Invest in Pomerania

FOCUS ON POMERANIA

New Mobility Sector

Fundusze Europejskie

Dofinansowane przez Unię Europejską

URZĄD MARSZAŁKOWSKI WOJEWÓDZTWA POMORSKIEGO

Invest in Pomerania

FOCUS ON POMERANIA
NEW MOBILITY SECTOR

Authors

Radosław Bojarczuk

Tomasz Grabowski

Justyna Jagielska

Michalina Kaczor

Dawid Kwiatkowski

Błażej Stelmarski

Mikołaj Trunin

Kacper Zawicki

Maja Ziemianowicz

Ewelina Zwierz

Graphic design

Agnieszka Lewandowska

Anna Kliniewska

Table of contents

Introduction

Preface

Rush hour in Shanghai — one of the world's largest metropolises. It is quiet. You do not smell exhaust fumes in the air, even though there are thousands of cars and scooters around. Dense traffic. And silence.

This is what the materialisation of a trend that has been talked about for years looks like. The electrification of transport. China has become the absolute leader in the industry, both technologically and in terms of market size. More than half of all electric vehicles worldwide are now sold in China, and over 70% of all manufactured EVs are Chinese.

What will happen to Europe? What will happen to the USA? How will trends in Western markets evolve in the face of Chinese dominance? Will we take a strong step back, „ending the Green Deal madness"? Or will we develop new business models so that the modern mobility sectors can thrive in the spirit of the 21st rather than the 20th century.

Together with our partners, we discuss these issues in this report. We present a global outlook while going a step further and showcasing what Poland and Pomerania have to offer to the modern mobility sector.

We hope that you have an enjoyable read.

The Invest in Pomerania Team

Methodology information

This report aims to present the situation of the new mobility sector in Poland and Pomerania, with particular focus on key investment projects, technological trends and the conditions and competitive advantages of the region. We understand new mobility broadly: as an ecosystem including electric vehicles, charging infrastructure, integration with renewable energy sources, energy management systems and digital transport service models.

The report was prepared based on an analysis of statistical data, industry reports, market forecasts and legal regulations shaping the sector at the national and European levels. Data from Statistics Poland, the Polish New Mobility Association (PSNM) and the Trade Map database were used in the analysis.

Interviews and consultations with representatives of local, national and international companies and institutions operating in the sector were vital for preparing the report. The opinions and perspectives of business and academic partners complemented and enriched the content of the study with the opinions of market experts.

Our thanks to the report's partners

This report would not have been possible without the commitment and support of many individuals and institutions.

We are grateful to the representatives of companies and organisations who have shared their knowledge, experience and data, contributing to the creation of a comprehensive picture of the new mobility sector in Pomerania. We would like to thank the representatives of the following companies and organisations: Aptiv, Electromobility Poland, Enelion, Energa-Operator, Equay, GreenWay Polska, Scania Industrial Batteries, Lyten, Polish New Mobility Association (PSNM), and also Hays for cooperation on the chapter on education and the labor market.

Special thanks go to prof. Monika Wilamowska-Zawłocka from the Gdańsk University of Technology and prof. Sambor Guze from Gdynia Maritime University, whose expert knowledge and guidance were extremely valuable in the process of preparing this publication.

