In the period 2020 to 2022, the number of commercial electric commercial vehicles has more than doubled in the Netherlands. Within this segment, electric vans (<3.5 tonnes) have increased the most (by 230%!) to a total of more than 13,800 vehicles (1.3% of the total number of vans). The number of electric trucks (>3.5 tons) has also grown strongly (210%) in the period 2020 to 2022, to 390 electric trucks, of which 28 are hydrogen-electric trucks.[24]

The supply of heavy electric vehicles is increasing

In Europe, in 2022, 14 OEMs (Original Equipment Manufacturer) offer electric trucks, with 19 different models[25], compared to 4 suppliers with 6 models in 2020.[26] The distance range (in WLTP) of the current range of truck models varies between 150 and 640 kilometres.[27]

More applications of electric trucks

DAF is the undisputed market leader on the Dutch truck market. Roughly one in three trucks registered here is a DAF. The DAF LF Electric - a fully electric 19-ton distribution truck for urban applications with a range of up to 280 kilometres - came onto the market at the beginning of 2021. Two models have now been added. The New Generation XD Electric and XF Electric can be quickly charged with powers of up to 325 kW and offer a range of up to 500 km on a single battery charge. This makes more and more applications of electric trucks possible, including for rural areas.

Zero emission zones for logistics vehicles are underway

The Dutch climate agreement stipulates that 30 to 40 Dutch cities must be supplied emission-free from 2025. 27 municipalities (and the airport Schiphol) have now decided to introduce a Zero Emission zone for logistics vehicles with effect from 2025. From then on all new trucks must be emission-free to be able to enter the ZE zone.[28] To make the switch feasible for entrepreneurs, a transitional arrangement applies in which certain vehicles are exempted (based on age and emission class).[29]

The use of electric trucks is not yet commercially attractive

Representatives of the sector point out that the use of an electric truck is rarely attractive from a commercial perspective. For example, an electric truck with a maximum gross weight (GVW) higher than 40 tons is more than € 266,000 more expensive in the purchase price than a diesel-powered truck.[30] In addition, electric trucks also entail operational risks, because the usage profile differs from a 'traditional' truck.

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[24] Developments are moving quickly: in August 2023, there were 966 electric trucks in the Netherlands (RVO, Statistics electric vehicles in the Netherlands).

[25] https://www.logistiekbereikbaar.nl/nl/slimme-logistiek/duurzamer-rijden-met-vrachtwagens/deze-elektrische-trucks-zijn-er/ and https://globaldrivetozero.org/tools/zeti/

[26] https://rwsduurzamemobiliteit.nl/beleid/routeradar/mmip-duurzaam-toekomstbestendig-mobiliteitssysteem/routeradar-innovatiemonitor-marktontwikkeling/vrachtauto/elektrisch/

[27] https://www.logistiekbereikbaar.nl/nl/slimme-logistiek/duurzamer-rijden-met-vrachtwagens/deze-elektrische-trucks-zijn-er/

[28] https://vng.nl/artikelen/zero-emissiezones

[29] https://www.opwegnaarzes.nl/bedrijven

[30] https://topsectorlogistiek.nl/tco-vracht/ - For a hydrogen-powered truck the difference is even more than € 500,000.

New: AanZET

On May 9, 2022, the purchase subsidy scheme Zero Emission Trucks (AanZET) was opened, which offers subsidies of 12.5% to 37% to entrepreneurs on the purchase price of a new zero emmission truck (depending on the type of vehicle and size of the company). Within one day, the AanZet scheme was four times oversubscribed. The oversubscription of the AanZET scheme shows that there is the will from the market.

Gaining experience with electric trucks

At the moment, it is mainly the larger logistics service providers that are sometimes willing to purchase one or two electric trucks to gain learning experiences. The decision is also made because the customer requests it, especially in supermarket logistics and the catering industry. The experiences are mainly positive with one or two vehicles in a larger vehicle fleet that can be used on suitable routes. For large-scale use of electric trucks, entrepreneurs say it is important that - in addition to a lower purchase price - the battery enables a greater range. In addition, a fully electric truck fleet requires enormous charging capacity. Options for on-the-go charging by trucks are still limited, and grid reinforcement on-site is expensive and not available everywhere in the foreseeable future.[31]

3.4 Mobile tools

Electric mobile equipment is on the rise

The quantity of mobile equipment is currently not systematically monitored. ElaadNL has drawn up a forecast for the electric construction site in the Netherlands[32] up to and including 2035 and estimates the number of mobile equipment in construction at around 55,000 machines, of which approximately 1.4% are currently electrically powered. It is expected that by 2035, 67% (around 15,900 tools) of small construction equipment, 37% (2,800 tools) of medium-sized equipment and 21% (5,900) of large equipment will be fully electrically powered.

Tenders are an important driver

Representatives of this sector confirm that there is strong demand for electric mobile equipment. As part of nature restoration, the Netherlands must ensure that nitrogen emissions are reduced. By using electric mobile equipment, construction projects that normally involve additional nitrogen emissions can still continue. The pressure to continue ensures that contracting parties are also prepared to bear the additional costs of using electric mobile equipment. In the Netherlands, extensive use is made of conversions of existing equipment for the electrification of mobile equipment. There is a lot of activity in the field of zero-emission construction by many (different) companies. It is expected that light construction equipment will soon switch to fully electric. It will take longer for larger equipment, but solutions for this are also coming onto the market.[33] Recent research (TNO; Spike; Connekt, 2020) into electrification of two medium-sized construction machines shows that electrification of construction machines is technically possible and that the payback period can be economically interesting.

In construction logistics, the major construction task offers a long-term perspective with which the step towards serial production can be taken. Electrification of mobile equipment will increasingly become necessary to allow construction projects to continue and contracting parties are therefore prepared to invest in this type of equipment. In addition to the large contractors, the small players are also now busy with the transition to electric by, among other things, writing off fossil tools more quickly and experimenting with electric tools.

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31 https://dutchmobilityinnovations.com/spaces/86/dutch-mobility-innovations/articles/lezen/53723/een-eerste-elektrische-truck-hoe-bevalt-dat-eigenlijk

32 ElaadNL, Outlook Q1 2021, Elektrisch bouwen, De ontwikkeling van de elektrische bouwplaats in Nederland t/m 2035, Februari 2021

33 See among others https://www.bouwmachines.nl/onderwerp/elektrische-graafmachine

New: SSEB
The Clean and Emission-Free Construction Equipment (SSEB) subsidy scheme was opened on May 9, 2022. The SEBB scheme was almost twice oversubscribed within one day. The scheme provides subsidies for the purchase of new emission-free construction equipment, retrofit of existing equipment, innovation around emission-free construction equipment and loading and refuelling infrastructure at the construction site. The scheme expires on January 1, 2027. The subsidy ceiling for 2022 was € 23.5 million for construction equipment and auxiliary functions and € 1.67 million for construction vehicles.

High demand for battery systems for stationary applications

Bredenoord is an international, specialized company that sells and rents temporary and mobile power solutions and is the market leader in the Netherlands. Bredenoord has more than a hundred battery systems with different capacities, which are used in places where limited emissions are allowed, for example near Natura 2000 areas. Four years ago this still involved batteries that could store seventeen kilowatt hours, but in 2023 the company already has batteries of the same size that can supply six hundred kilowatt hours.

Bredenoord has also developed the Battery Box. With connected Battery Boxes, a total capacity of several MWs can be achieved, offering an excellent solution for large festivals or construction sites. The connection of a Battery box with an extender, such as a generator (running on (bio)diesel or hydrogen) or wind or solar energy, makes it possible to work completely autonomously. Conversely, the Battery Box can also be used as a backup for the electricity grid for peak shaving if a mains connection is used.

The Battery Box is also used for the temporary storage of solar energy, to absorb fluctuations in power generation by the sun. Companies and private individuals with solar panels increasingly see the temporary storage of their own generated energy as an opportunity to become energy neutral (and save energy costs).

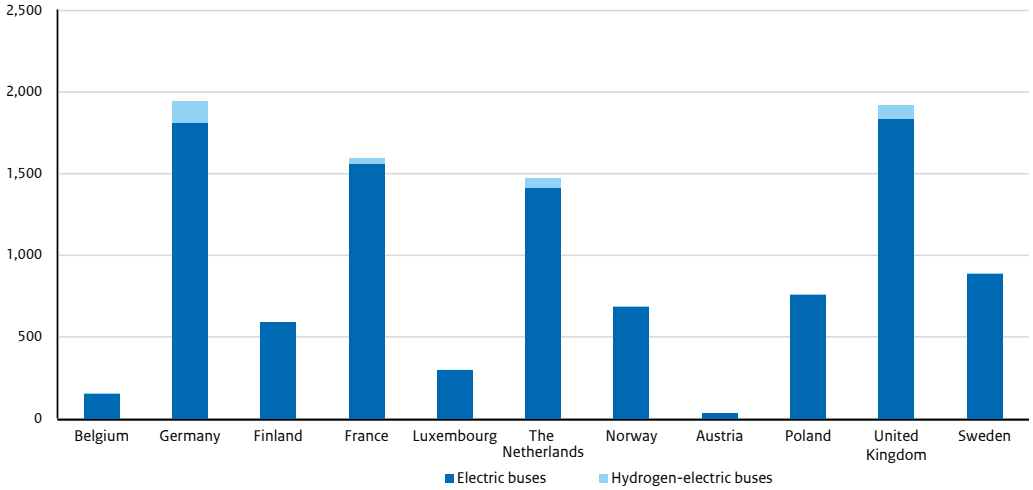
3.5 Buses

The Netherlands is a leader in Europe with zero-emission public transport bus transport
At the end of 2022, the Netherlands had 1,472 electric public transport buses out of a total of 5,248 (26%).[34] There are now five concessions where ZE buses form the majority of the fleet. The Groningen-Drenthe and Amstelland-Meerlanden concessions joined Noord-Holland Noord, Haarlem-IJmond and IJssel-Vecht where this had already happened.[35]

34 https://www.crow.nl/over-crow/nieuws/2022/juni/milieuprestatie-2022-26-procent-emissieloos#:~:text=Het%20totaal%20aantal%20ov%2Dbussen,2021%20naar%205.248%20in%202022
35 https://www.crow.nl/downloads/pdf/collectief-vervoer/millieuprestatie-ov-bussen-2022.aspx?ext=.pdf

The Netherlands is a leader in Europe with regard to zero-emission bus transport, partly thanks to the aforementioned Zero Emission Bus (BAZEB) administrative agreement in which the parties involved jointly strive for completely emission-free regional bus transport by 2030. From 2025, all new public transport buses must be zero-emission. The figure below shows the Netherlands' progress towards this objective. The Netherlands ranks fourth when it comes to the number of electric public transport buses in Europe. The Netherlands is also doing well in the share of zero-emission public transport buses in the new registration of public transport buses. More than 80 percent of new buses in 2020 were zero-emission, putting the Netherlands far above other EU countries.[36]

Figure 3.2: The number of registered zero-emission public transport buses per European country in 2022



Source Monitor zero-emission buses in the Netherlands, version April 1, 2023[37]

VDL is the market leader in electric buses in Europe

A total of 1,767 electric buses were registered in Europe in the first half of 2022. VDL Bus & Coach is the European market leader with 242 VDL registered electric buses. This is evident from figures from Chatrou CME Solutions. VDL Bus & Coach is the undisputed market leader: the 1,300 electric VDL Citeas cover more than 240,000 kilometres every day in 11 European countries and 77 cities and regions. These 200 million electric kilometres result in almost 0.028Mton CO2 reduction. The Netherlands has the most electric VDL buses: approximately 650 electric buses are operational in 35 cities. But Germany also has 270 electric VDL buses in operation, followed by Scandinavia with 250 electric VDL buses. In addition to the buses from VDL, the electric buses from the also Dutch Ebusco are also sold worldwide.

36 https://think.ing.com/articles/all-aboard-europes-electric-bus-revolution-290921/
37 https://zeroemissiebus.nl/wp-content/uploads/2023/04/Monitor-ZE-bussen-1e-kwartaal-2023.pdf

3.6 Light electric vehicles

Light electric vehicles continue to grow unabated

In this report the focus is on light electric vehicles with license plates. Electric bicycles fall outside the scope of this monitor.

The number of light electric vehicles (LEVs[38]) has grown by approximately 56,800 vehicles in the period from 2020 to 2022, to a total of 135,300. The electric fleet in 2022 will mainly consist of mopeds with a maximum speed of less than 25 km/h (51%), followed by mopeds with a maximum speed of less than 45 km/h (24%) and speed pedelecs (23%). Within the fleet of electric four-wheelers (L6 – L7), the electrically powered microcars have almost doubled to a total of almost 3,000 vehicles. Only electric trikes and motorcycles are left behind.

Municipal support to accelerate the electrification of the scooter industry

In addition to the national business subsidies for electric scooters (part of the mopeds), various municipalities support the transition to electric driving for LEVs through subsidies. For example, the municipalities of Amersfoort, The Hague and Nijmegen have a scrapping scheme for mopeds or scooters with a petrol engine if the user switches to an electric bicycle or moped.[39]

3.7 Aviation

Pioneering with electric aviation

The Netherlands has formulated clear ambitions for sustainable aviation in the Aviation Memorandum. The first nine-passenger commercial electric aircraft is expected to be available on the market for short-haul flights in 2026.[40]
There are currently several pilots with electric flying and numerous (market) initiatives are in development, for example:

- The development of a hydrogen system (HAPPS: Hydrogen Aircraft Powertrain and Storage System) for aircraft by a Dutch public-private partnership consisting of seventeen organizations, including Unified International and InnovationQuarter, Fokker, TU Delft, the National Government and the Royal Dutch Air and Space Center.[41]
- In the joint learning environment Power Up, airports will gain knowledge about the feasibility, potential and handling of electric flights. The first electric passenger flights between airports in the Netherlands are expected to take place within five years.[42]
- On April 11, 2022, a cooperation agreement was signed between KLM Royal Dutch Airlines, Royal Schiphol Group, Airbus, Royal NLR and TU Delft for setting up an innovation infrastructure (think tank Flying Vision) with the aim of advancing technological development towards climate-neutral flying by 2050. to realise.[43]

[38] Motor vehicles with two, three or four wheels, such as quadricycles, motorcycles, mopeds, speed pedelecs and microcars. Vehicles without license plates such as Ebikes and electric scooters are not included.
[39] https://agm-goccia.nl/subsidie/
[40] NACO en NLR, Roadmap – Electric flight in the Kingdom of the Netherlands, 2021. https://reports.nlr.nl/bitstreams/e626e923-a0bc-470c-bee3-d180cdd395d9/download https://www.royalhaskoningdhv.nl/nl-nl/nieuws/nieuwsberichten/2022/elektrisch-vliegen-in-nederland-in-2026-haalbaar
[41] https://www.innovationquarter.nl/primeur-s-werelds-eerste-commerciele-waterstofvliegtuig-is-made-in-holland-en-zero-emission/
[42] https://www.powerup.aero/nl/
[43] https://www.tudelft.nl/2022/tu-delft/topspelers-luchtvaartsector-en-tu-delft-gaan-snellere-transitie-naar-duurzame-luchtvaart-realiseren

Aviation in transition

In the National Growth Fund round 2, € 264 million has been allocated for the one-off and multi-year Aviation in Transition programme. Aviation in Transition aims to make Dutch aviation more sustainable and thereby create economic opportunities for companies in related sectors. The following concrete action plans are being drawn up within the program: A think tank ('Flying Vision'), pilots in which synthetic aviation fuels are produced on a small scale from green hydrogen, the building of three hydrogen aircraft and testing grounds for innovations at Dutch airports.

New: TSH Aircraft Manufacturing Industry

The Top Sector High Tech Aircraft Manufacturing Industry subsidy scheme was opened in January 2021. The aim of TSH Aircraft Manufacturing Industry is to stimulate research and development projects that contribute to the sustainability of aviation. The TSH subsidy was awarded in 2021 to 6 projects (Dutch Turbulence Task Force, ASSET, CATHINCA, RHIADA, DIRECTION: Radical resistance and weight reduction through morphing and microstructures and Development of manufacturing method for LH2 tank domes.[44]

3.8 Inland shipping

Experimenting with electric inland shipping

In inland shipping, important steps have been taken in the past two years in the development of and transition to zero-emission sailing. In 2021, the company Zero Emission Services (ZES) was founded by ENGIE, ING, Wärtsilä and the Port of Rotterdam Authority with support from IenW. On September 6, 2021, the first Dutch inland vessel with interchangeable energy containers for propulsion was put into use.[45] This is the first commissioning of ZES's innovation energy system. The National Growth Fund has allocated an investment of € 50 million for the ZES concept in 2022 with a view to further scaling up.

The world's first converted zero-emission charter ship

Under the banner of the Green Shipping Waddenzee program, SRF Shipbuilding is currently renovating the charter ship 'the Tjalk' in the port of Harlingen. The diesel generator, used for propulsion and heating of the ship, will be replaced by an electric motor that is charged via shore power.[46]

Fully electric sailing is (currently) especially suitable for ships that travel short distances and sail locally or on fixed routes, such as tour boats, cruise ships or work boats in a port. Inland vessels or container ships that travel longer distances will mainly have a battery system in a hybrid setup. In maritime shipping, electrifying the fleet is complex due to the often long distances. Currently, approximately six hundred seagoing vessels worldwide sail electrically or hybridly, out of a total of approximately 100,000 ships in the world trading fleet.[47] The number of electric ships can grow rapidly in the coming years as battery technology continues to develop.[48]

44 https://www.rvo.nl/subsidies-financiering/tsh-vliegtuigmaakindustrie/geselecteerde-projecten
45 https://zeroemissionservices.nl/eerste-emissievrije-binnenvaartschip-op-energiecontainers-in-de-vaart/
46 https://www.investeringskaderwaddengebied.nl/2022/11/16/het-eerste-omgebouwde-zero-emissie-charterschip-van-nederland-en-de-wereld/
47 https://innovationorigins.com/nl/schip-op-batterijen-is-vooral-geschikt-voor-de-korte-afstand/
48 https://innovationorigins.com/en/laio/electrifying-the-seas-the-soaring-market-of-electric-ships/

Batteries from EST-Floattech for smaller seagoing vessels.

EST-Floattech, based in Badhoevedorp, is involved in the design, assembly and certification of maritime battery systems and employs approximately 40 people. The company mainly supplies small and medium-sized commercial vessels. For example, the daily IJveer ferries in Amsterdam are powered by EST-Floattech batteries (273kWh). Of the approximately six hundred electric or hybrid seagoing vessels in service, a number of those ships are equipped with batteries from EST-Floattec.

In pleasure boating, electrically powered boats are becoming increasingly common. Of the total number of vessels in Amsterdam, approximately one third (33%) are hybrid or electrically powered.[49]

New: Temporary Subsidy Scheme for Making Inland Shipping Vessels Sustainable

On January 30, 2021, the Temporary subsidy scheme for sustainable inland shipping 2021-2025 (SRVB) was opened. This subsidy can be used to install an electric drivetrain or the purchase and installation of a catalytic converter.

On behalf of the IenW, RVO, in collaboration with TNO, had an interim evaluation of this subsidy scheme carried out.[50] This research showed that in 2021 there was very limited interest from the sector in the purchase and installation of SCR catalysts, while the request for engine replacement was much larger than the available budget.

3.9 Batteries

Developments in battery technology are crucial for the electric mobility sector, both on the cost side and in use. A large part of the purchase costs of electric mobility modalities is determined by the battery. The technology also has a major impact on the functionality of the vehicle in the form of power and range.

The Battery Systems Action Agenda[51] was published in September 2022, as part of the Dutch battery strategy that was launched in 2020.[52] With this action agenda, the central government takes on a coordinating role in bringing parties together to develop a concrete plan for the battery ecosystem in the Netherlands.

To create the Action Agenda, sub-areas of the battery value chain in which the Netherlands can distinguish itself in the European and global playing field were examined.[53] These are in particular:

- Specific applications in heavy transport;
- Batteries for lighting the grid;
- New battery concepts;
- Battery recycling.

49 https://openresearch.amsterdam/image/2023/6/28/evaluatie_elektrisch_varen.pdf

50 RVO, Tussentijdse evaluatie Tijdelijke subsidieregeling verduurzaming binnenvaartschepen 2021-2025, September 2022. https://open.overheid.nl/documenten/ronl-2c53284607e55a465296d19d4bc2f8a0b02d2831/pdf

51 https://www.rijksoverheid.nl/documenten/kamerstukken/2022/09/23/actieagenda-batterijsystemen

52 https://zoek.officielebekendmakingen.nl/kst-31209-236.html

53 PwC Strategy& (2022), The business position and opportunities in the battery value chain for the Netherlands | Parliamentary piece | Rijksoverheid.nl. PWC estimates the total production value of batteries for (heavy) e-mobility at $2,950 million in 2030, more than 80% of the total production value of the battery sector in the Netherlands.

When setting up the Action Agenda, the Battery Competence Cluster Netherlands (BCC-NL) platform was also launched, in which leading companies, knowledge institutions, national industry associations and the government join forces to build knowledge and competencies in the field of battery technology.

EcarBattery

EcarAccu is one of the parties active in the young cluster surrounding drive batteries for electric cars. EcarAccu was founded in 2015 and has specialized from the start in the reuse of hybrid and electric mobility batteries for stationary applications. In collaboration with ARN Netherlands, the company sources used car batteries, but the batteries also come from abroad. This concerns damaged batteries that, after repair, can be used as a battery for the storage of sustainable energy or flexibility services in the electricity grid. EcarACCU disassembles and overhauls battery packs from electric cars and achieves a recycling rate of 98 percent. The monthly capacity of the available batteries has grown over the past 5 years from about 10 kilowatt hours to 1,500 kilowatt hours, and the turnover from 4,000 to approximately 1 million euros.

4 Developments in the economic significance of electric mobility

4.1 The economic significance of the electric mobility sector

This chapter outlines developments in the economic significance of the electric mobility sector for the period 2015-2022. We distinguish between two types of company populations:

1. Fully electric mobility companies, these are companies that are exclusively focused on electric mobility. Typical examples are: CPOs (Charge Point Operator, a company that installs and operates charging points), charging point manufacturers, and new builders and convertors of electric vehicles/equipment.
2. Companies that are partly engaged in electric mobility activities, but also develop other activities. This group is much larger. We focus on a number of major industries where electric mobility activities are undeniably on the rise, such as the automotive sector and the installation sector.

The economic significance is expressed in two economic indicators:

- Employment (in full-time equivalents or FTEs)[54];
- Added value, or the difference between the production value and the value of the goods and services consumed in the production process (in euros)[55].

In section 4.2 we first describe the developments at the fully electric mobility companies. Section 4.3 follows the developments in a number of specific industries (partly electric mobility companies). Section 4.4 contains an estimate of the total economic significance of the electric mobility sector.

4.2 Developments in the economic significance of fully electric mobility companies

Approach for identifying fully electric mobility companies

A web crawl[56] was used to systematically and automatically search the websites of all companies registered in the Netherlands and analyse whether and to what extent they develop electric mobility activities. Search terms were used that relate to the various aspects of electric mobility. Only companies whose activities can be fully attributed to the electric mobility sector - i.e. which are solely involved in the manufacture of products and/or services related to electric vehicles and/or charging infrastructure - have been selected. Leasing companies, car rental companies, dealers and garage companies are excluded. These companies are part of the analysis of specific industries in section 4.3.