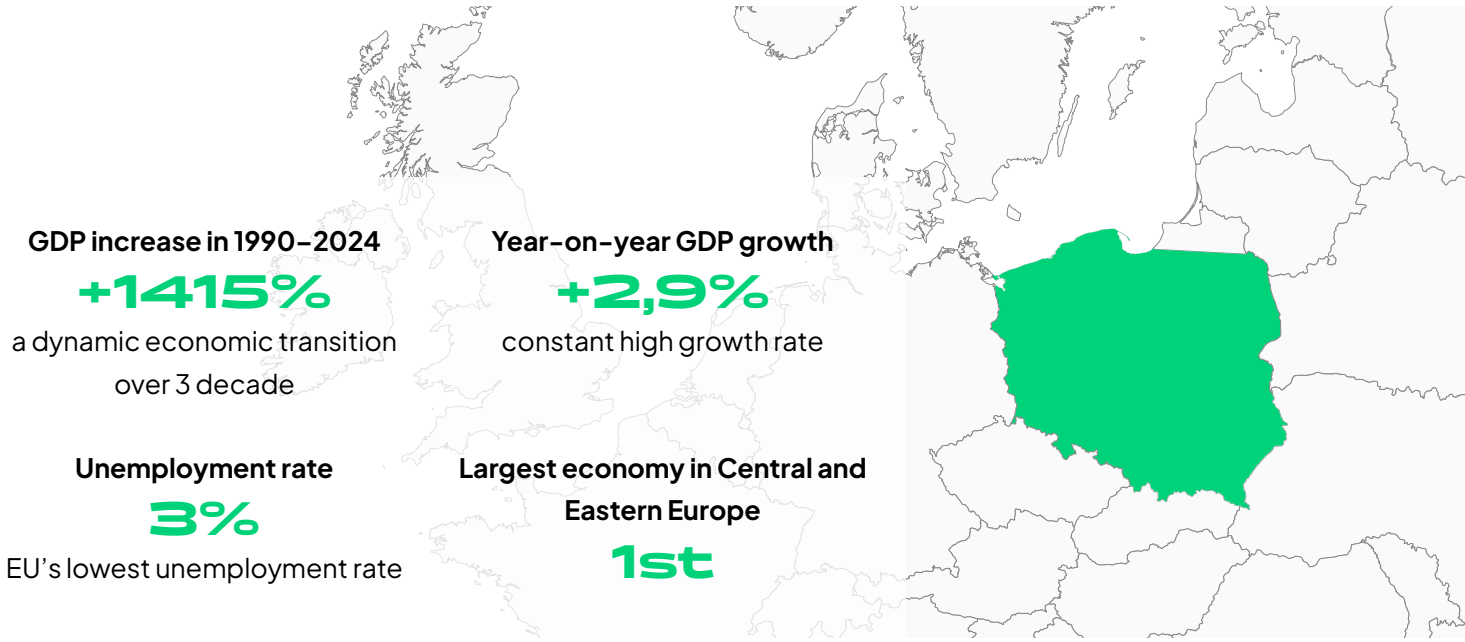
We would also like to thank our interns: Daria Korchevna and Luka Vivas Nikonorov for their support in working on the report.

Poland

Poland is the largest economy in Central and Eastern Europe and one of the most attractive investment destinations in the region. Since 2018, it has been classified as a developed country according to the FTSE Russell classification, and its stable credit rating of A2 (Moody's) confirms its financial credibility.

The Polish economy has undergone a rapid transition over the last twenty years. Since joining the European Union in 2004, Poland's GDP per capita (in current USD) has increased from USD 6,711 to USD 25,022 by 2024[1]. At the same time, unemployment has fallen from 19% in 2004 to 3% in 2024, one of the lowest levels in the EU[2].

Poland's strategic location has made it an attractive place for investment and business growth. This growth has fuelled a steady inflow of foreign direct investment (FDI), making Poland the fourth largest FDI destination in the European Union in 2023. Today, according to the *EY Attractiveness Survey 2025*, Poland is the FDI leader in the CEE region and ranks 6th in Europe[3,4]. The Warsaw Stock Exchange has grown fourfold since 2005. By comparison, the New York Stock Exchange index has increased threefold over the same period.v Poland offers a high level of regional assistance for businesses[6], as well as a cost-competitive[7] and well-educated labour market[8].



Poland's strategic location, well-established infrastructure (roads, railways, ports, airports) and proximity to EU markets influence the country's position as a key logistics and manufacturing hub. It is home to 14 Special Economic Zones, which have created thousands of jobs and significantly increased FDI since 1995, including in the automotive sector.