The web crawl was also used to arrive at a data-driven cluster layout. Companies with a similar profile are automatically placed in the same cluster. These clusters were then further described based on an analysis of the type of companies in the cluster. This approach has led to the cluster classification below.[57]

[54] The estimate of employment in 2022 still has many uncertainties. For this reason, the value for 2022 is not shown in the following graphs.

[55] Sales minus purchases, this does not equal profit (sales minus costs)

[56] A methodical and automated browsing of URLs (address of a website) on the World Wide Web.

[57] This cluster classification differs from the classification applied in previous versions of this monitor based on a manual allocation of companies: 1) New construction and conversion of vehicles, 2) Charging infrastructure and smart grids, 3) electric mobility services, 4) Drive technologies and components , 5) Batteries and second use.

Table 4.1: Cluster classification of fully electric mobility companies

Cluster name fully electric mobility	Description
Charging infrastructure and services	The charging infrastructure and services cluster mainly consists of charging operators and companies that offer electric mobility (payment) services.
Electric sailing	The electric sailing cluster mainly consists of companies that focus on the new and conversion of engines for vessels.
Electric commercial vehicles and trucks	The cluster of electric commercial vehicles and trucks mainly includes companies that focus on the new construction of electrically powered vehicles and the repair and maintenance of engines.
Electric mobility mixed	Finally, a residual cluster has emerged, consisting of companies that are not linked to the above clusters and/or combine electric vehicles and charging infrastructure in their activities. For example, new construction and conversion of buses belongs to this cluster.
Electrical tools	The electrical tools cluster mainly consists of companies that focus on converting fossil-powered tools.

Appendix 1 describes in detail the approach taken to identify the fully electric mobility companies.

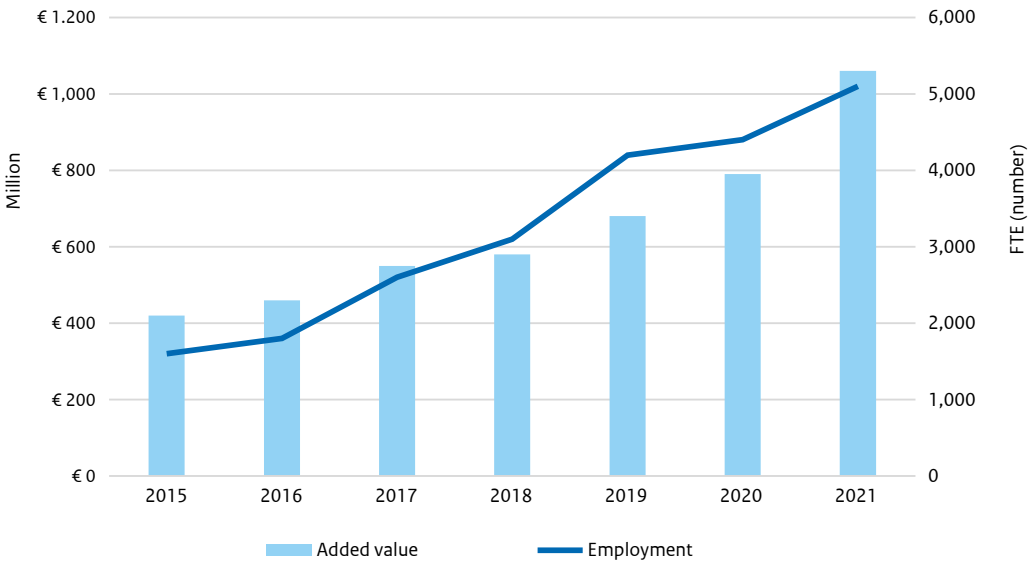
For many companies, only part of their activities relates to electric mobility. This analysis therefore used a limited population with only fully electric mobility companies. This can cause fluctuations in the aggregated data due to developments at individual companies that deviate from the general trend. As the electric mobility sector grows, an increasingly robust picture will emerge in the coming years.

Total developments in the economic significance of fully electric mobility companies 2015-2022

In 2022, the total employment of the fully electric mobility companies found was 5,900 FTE. The total added value amounted to € 1,060 million in 2021.[58]

The figure below shows the developments in the economic indicators over the period 2015-2022.

Figure 4.1: Development of economic significance of fully electric mobility companies



Source: Statistics Netherlands based on company list

[58] Data on added value in 2022 is not yet available at the time of publication of this report. At the time of publication, employment for 2022 is a provisional estimate for this year, which may be adjusted later by Statistics Netherlands.

We see an upward trend for all indicators in line with the increase in electric mobility adoption, with an acceleration from 2020. The economic size in terms of employment and added value has roughly quadrupled in 6 to 7 years.

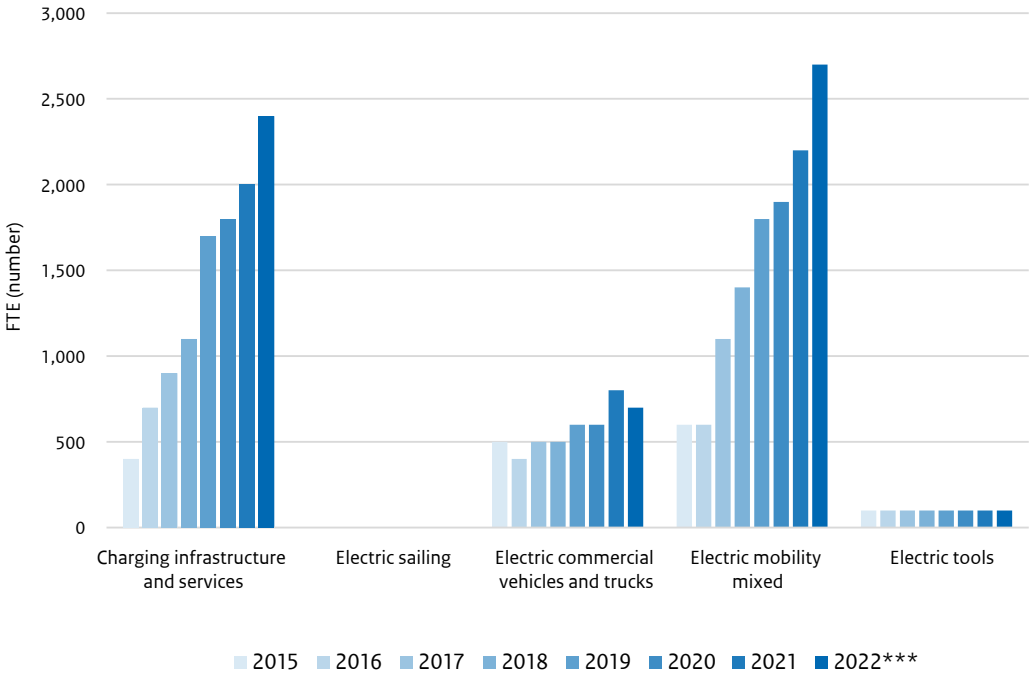
In general, a stronger increase in added value compared to employment indicates growth in labor productivity. This seems to indicate that several electric mobility companies will now reap the benefits of previous investments in manpower.

Developments per cluster 2015-2022

The figures below distinguish between the different clusters in the entire electric mobility companies over the period 2015-2022.

Figures 4.2 and 4.3 show that the size of the electrical indicators in electric sailing and mobile equipment is relatively very small compared to the other clusters. No growth is visible yet. Because this concerns a small number of companies, these figures are difficult to interpret. A possible explanation may be that the growth in employment in these clusters mainly takes place in non-complete electric mobility companies, for example 'traditional' companies that offer electric mobility in addition to fossil mobility.

Figure 4.2 Employment development of fully electric mobility companies per cluster[59]



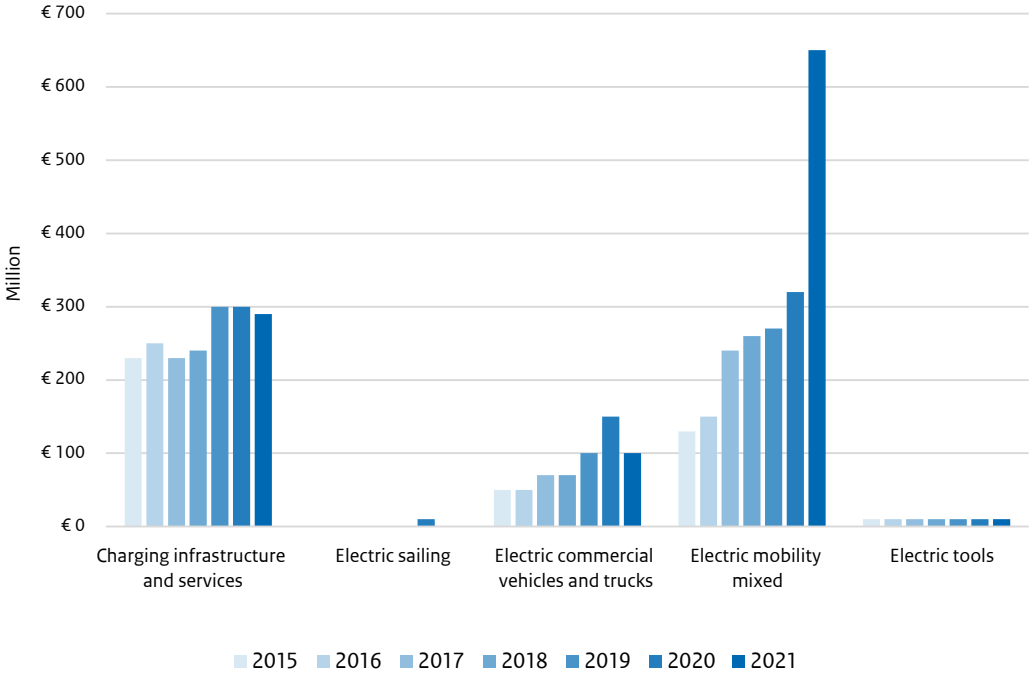
**** Preliminary estimate with great uncertainty Source: Statistics Netherlands based on company list*

Employment and added value in the electric commercial vehicle and truck cluster have grown overall between 2015 and 2022. In 2021 we will see a strong increase in employment, which will be accompanied by a decrease in added value. This seems to be in line with the recent rise of electric trucks, in which companies are now investing heavily.

[59] The number of companies in electric boating is so small that Statistics Netherlands has suppressed the data about these companies to prevent disclosure of information about individual companies.

Employment in the electric mobility mixed and charging infrastructure and services clusters (together accounting for almost 80% of employment at all-EV companies in 2022) has grown by a factor of 5 in both clusters since 2015.

Figure 4.3: Development of added value of fully electric mobility companies per cluster



Source: Statistics Netherlands based on company list

In the electric mobility cluster, the added value doubled between 2020 and 2021, a significantly greater increase than in employment. In short, labour productivity has risen sharply.

In the charging infrastructure and services cluster, there has been a decline in labour productivity (added value lags behind employment). It seems unlikely that labour productivity in this cluster has decreased, as knowledge and experience with charging has only increased. It is possible that the COVID-19 period has resulted in a somewhat atypical development of added value, something that will become clear in the coming years.

4.3 Developments in the economic significance of electric mobility activities in specific industries

For a number of specific and large industries it is evident that at least some of the activities relate to electric mobility, for example the automotive industry and installation industry. The findings from section 4.2 would therefore give a too narrow picture of the economic significance of the electric mobility sector.

A top-down approach was used to determine the incomplete electric mobility activity (instead of a bottom-up approach as in the previous section). For each industry, an estimate has been made as to what share of the activities within that industry can be allocated to the electric mobility sector. Appendix 2 describes which distribution key has been applied per industry.

In this report we focus on the following economic activities:

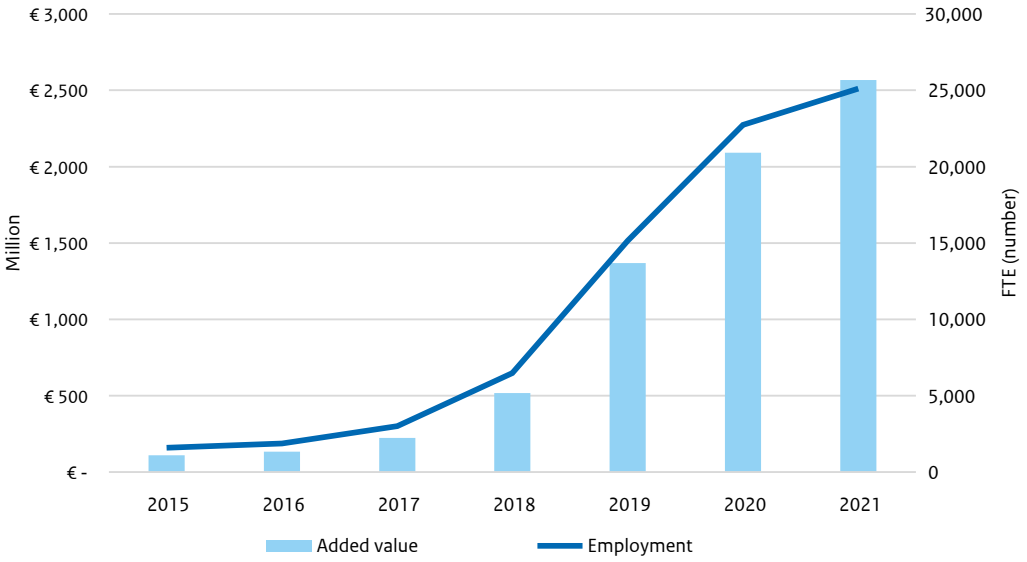
- The import of new BEV passenger cars and electric light commercial vehicles;
- The trade, maintenance and repair of BEV passenger cars and electric light commercial vehicles;
- The operational and private lease of BEV passenger cars and electric light commercial vehicles;
- The rental of BEV passenger cars and electric light commercial vehicles;
- The installation of charging points;
- Manufacture of batteries and other energy storage systems for electric mobility

Overall developments in the economic significance of electric mobility in specific industries 2015-2022

In 2021, total employment for electric mobility activities in the surveyed industries amounted to 25,110 FTE. The added value amounted to € 2.09 billion in 2021.[60]

The figure below shows the developments in the economic indicators over the period 2015-2022. The added value will increase sharply from 2018. Employment will increase even more, but growth will weaken again between 2020 and 2021. Labor productivity will increase.

Figure 4.4 Development of economic significance of electric mobility in specific industries



Source: Ecorys based on Statistics Netherlands data for SBI[61] code

[60] No data for 2022 are yet available for added value and employment.

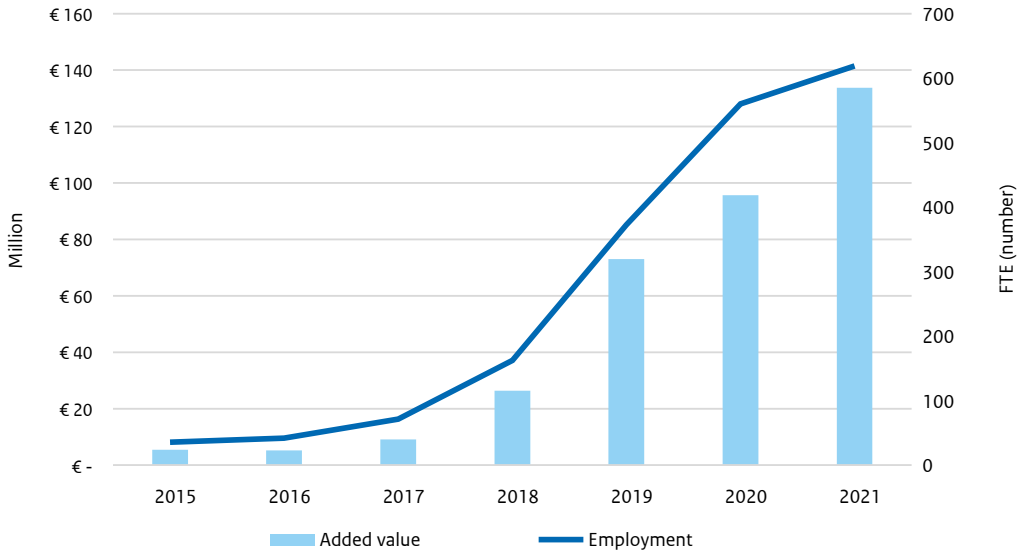
[61] An SBI code is a 4 or 5-part series of numbers that indicates the activity of a company. The code is issued by the Chamber of Commerce upon registration.

Below we describe the developments in electric mobility activities per industry.

Import of new BEV passenger cars and electric light commercial vehicles

The sector has shown very impressive growth figures since 2015, by a factor of 15 to 20 in terms of both employment and added value in line with the influx of new BEV passenger cars. The figure below shows that there has been an acceleration since 2017. Employment growth will decline slightly between 2020 and 2021.

Figure 4.5: Development of economic significance of the import of new BEV passenger cars and electric light commercial vehicles

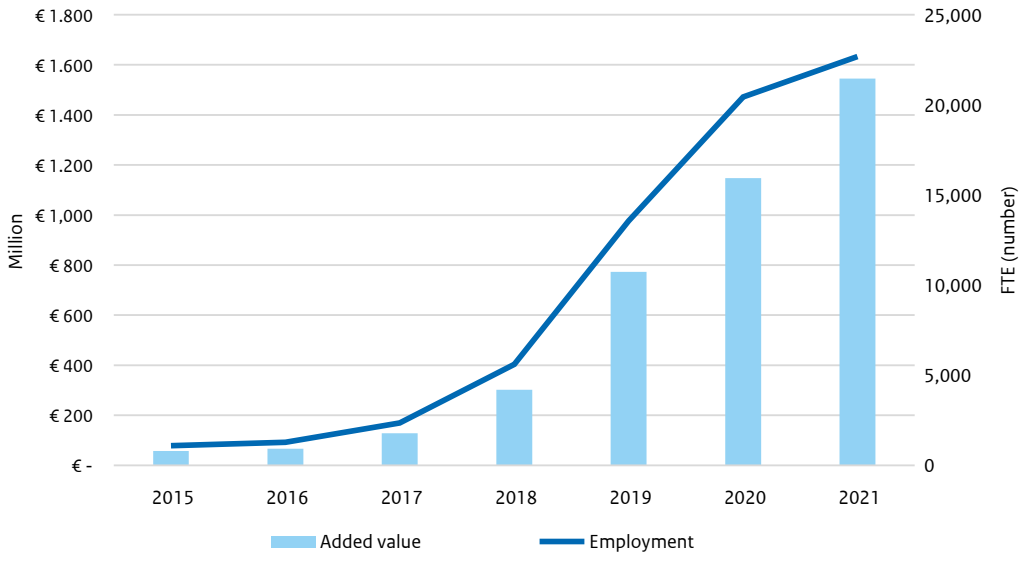


Source: Ecorys based on Statistics Netherlands data for SBI code

The trade, maintenance and repair of BEV passenger cars and electric light commercial vehicles

Here too we see strong growth (factor 10 to 15) in added value and employment, with growth in employment decreasing slightly in the period 2020-2021.

Figure 4.6: Development of the economic significance of the trade, maintenance and repair of BEV passenger cars and electric light commercial vehicles

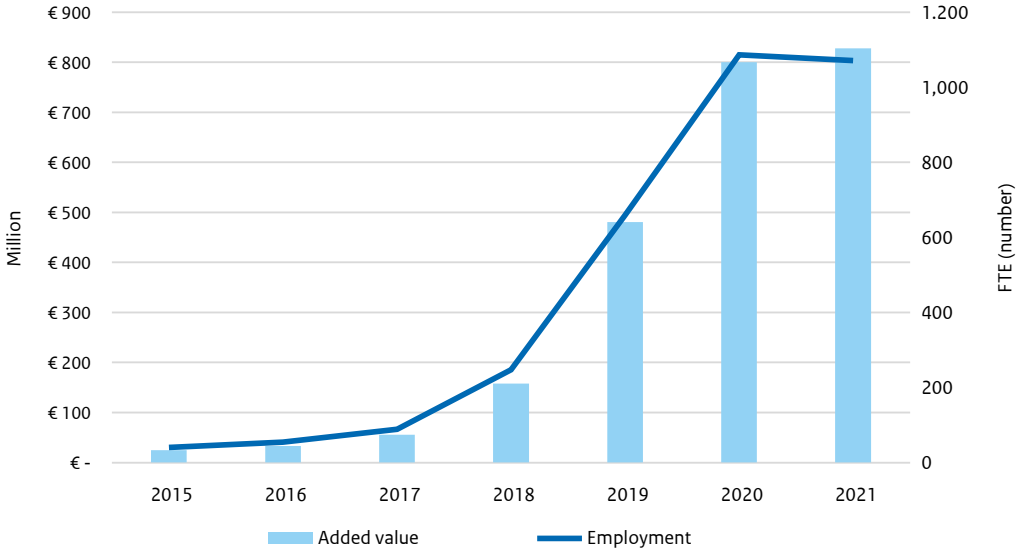


Source: Ecorys based on Statistics Netherlands data for SBI code

The operational and private lease of BEV passenger cars and electric light commercial vehicles

We see stagnation here between 2020 and 2021, with employment even declining. COVID-19 could be a cause for this. Between 2018 and 2020, added value and employment increased by a factor of 3.8.

Figure 4.7: Development of the economic significance of the operational and private lease of BEV passenger cars and electric light commercial vehicles

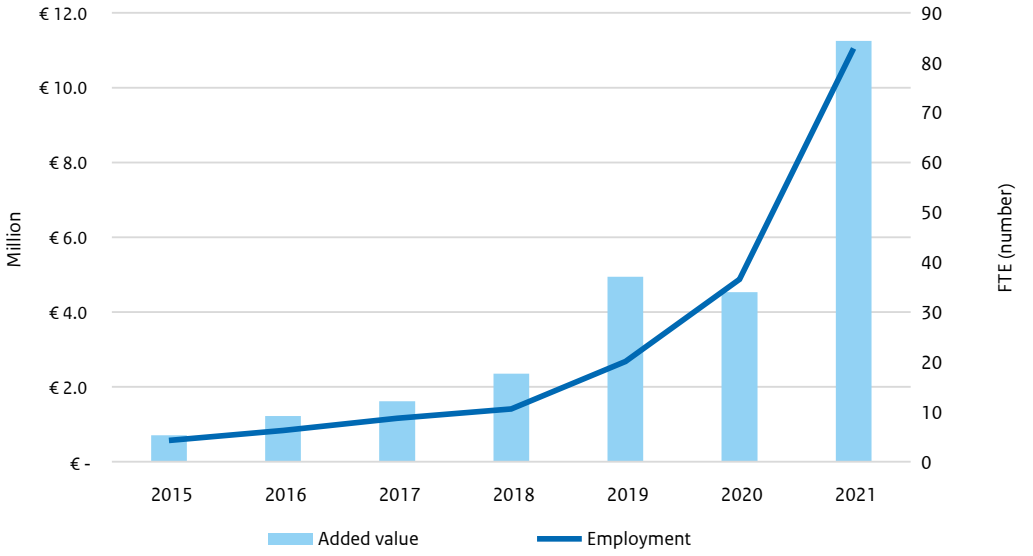


Source: Ecorys based on Statistics Netherlands data for SBI code

The rental of BEV passenger cars and electric light commercial vehicles

We see strong growth in rental, especially between 2020 and 2021, more than doubling for the indicators. However, the added value lagged somewhat between 2019 and 2020.