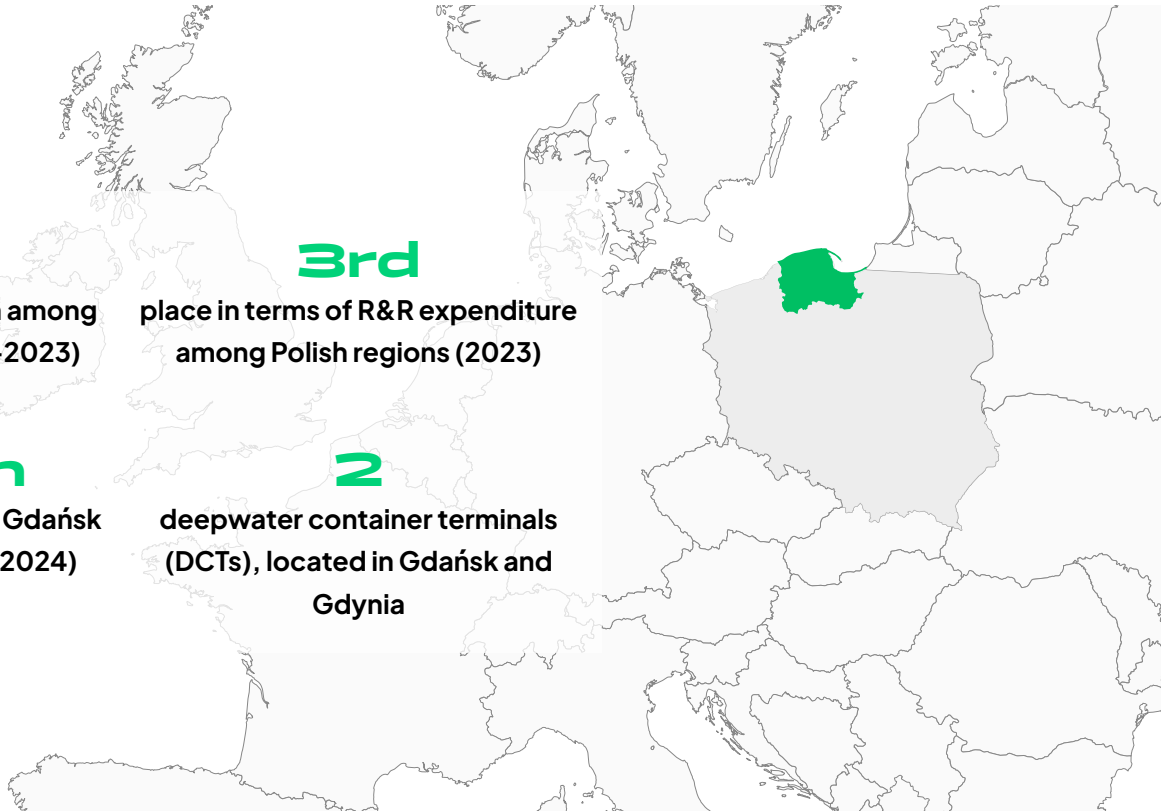
Pomeranian Voivodeship

The Pomeranian Voivodeship is located by the Baltic Sea. It benefits from its strategic location - the proximity to the deepwater seaports of Gdańsk and Gdynia, enabling the handling of the world's largest vessels, and a developed road and rail network, which provides the foundation for logistics and international trade. The region plays a crucial role as a transport and distribution hub on a national and European scale. Its other notable advantages include convenient air connections with Scandinavian countries and road transport routes to Germany and Southern Europe.

In the fDi *Intelligence European Cities and Regions of the Future 2025* ranking, Gdańsk took third place with regard to business friendliness. Pomerania is also one of the leaders in terms of implementing strategies to attract foreign investment[9] – this is a strong position that has the potential to strengthen further with the development of new mobility projects in the region.

The Pomeranian Voivodeship is intensely developing its renewable energy sector: both offshore and onshore wind farms (e.g. near Potęgowo, Kopaniewo and Pelplin) are significantly contributing to the region's energy transition (see page 20).

In the coming decade, Pomerania will become home to Poland's first nuclear power plant project, located in the municipality of Choczewo (Lubiatowo-Kopalino). This is bound to create a solid foundation for the development of human resources and local companies, which will turn the region into a nuclear energy hub in the coming decades. Poland's first nuclear power plant is expected to power the region and support the economic landscape as early as 2035–2036 (see page 20).



2nd
in terms of GDP growth among Polish regions (2000–2023)

3rd
place in terms of R&R expenditure among Polish regions (2023)

6.7 mln
passengers serviced at Gdańsk Lech Wałesa Airport (2024)

2
deepwater container terminals (DCTs), located in Gdańsk and Gdynia

Looking at a map of Poland, Pomerania is the natural centre of the green transition. This is where offshore wind energy is developing, where a nuclear power plant will be built in the future, and where hydrogen potential should be built. One could say that Pomerania has the chance to become a „green Silesia" — Poland's new energy hub. While southern Poland used to be an industrial hub, northern Poland is now becoming an energy hub, leveraging renewable sources and future technologies. This is our great advantage in the context of electromobility development, as the sector cannot function without stable, low-emission energy sources. If we combine wind, nuclear and hydrogen power, Pomerania could be the region where electromobility finds its natural home.

Prof. Sambor Guze
Deputy Rector for Education
at Gdynia Maritime University

The report you are holding presents key trends and directions for the development of many industries – from automotive and energy to construction and agriculture. Electromobility represents a significant opportunity for our region: it supports the development of new competencies, creates high-quality jobs, and provides a solid foundation for future investments. It also brings tangible improvements to residents' quality of life - more attractive career prospects, less noise, and cleaner air. Electromobility is becoming a real driver of regional growth. It creates highly specialized jobs in industry, strengthens the competitiveness of local companies, and increases public awareness of emerging technologies. From the perspective of Scania Industrial Batteries, we clearly see that electromobility goes far beyond passenger cars. It also includes the electrification of construction, agricultural, mining, and port machinery - wherever powerful combustion engines are still in use today. In these areas, zero-emission powertrains can deliver the most significant benefits to local communities in a relatively short time. We also observe that users increasingly view vehicles and machines as advanced technological devices and expect safety, flexibility, and comfort. This is exactly the direction in which we, together with our partners, aim to develop the market further.

Waldemar Algrzym
Managing Director
Scania Industrial Batteries in Poland

What is new mobility and why is it key to local development?

As individual segments of electric transport develop, the very concept of electromobility ceases to refer only to vehicles. It is increasingly seen as a complex ecosystem.