Figure 4.8: Development of the economic significance of the rental of BEV passenger cars and electric light commercial vehicles

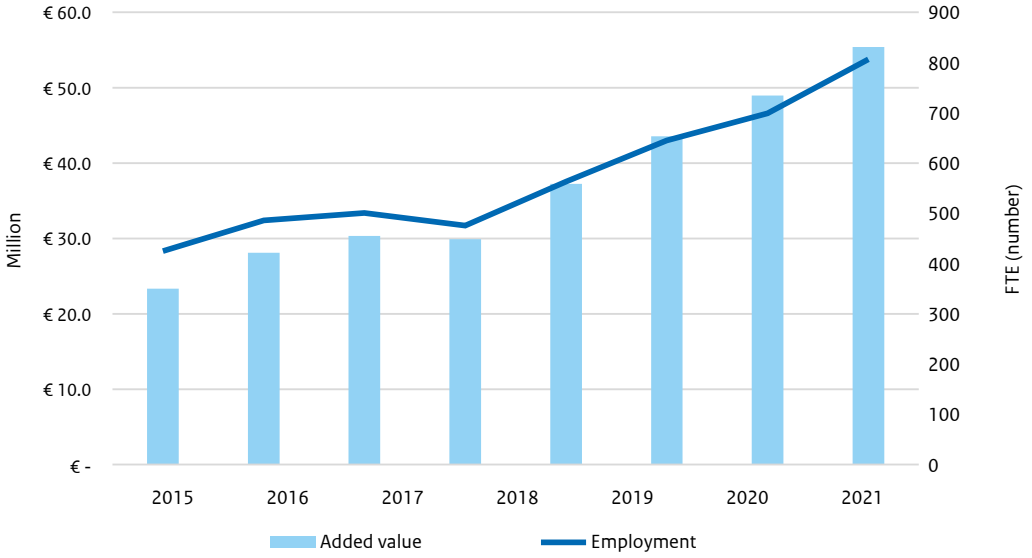


Source: Ecorys based on Statistics Netherlands data for SBI code

Installation of charging points

Growth is still limited in the period 2015-2018. Since 2018, there has been a steady growth curve, with both indicators moving at approximately the same rate.

Figure 4.9: Development of the economic significance of the installation of charging points



Source: Ecorys based on Statistics Netherlands data for SBI code

Manufacture of batteries and other energy storage systems for electric mobility

The number of companies involved in the manufacture of batteries is too small to obtain from the Statistics Netherlands data (SBI codes). Statistics Netherlands estimates that this currently concerns several hundred jobs, but more precise indications are lacking.

What is clear is that it is an industry that is growing rapidly worldwide. Between 2016-2022, the supply of batteries for the electric mobility sector worldwide has grown almost 10-fold, reaching 61% of all battery capacity in 2022.

Table 4.1: Development of the supply of lithium batteries (in kt) per sector, worldwide

Overall supply and demand of lithium for batteries by sector, 2016-2022 (in kt)	2016	2017	2018	2019	2020	2021	2022
EV demand	8	7	12	16	25	51	77
Other batteries	11	14	15	15	15	23	27
Ceramics and glass	12	9	9	9	9	9	9
Other	8	15	15	15	14	14	15
Supply/total	38	44	52	71	77	95	126
EV demand in %	21%	16%	23%	23%	32%	54%	61%

Source: https://www.iea.org/reports/global-ev-outlook-2023/trends-in-batteries

The demand for batteries for electric construction machines and tractors shows explosive growth

The Oleo battery factory, founded in 2017 by former students of Eindhoven University of Technology, wants to make a difference in the international market for battery pack manufacturers with a wide range of varieties and types. It already supplied battery packs for construction and excavators, tractors, sweepers, forestry machines, energy storage systems and delivery vehicles. What started as a student project at TU Eindhoven has grown seven years later into a company with seventy employees. Oleo expects to double in size this year from 60 to 120 employees. Further growth to 200 people is expected in 2024. In the long term, the company also expects to open international production facilities. Presumably starting in the United States, where a first step is planned from 2025 with a sales office.

The company expects a global market to open up for batteries for machines for construction, building roads, cultivating the land, harvesting and so on. Given the growth of the world population, it is expected that the number of work machines will double by 2050. Demand will increase enormously."

4.4 Scope of the economic significance of the entire electric mobility sector

The findings from 4.2 and 4.3 can be added together to arrive at an overall picture of the economic significance of electric mobility, there is no overlap between the two company populations.

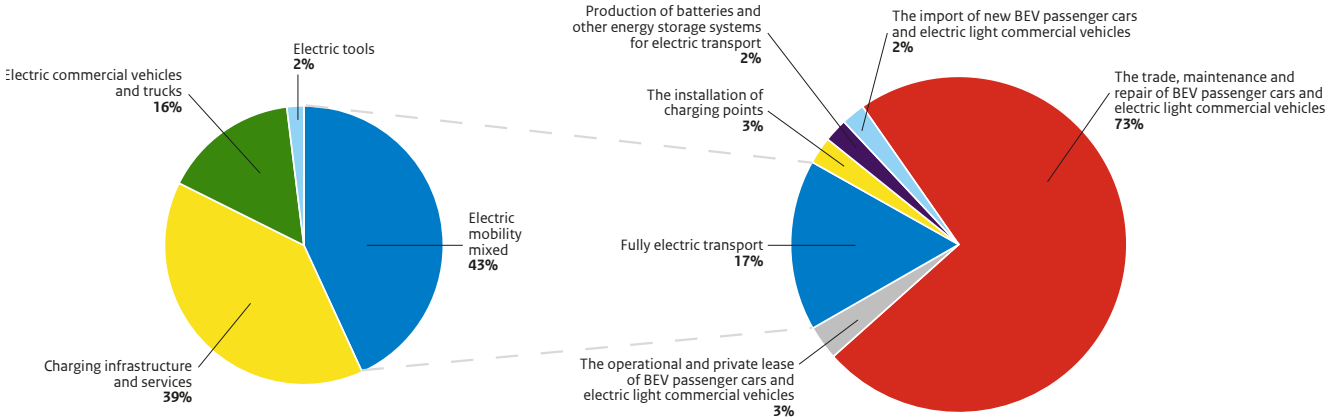
Please note that both approaches involve a certain underestimation:

- The fully electric mobility companies that have been identified have been carefully screened to determine whether they are indeed fully electric mobility companies. However, it seems likely that there are actually more fully electric mobility companies than have now been found with the web crawl. For example, companies that do not have a website or other companies that are not included in the search process;
- The approach for the specific industries is limited to those industries where the largest electric mobility share is expected. It is likely that there will also be a (small) electric mobility share in other industries. Quantitative data are lacking for the batteries industry.

Size and distribution of employment in the electric mobility sector in 2021

Total employment in the electric mobility sector in 2021 is estimated in this report at 30,210 FTE. This is a growth of 56.1% compared to 2019. In 2021, employment was distributed as follows across the various clusters of electric mobility companies.

Figure 4.10: Employment in the electric mobility sector in 2021

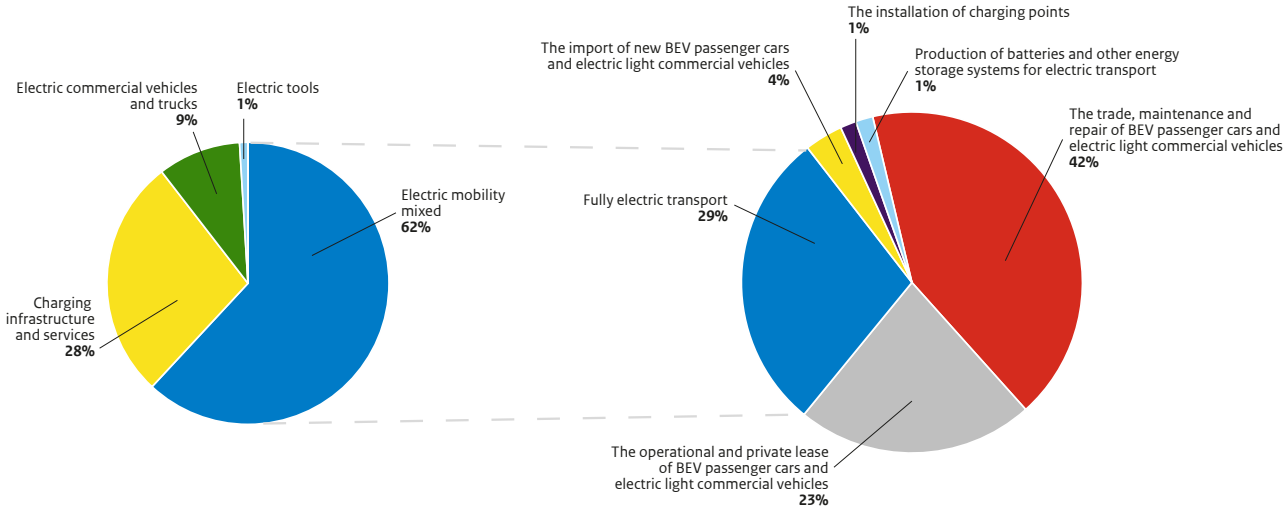


This shows that by far the largest share of electric mobility employment (>73%) is in companies that are active in the trade and repair of passenger cars, such as dealers and garages. The companies that we classify as full electric mobility together account for 17% of employment in the electric mobility sector, with most employment in the charging infrastructure and services cluster (specialized companies, no installation sector in general) and the mixed mobility cluster.

Size and distribution of added value in the electric mobility sector in 2021

The total added value in the electric mobility sector in 2021 is estimated in this report at € 3.6 billion. This is a growth of 76.9% compared to 2019. In 2021, the added value was distributed as follows among the different types of electric mobility companies.

Figure 4.11: Added value of the electric mobility sector in 2021



29% of the added value of the electric mobility sector is realized by fully electric mobility companies; on average, the added value per FTE at specialized electric mobility companies is significantly higher than at companies that partly carry out electric mobility activities. Within the group of specialized/fully electric mobility companies, the most added value is achieved in the Mixed Mobility cluster, both in absolute terms and per FTE.

5 Current status of electric mobility earning potential at the end of 2022

5.1 Introduction

Previous chapters show that the electric mobility sector is growing steadily to strongly, depending on the industry or market cluster. A number of electric modalities are becoming increasingly common (BEV passenger cars, light electric commercial vehicles and LEVs), led by the electric bus. New electric modalities are emerging: electric sailing is often still experimental, but the electric truck is taking off seriously and is expected to grow strongly in the coming years, as are electric mobile equipment. This means that the electric mobility sector also touches more and more sectors: think of techniques for improving and recycling batteries, the construction sector, but also the service sector. There is increasing competition with other (major) users of electricity and technical personnel.

Despite the positive growth figures, it is still a sector in which much further growth can be expected. There are now approximately 330,000 electric cars on the road in the Netherlands, out of a total of 9 million. This will (and should) increase considerably as we move towards zero-emission.

5.2 Promising and new developments

The Netherlands leads the way in charging infrastructure and smart charging solutions. Smart charging solutions such as Vehicle-to-Grid (V2G), bidirectional charging, but also the combination with sustainable generation and energy storage are developments that many companies in the Netherlands are working on. Smart charging makes it possible to charge at the cheapest price and make optimal use of renewable energy, while simultaneously relieving the energy grid. The limited grid capacity in the Netherlands is an urgent problem that hinders the rollout of electric mobility in some areas, but it does mean that Dutch companies are now investing heavily in and gaining experience with smart charging. Other countries are also expected to experience this more often. This offers an opportunity for the Netherlands to capitalize on its lead.

Electric mobility is a major driver for the battery sector. Various studies show that there are major opportunities for the Netherlands in the production, maintenance and recycling of batteries. There are also opportunities in the field of research, battery management systems (BMS) and innovations. This industry is still relatively young and the right investments at this time can provide high earning potential.

Rapid developments in battery storage capacity

LeydenJar has developed a new technology that allows the battery to be charged with a 70% higher energy density than the traditional lithium battery. The company recently received an investment of 30 million euros from the European Investment Bank (EIB) to further develop this technology. The Eindhoven company SALD is developing a battery that should enable a range of more than a thousand kilometres in the future with a charging time that is five times faster.

Other promising developments that emerged from this research are mobile equipment and the inland shipping sector. The Netherlands is a leader in the use and conversion of mobile equipment in Europe. With strict nitrogen standards, sustainable mobile equipment is necessary to realize the ambitious construction task for the coming years.

The inland shipping sector consists of many independent entrepreneurs, for which investments in electrification are often too cost-intensive, but this sector nevertheless offers great potential for sustainability and there is a lot of effort in R&D. The sector is also characterized by investments or research into new revenue models.

The National Growth Fund

From 2021 to 2025, the government invests € 20 billion in projects that ensure long-term economic growth. The national government sees opportunities for structural and sustainable economic growth mainly in knowledge development and research, development and innovation: pillars that are closely related to the electric mobility sector. The first round of growth fund applications did not yet include any projects related to the electric mobility sector. In the second round, the selection committee recommended allocating or reserving money for making aviation and shipping more sustainable through 'Aviation in Transition' (see box 3.7) and 'Zero Emission Services'. In the third round, a project was approved for battery technology (Material Independence & Circular Batteries) and to accelerate electrification of the logistics sector through collaboration, research and innovation (Charging Energy Hubs).

With the National Growth Fund, the Netherlands is responding to the growth potential in markets such as battery technology or electric inland vessels.

Zero emission inland shipping, battery-electric

A contribution of € 50 million from the National Growth Fund has been allocated for this project, which will be invested in 45 ships, 77 battery containers and 14 charging stations for fully battery-electric inland vessels. The ultimate objective of the project is to allow inland vessels to sail emission-free using modular energy containers.

Material Independence & Circular Batteries

Battery technology plays a crucial role in the energy transition as a storage system for green energy for stabilizing the electricity grid and for the electrification of the mobility sector. The proposal focuses on achieving a strong position for the Dutch manufacturing industry in the global battery chain. Intended results include that Dutch companies are important suppliers of sustainable battery processes and parts, the Dutch industry in the field of mobility (transport and means of transport) being at the forefront with zero-emission end products, such as buses and trucks, and the Netherlands having sufficient talent and personnel for this.
The National Growth Fund guarantees a maximum investment of € 296 million in this project.

Charging Energy Hubs

The Charging Energy Hubs project focuses on efficient use of smart energy systems to maximize grid efficiency using smart energy solutions. By seamlessly integrating charging infrastructure, renewable and other energy sources, energy storage and local consumers, these charging energy hubs provide flexibility during peak demand or grid balancing issues. This solution alleviates grid congestion while providing a solid business case for investments in charging infrastructure. 29 leading organizations have committed to this initiative, which has been allocated € 44 million from the Growth Fund.

International opportunities

The international opportunities lie mainly in utilizing our leading position in the areas of charging infrastructure, smart grid solutions and dynamic electricity contracts. Because the Netherlands is already struggling with a shortage of grid capacity, many (potential) solutions are being developed and tested for issues that will also be relevant to other countries in a number of years. At that time, opportunities may arise for Dutch companies to remove the obstacles to electric mobility adoption in other countries by supplying products and services. However, it is not only about concrete products and services, but also about advice in the field of charging strategies.

Companies such as EVBox and Alfen are already working on this; they are frequently active in supplying and installing hardware and software in surrounding European countries and the United States. Companies such as Fastned, Allego and Last Mile Solutions are also increasingly focusing on offering advice. Dutch companies are responding to international needs and thus strengthening the position a nd earning capacity of the Netherlands.

From start-up to a leading, multinational company

EVBox is a Dutch company, founded in 2010, that offers all-in-one charging solutions to companies and private individuals. Since 2010, EVBox has supplied 500,000 charging points in more than 70 countries.

Another strong position within the Dutch electric mobility sector belongs to VDL with the production, assembly and export of electric buses.[62] Ebusco has also become an important player in this field.

Finally, there are opportunities internationally to strengthen international agreements and collaborations, both public and private. The Netherlands can benefit from its early lead and widely propagate and capitalize on its knowledge and experience.

5.3 Points of attention

The influx of BEV passenger cars is stagnating

In recent years, the electric car has been promoted in many ways. Subsidies and tax benefits are now being scaled back. This makes the electric car less attractive. Rising charging prices, as a result of energy prices, also make electric driving more expensive. The charging price varies greatly between charging stations.[63] Many parties point out that this could cause a (temporary) setback in the growth of the BEV passenger car. Some also point out that the maximum list price of € 45,000 in the SEPP could lead to export flows of used cars from the more expensive segment, because they are not eligible for the subsidy.

Chinese electric cars are conquering the Dutch market

The breakthrough of Chinese OEMs on the Dutch market is a fact. The greater availability and lower cost of electric mobility vehicles from China is driving electric mobility use and electric mobility activities. The EU has started an investigation into whether the pricing of Chinese BEV passenger cars is not too low due to unfair subsidies from the Chinese government.[64]

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[62] https://www.automotive-online.nl/management/overig/2021/01/12/vdl-krijgt-order-voor-102-elektrische-bussen-aan-noorwegen/

[63] https://www.businessinsider.nl/hoge-prijs-elektrische-auto-stuwt-interesse-voor-hybride-maar-aanbod-is-zeer-beperkt/ and https://www.rtlnieuws.nl/economie/life/artikel/5389666/elektrisch-laden-rijden-elektrische-auto-prijs-prijzen

[64] https://www.nu.nl/economie/6280699/eu-onderzoekt-oneerlijke-chinese-subsidies-voor-elektrische-autos.html

Especially when the stricter European environmental standard Euro 7 comes into effect, the production of smaller petrol and diesel cars in particular will become more expensive and it will become attractive to offer affordable small electric cars in Europe[65]. This may be a reason for Chinese manufacturers to open production sites in Europe. This can create new employment in the Netherlands. At the same time, this also poses a threat to our own automotive sector, specifically the production of electric buses and associated employment[66].

Shortage of technical personnel

The shortage of technical personnel in the supply industry and grid operators is a persistent problem and causes delays in the delivery of products and services. Several initiatives have now been launched to resolve this issue. For example, the Human Capital Agenda Charging Infrastructure was launched at the end of 2022. In addition to developing new training courses for charging station technicians and a new Electric Vehicle elective for secondary vocational education students, efforts are also being made to develop new, less labour-intensive connection methods[67].

The availability of technical and IT talent is also a crucial success condition for the ambitions of the battery technology chain in the Netherlands. The Battery Competence Cluster therefore focuses on a progressive Human Capital approach for the battery sector, in collaboration with employers and training institutes.

The coming years will reveal whether this effort will make a successful contribution to the availability of sufficiently qualified technical personnel.

65 https://www.rtlnieuws.nl/economie/artikel/5399773/elektrische-auto-china-merk-nio-aiways-polestar-lynck-co-zeekr
66 https://fd.nl/opinie/1328623/import-elektrische-bussen-uit-china-gaat-ten-koste-van-werkgelegenheid-in-nederland
67 https://elaad.nl/staatssecretaris-geeft-startsein-voor-de-human-capital-agenda-laadinfra/

Appendix 1 – Basis for the creation of a full electric mobility company list

This year, an automated search process - through a web crawl - was chosen to identify companies in the Netherlands that offer electric mobility-related products and services. A number of steps were followed to arrive at a validated list of companies with complete electric mobility companies. These steps are described below.

Step 1 Creating a basic file

1. Collecting URLs of companies from the trade register;
2. Validation and cleaning of URLs;
3. Filtering economically active companies (no general partnership, owners association, etc.);
4. Crawling the resulting URLs based on keywords that indicate a company's electric mobility relevance. The Common Crawl dataset is used (based on the period January 2023 - June 2023).
5. The URL of some companies is not in the trade register. That is why the main page and the pages with contact details of Dutch-language websites in the Common Crawl dataset are also checked to see whether the Chamber of Commerce number is mentioned on this page. These are then added to the basic file with Chamber of Commerce data and URLs, and step 4 is repeated for this supplemented dataset.

This method has a number of limitations:

- Natural legal entities (no sole proprietorships and general partnerships) are excluded in connection with the GDPR. This is a deliberate choice;
- The URL is not known for all companies, and not all companies mention the Chamber of Commerce number on the website, some companies have no website at all and the URL may have been entered incorrectly for one reason or another;
- Some companies do not have information on their website or do not allow it to be indexed.
- An entry in the trade register is not the same as what is normally meant by 'a company'. When you talk about 'a company', this usually means a group of interconnected companies, i.e. a holding company, an operating company, etc. It varies per company whether or not it lists a URL in the trade register. Some companies provide the website of every company within the group, others only of the operating company.
- Defining a search profile can sometimes be challenging, with unwanted extra data from incorrect search results. This can also be seen as an advantage, as it helps you define your target group more clearly.

Step 2 Search for electric mobility companies using search terms

Using search terms that are considered indicative of the electric mobility sector, the basic database was searched for companies involved in electric mobility with a web crawl. Below is the list of keywords that were used.

Label	Search terms
charging infrastructure and services	fast charging of electric vehicles, charging facilities for electric vehicles, charging infrastructure with charging stations or charging plazas with charging points and charging parking spaces, charging point for electrically charging electric cars, charging installation for charging electric cars, charging cards and charging subscriptions for electric drivers, Charge Point Operator (CPO) installs and manages charging stations, business provider of charging solutions and operation of charging station management, nationwide charging infrastructure to power electric vehicles, charging infrastructure for electric cars, charging stations for electric vehicles, charging points for electric vehicles, connecting charging stations for electric cars, vehicle charging systems, public charging stations.
electric commercial vehicles and trucks	electric commercial vehicle, electric van, fully electric truck, fully electric E-Truck, electric truck, electric vehicles, zero-emission transport solutions, zero emission vehicles, electric vehicle, zero-emission cars and zero-emission freight transport.
electric sailing	hybrid or electric propulsion of ships, electrification of shipping, electric propulsion of inland vessels, electric propulsion of tour boats and passenger ferries, electric POD motors for electric sailing, boats with an electric outboard motor, electric powertrains in vessels.
electrical tools	electrically powered construction equipment, electrically powered mini digger, emission-free construction machines.
electric cars	electric car, electric car, conversion of vehicles with a conventional drive to an electric drive.
electric mobility	electric driving, electric mobility, electric mobility, emission-free mobility, e-mobility, emission-free transport, zero emission energy stations.

The companies identified are assumed to be involved with electric mobility.

Step 3 Correction for SBIs that are not included in the scope of this report

Companies that fall under the SBI codes 'Shops in bicycles and mopeds' and 'Wholesale in bicycles and mopeds' have been filtered from the company list. These are not included in this analysis of the economic significance of the electric mobility sector. Insurance intermediaries, accounting firms and accounting/ administration consultants have also been removed; this is seen as an indirect electric mobility activity. Finally, all companies with an SBI code that have a smaller share than 1.5% have also been removed from the company database.

Step 4 Correction for SBIs that are mapped separately

The economic value of companies from some specific SBIs is determined separately (see section 4.3). See above. Companies with this SBI have therefore been filtered out from the company list to prevent double counting.

Step 5 Define the list of companies to complete electric mobility companies

We then zoomed in on the electric mobility share of a company, after all a company does not solely have to be involved in electric mobility to be found in the web crawl. This is often only be a small part of all business activities. Through a number of iterations (based on the number of web pages on a company's website on which an electric mobility keyword is found), an attempt was made to determine the electric mobility share per company. This proved unsuccessful. Manual checks showed that the output was not reliable. For this reason, it has been decided to limit the company base to complete electric mobility companies. These are companies where, according to the web crawl, an electric mobility search term was found on all web pages of their website. In addition, these companies have been manually checked by RVO, Ecorys and Statistics Netherlands.

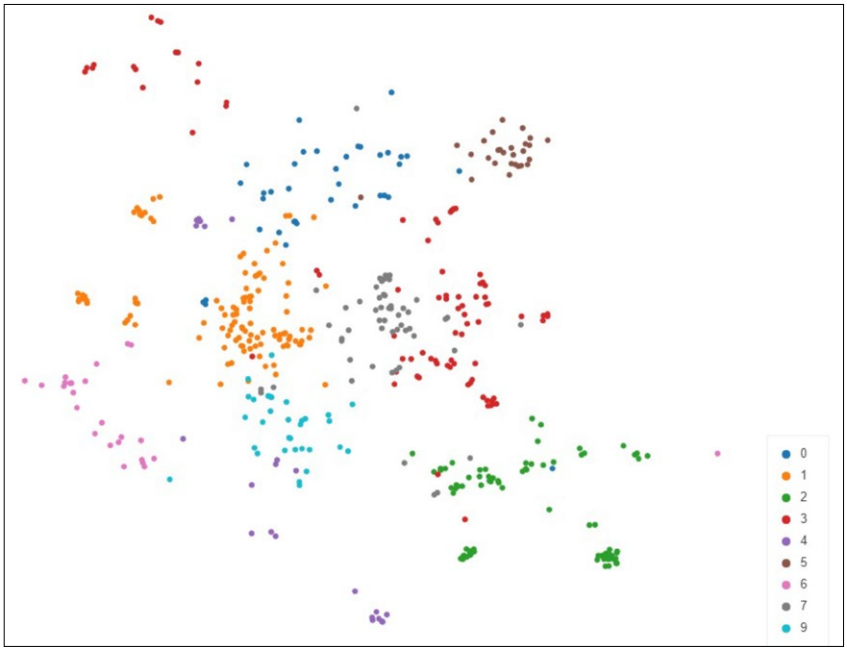
Step 6 Add full electric mobility companies from 2020

A number of companies from the 2020 company list were not found with the web crawl. The companies that were classified as 100% electric mobility at the time were therefore manually added to the company list.

Step 7 Clustering of electric mobility companies

The 100% electric mobility company list was built up step by step with steps 1-6. In the last step the companies are clustered. An algorithm was used that determines the similarity between companies (based on keywords on the websites) and places companies that are similar together in a cluster. This is depicted graphically in the figure below.

Figure 10: Clusters of full electric mobility companies



Source: RVO webcrawl

The distinct clusters are then characterized on the basis of the characteristics of the companies in the clusters, see the table below.

Cluster	Number of companies in cluster	Type of cluster
Cluster 0	30	Electric mobility (cars, charging, trucks and scooters)
Cluster 1	113	Charging infrastructure and services
Cluster 2	47	Electric sailing
Cluster 3	60	Electrical tools
Cluster 4	21	Electric mobility (cars, charging, trucks and scooters)
Cluster 5	5	Electric mobility (cars, charging, trucks and scooters)
Cluster 6	22	Charging infrastrcurue and services
Cluster 7	27	Electric commercial vehicles and trucks
Cluster 9	28	Charging infrastructure and services
Total	**323**	

This characterization and companies underlie the analysis in section 4.2. Some clusters that could not be clearly identified separately have been combined.

N.B. This is the list of companies given to Statistics Netherlands for an economic indicator search. Statistics Netherlands has also made adjustments and further reduced the company list to 130 companies, partly due to data availability and partly for substantive reasons (not a complete electric mobility in Statistics Netherlands's opinion).

Appendix 2 – Basis for calculation method for economic significance of specific SBIs

This appendix presents the calculations applied to determine the electric mobility share in a number of specific industries (SBIs). This share was then applied to the economic indicators that Statistics Netherlands provided for these SBIs.

SBI	Name	Basis for determining electric mobility share
45.11.1 – Import of new passenger cars and light commercial vehicles	The import of new BEV passenger cars and electric light commercial vehicles	Inflow of new vehicles and average price
45.11.2 – Trade in and repair of passenger cars and light commercial vehicles (no import of new cars)	The trade, maintenance and repair of BEV passenger cars and electric light commercial vehicles	• New vehicle sales and average price • Used sales and average price • Repairs existing fleet and average price
77.11.1 - Rental of passenger cars and light commercial vehicles (not operational lease)	The rental of BEV passenger cars and electric light commercial vehicles	Size of car rental park
77.11.2 – Operational leasing of passenger cars and light commercial vehicles	The operational and private lease of BEV passenger cars and electric light commercial vehicles	Size of lease park
43.21 – Electrical construction installations	The installation of charging points	• Average construction costs of charging infrastructure • Number of private charging points • Number of (semi)public charging points
27.2 – Manufacture of batteries and accumulators	Manufacture of batteries and other energy storage systems for electric mobility	*Qualitative description*

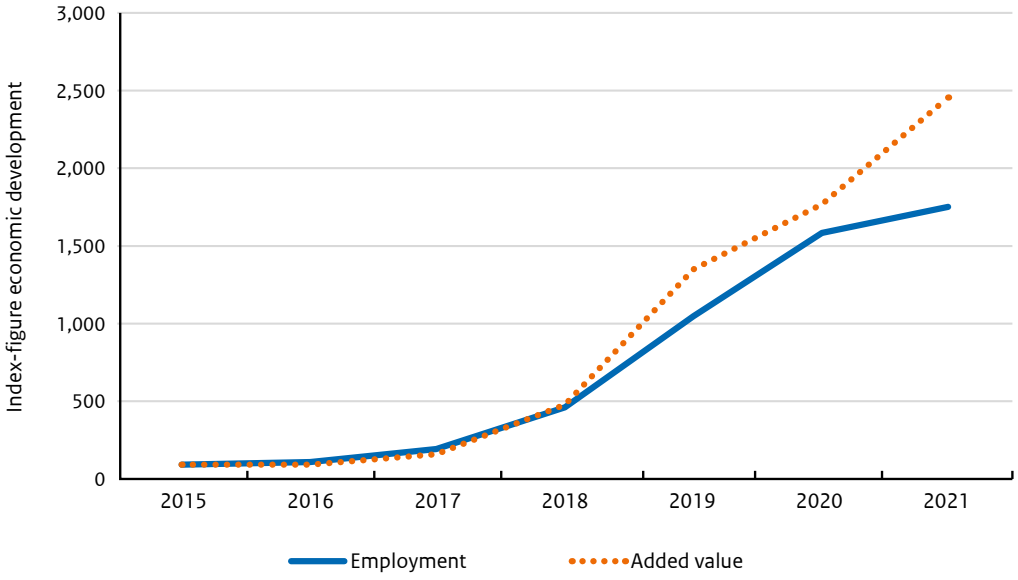
In the figures 11 to 15 we show the developments of the specific industries in an indexed manner. 2015 was taken as the starting year (=100) and from there the increase to 2021 was mapped out.

Import of new passenger cars and light commercial vehicles

We assume here that all new cars and commercial vehicles in the Netherlands have been imported. To determine the fraction of the electric mobility share within this SBI, we therefore use the fraction of electric vehicles in new sales of passenger cars and light commercial vehicles, from the RVO statistics. We further assume that the added value and employment per electric car is the same as for a fossil car.

Please note: in the calculations, the electric mobility-fractions for new passenger cars and light commercial vehicles have been determined separately and linked to the Statistics Netherlands data for the total SBI. These two results are then added together for the total value. We are aware that this is double counting and if the percentages become higher in future years, this must be corrected, either by adding weighting factors (depending on available data), or by more pragmatically assigning a ceiling to the value that is allocated to electric mobility from the SBI code. At this time it does not produce any incorrect calculations and a weighting factor could not be applied.

Figure 11: Developments in the economic indicators for the import of new BEV passenger cars and electric light commercial vehicles (2015 =100)



Source: Ecorys based on Statistics Netherlands data for SBI code

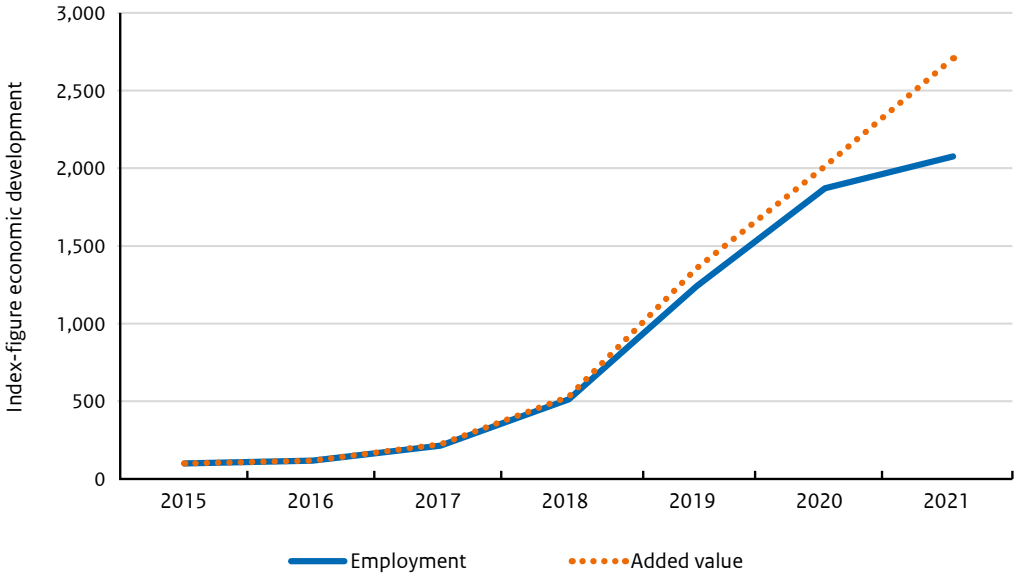
In 2021, the added value will be almost € 134 million and 619 FTE will be employed. Added value has grown faster than employment since 2018.

Trade in and repair of passenger cars and light commercial vehicles (no import of new ones)
This SBI covers the activities of the dealers in the Netherlands. This consists of selling new cars (via a margin on trade), trading used cars and maintaining and repairing cars.

For this SBI we follow a slightly different approach from 45.11.1. For the activities surrounding the sale of new cars, we use the same fractions as in 45.11.1 (the electric mobility share in new sales). For the economic figures for the trading of used cars, we look at the used car market (Statistics Netherlands and BOVAG figures) and light commercial vehicles (RVO). We use these figures to determine the share of electric vehicles in this category. This is how we approach the work of trading used cars. The maintenance and repair of cars is a combination of new sales and used cars.

Again, the value assigned for the electric mobility activities per part is added together for the whole. It is currently not feasible to weight the fractions of the components within this SBI according to the share in economic activities per component. For the used market, we choose the number of new sales as a proxy as the basic fraction to approximate the value as closely as possible. Further depth was not possible based on the available data.

Figure 12: Developments in economic indicators for the trade, maintenance and repair of BEV passenger cars and electric light commercial vehicles



Source: Ecorys based on Statistics Netherlands data for SBI code

In 2021, the added value will be more than € 1,545 million and almost 20,300 FTE will be employed. Value added has grown faster than employment since 2019, and from 2020 employment will stagnate compared to value added.

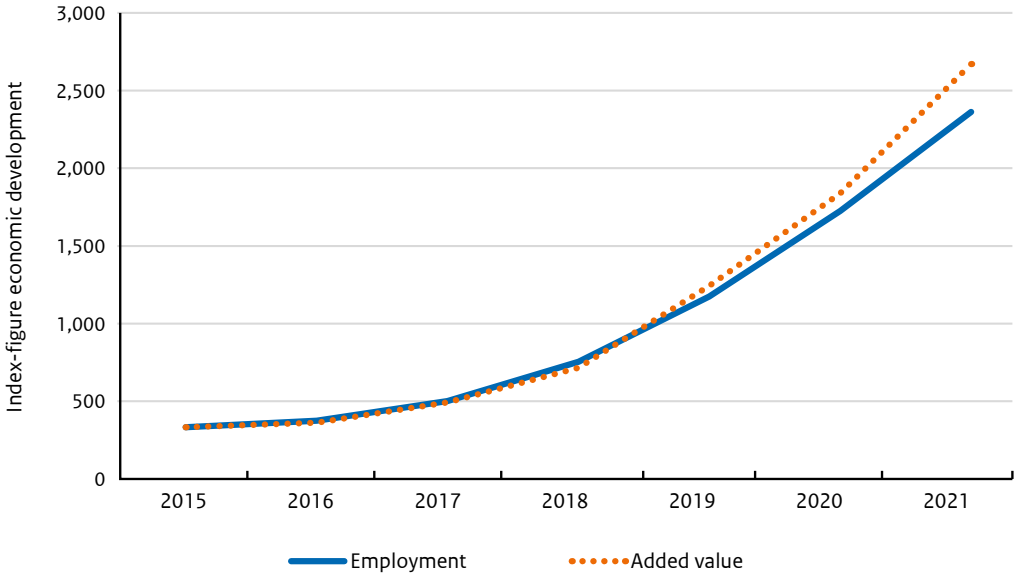
Operational leasing of passenger cars and light commercial vehicles

The leasing market falls under this SBI. For the numbers in the rental car market for passenger cars, we base ourselves on data from the BOVAG. We use VWE's national used car survey for the numbers of light commercial vehicles[68]. In addition, we use the RVO statistics database to record the portion of electric mobility over time.

From this we calculate the fully electric share for the total used car market, including the distinction between the used car market and light commercial vehicles.

[68] https://www.vwe.nl/sites/default/files/2022-02/Nationaal-Occasion-Onderzoek-2019.pdf

Figure 13: Developments in the economic indicators for the rental of BEV passenger cars and electric light commercial vehicles



Source: Ecorys based on Statistics Netherlands figures for SBI code

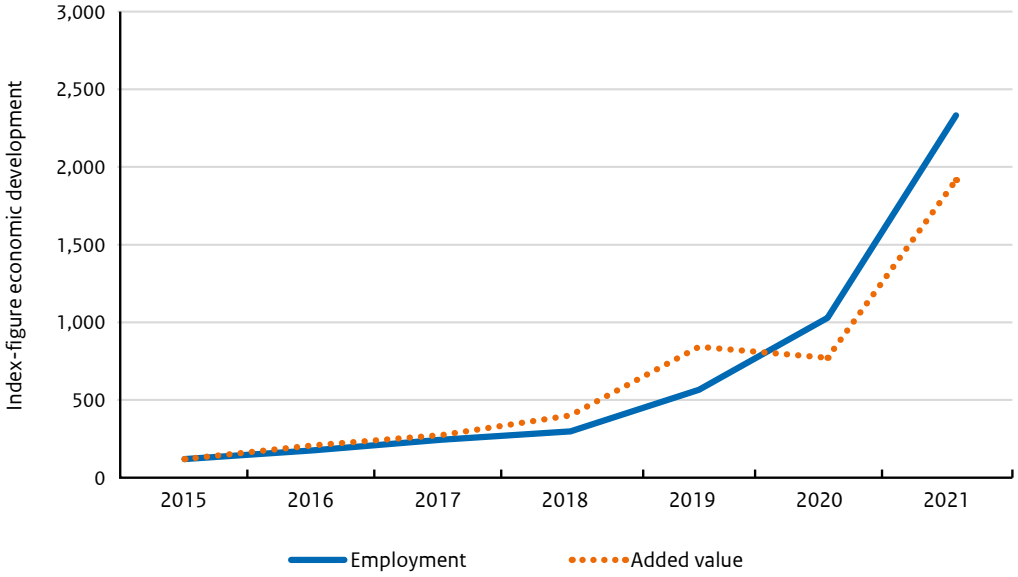
In 2021, the added value of electric mobility activities in the operational lease of passenger cars and light commercial vehicles will amount to € 828 million and 1,071 FTE will be employed. The two economic indicators have virtually the same growth factors in this period, except for the last two years in which added value increased more strongly.

Rental of passenger cars and light commercial vehicles (no operational lease)

This SBI concerns the rental of vehicles to companies, such as passenger cars and light commercial vehicles for private individuals. For the population we base ourselves on the reports of VNA (car leasing market in figures). We have figures for the share of electric in private lease, business passenger cars and vans for 2021 and 2022. For the development in the period 2015 - 2022, we use the two figures for the last few years and estimate the years 2015 - 2020 via the percentage of BEV in new sales of passenger cars. We have received data from RVO for the period 2015 – 2022 for the development over time of light commercial vehicles (excluding company stock).

These values have been added together, as with the other SBIs, and the same caveat of double counting applies, which can lead to overestimation at higher percentages.

Figure 14: Developments in the economic indicators for the operational and private lease of BEV passenger cars and electric light commercial vehicles



Source: Ecorys based on Statistics Netherlands figures for SBI code

In 2021, the added value of electric mobility activities in the rental of passenger cars and light commercial vehicles (not operational lease) will amount to € 11 million and 83 FTE will be employed. Employment within the leasing market for BEV passenger cars and electric light commercial vehicles has been growing faster since 2019, stronger than the added value.

The installation of charging points

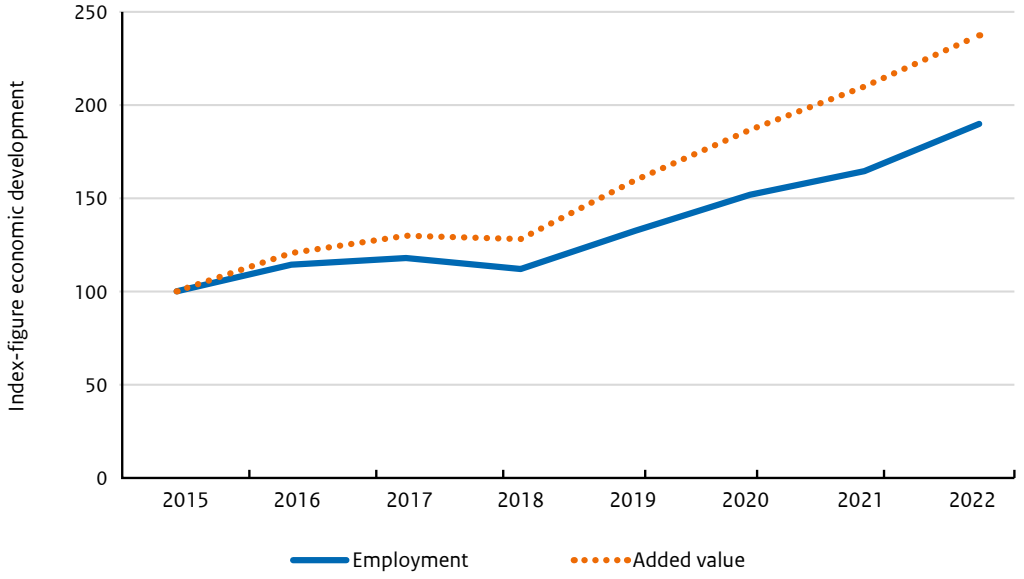
Companies that install charging stations largely fall under the electrical construction installations industry. We determine the added value for the installation sector, just like the other SBIs, on the basis of P x Q. For the numbers of charging stations (semi-public and private) we use the RVO statistics for the period 2015 - 2022. For the price of semi-public and private charging stations for 2020 we base ourselves on ABN AMRO's estimate (€ 300 installation costs for private locations and € 1,000 for semi-public and public locations69). ElaadNL's estimate for the installation costs was used for 201570. The price development in 2015-2022 is calculated linearly based on the above prices in 2015 and 2020. With this data, the added value of the installation sector has been calculated for the period 2015-2022.

To approximate the other economic indicators, on the advice of Statistics Netherlands, we use the structure of SBI 43 (specialized construction). The added value and employment SBI 43 were retrieved from Statline, and the relationship between these indicators was then applied to the Electrical Construction Installations industry.

[69] https://www.abnamro.nl/nl/zakelijk/insights/sectoren-en-trends/bouw/een-miljard-euro-extra-omzet-bij-installatie-laadpalen.html#:~:text=De%20jaaromzet%20bij%20de%20installatie,is%20haar%20capaciteit%20te%20overgroten

[70] https://ec.europa.eu/competition/state_aid/cases/258489/258489_1710978_136_2.pdf

Figure 15: Developments in economic indicators for the installation of charging points (2015 =100)



Source: Ecorys based on Statistics Netherlands figures for SBI code

In 2022, the added value of electric mobility activities in the installation sector will amount to more than € 55 million. Added value has shown greater growth than employment since 2015.

Appendix 3 – Interviews

- Bouwend Nederland
- BOVAG
- ElaadNL
- Emissieloos Netwerk Nederland (ENI)
- Nederlandse Vereniging Duurzame Energie (NVDE)
- RAI Vereniging
- Vereniging DOET
- Vereniging Elektrische Rijders (VER)
- Vereniging van Nederlandse Autoleasemaatschappijen (VNA-Lease)
- NKL = Nationaal Kennisplatform Laadinfrastructuur
- Transport en Logistiek Nederland (TLN)

Appendix 4 – List of abbreviations

Abbreviation	In full	Translation
AanZET	Aanschafsubsidieregeling Zero Emissie Trucks	Purchase subsidy scheme for Zero Emission Trucks
AFIR	Alternative Fuels Infrastructure Regulation	
BAZEB	Bestuursakkoord Zero Emissie Regionaal Openbaar Vervoer per Bus	Administrative Agreement Zero Emission Regional Public Transport by Bus
BCC-NL	Battery Competence Cluster Netherlands	
BEV	Batterij Elektrisch Voertuig (volledig elektrisch voertuig)	Battery Electric Vehicle (fully electric vehicle)
BMS	Batterijmanagement systemen	*Battery management systems*
CPO	Charge Point Operator, a company that installs and operates charging stations	
EIB	Europese Investeringsbank	*European Investment Bank*
EV	Elektrisch Vervoer	*Electric mobility*
FCEV	Fuel Cell Elektrisch Voertuig (waterstofvoertuig)	*Fuel Cell Electric Vehicle (hydrogen vehicle)*
GVW	Gross Vehicle Weight	
HAPSS	Hydrogen Aircraft Powertrain and Storage System	
IEA	Internationaal Energie Agentschap	*International Energy Agency*
IenW	Ministerie van Infrastructuur en Waterstaat	*Minisitry of Infrastructure and Water Management*
kWh	Kilowattuur	*Kilowatt-hour*
LEV	Light Electric Vehicle	
MCS	Megawatt Charging Systems	
Mton	Megaton	
OEM	Original Equipment Manufacturer	
PHEV	Plug-in Hybride Elektrisch Voertuig	*Plug-in Hybrid Electric Vehicle*
R&D	Research and Development	
RVO	Rijksdienst voor Ondernemend Nederland, onderdeel van ministerie EZK	*Netherlands Enterprise Agency, part of Ministry of Economic Affairs and Climate Policy*
SEPP	Subsidieregeling Elektrische Personenauto's Particulieren	*Subsidy Scheme for Electric Passenger Cars for Private Individuals*
SRVB	Tijdelijke subsidieregeling verduurzaming binnenvaartschepen	*Temporary subsidy scheme for making inland vessels more sustainable*
SSEB	Subsidieregeling Schoon en Emissieloos Bouwmaterieel	*Subsidy scheme for Clean and Emission-free Construction Equipment*
TCO	Total cost of ownership	
TSH	TopSector High Tech	
V2G	Vehicle-to-Grid	
VVE	Vereniging van eigenaren	*Owners association*
VTE	Voltijdsequivalenten	*Full-time equivalents*
WLTP	Worldwide Harmonised Light Vehicle Test Procedure	
ZES	Zero Emission Services	

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