It is now recognised that an effective transition in the transport sector can only take place with a comprehensive approach that considers not only road transport but also maritime and (even) air transport, charging networks (public and domestic), energy storage, energy management systems, infrastructure for RES integration and inclusive digital services (carsharing, fleet management and Mobility as a Service solutions). It is this comprehensiveness that enables the system to be effective. On the one hand, it can contribute to global CO_2 reduction targets and, on the other, be efficient and attractive to the end consumer.

Transport is responsible for about 21% of greenhouse gas emissions globally. Land, sea and air transport emissions are rising in the EU, despite declines in other sectors. It is the most polluting source in developed countries. Because of its strong links to economic growth and its continued heavy dependence on hydrocarbons, transport is one of the most challenging sectors to decarbonise[10].

Between 1990 and 2022, net greenhouse gas emissions in the EU have declined by as much as 31%[11]. Transport (road, maritime and especially aviation) is clearly the weakest link in Europe's energy transition, which is why the EU is introducing new tools to get closer to its targets.

The development of new mobility would not have been possible without this regulatory impetus. EU strategies - Fit for 55, the Green Deal, the ETS2 (from 2027) and the Alternative Fuels Infrastructure Regulations (AFIR) - set ambitious emission reduction targets and accelerate the transition to zero-emission propulsion systems (see page 29 for more on regulation). Innovation in new mobility is recognised as a strategic direction for Europe's economy, making it a testing ground for innovative solutions.

From an environmental standpoint, the benefits of developing zero-emission transport are evident: reduced greenhouse gas emissions, improved air quality in cities, less noise. Yet, the new industry also faces considerable challenges. Battery production requires large quantities of critical raw materials, and their recycling is becoming one of the major issues which the market must address.

In addition, ESG (Environmental, Social, and Governance) reporting requirements are forcing manufacturers to be increasingly transparent about their carbon footprint, raw material sources and production processes. This, in turn, is influencing company management boards' decisions on further investments in green transformation, both in low-carbon products and in the decarbonisation of their own production lines and supply chains.

Social change is a strong driver for the new sector. Increasing urbanisation and its consequences - larger population centres, traffic jams and air pollution - are prompting changes in the movement patterns of residents. Shared transport, micromobility and smart-city integrations are gaining importance.

Regardless, this megatrend is unstoppable — electromobility has no real alternative. Today, the question is no longer „if", but „how fast and in what shape" it will develop. The last two years — high inflation, expensive capital and reduced production volumes — have brought about a correction of earlier expectations. However, this does not change the fundamental issue: the direction has already been determined.

Robert Chryc-Gawrychowski
CEO, Lyten Poland

New mobility is not only the future of transport, but it may also become an absolutely crucial branch of the Polish economy. Based on PSNM analyses, by 2050, the e-mobility industry could account for almost 6% of Poland's GDP. It will not be an exaggeration to say that the value of announced and ongoing investments in the e-mobility sector worldwide is growing exponentially. In 2023, it amounted to USD 312 billion; in 2024, it was already USD 1.2 trillion. According to BNEF forecasts, the total value of electric vehicle sales by 2050 could reach as much as USD 63 trillion. And let us remember that vehicles are just one of many elements of the new mobility ecosystem.

Jan Wiśniewski
Director of the Research and Analysis Centre
Polish New Mobility Association (PSNM)

Demographics are also important — an ageing population also affects transport needs (e.g. requiring more accessible and convenient transport that is less dependent on vehicle ownership). Rising car maintenance costs, taxes, fuel and parking costs are prompting some users to give up their own car in favour of subscription or carsharing services.

Poland is undergoing an energy transition, an important element of which is the decarbonisation of transport. In recent years, the new mobility market has grown significantly, both on the consumer side (growing sales of electric and plug-in hybrid cars) and on the industrial side (investments in battery and component production). Poland is becoming one of the European leaders in this sector, as discussed later in this report (page 34).

POMERANIA — THE HEART OF POLAND'S ENERGY TRANSITION

Pomerania is currently at the heart of the energy transition. The high potential for the development of renewable energy sources - primarily the onshore wind farms and the planned offshore wind farms, as well as the dynamic development of photovoltaics and new industrial investments - requires us to take a strategic approach to grid expansion and modernisation.

One of the most important challenges is to adapt the infrastructure to the growing needs of energy consumers and producers. Priorities include the modernisation of existing lines and stations, the construction of new switching stations, and the development of high-voltage networks in areas with intensive RES development. It is also necessary to implement digital and automation solutions to enable flexible management of energy flows and reduced response times to outages.

In its new Development Plan for 2026–2031, which is currently being agreed with the President of the Energy Regulatory Office, Energa-Operator S.A. has planned investments totalling approximately PLN 7 billion in the Pomeranian Voivodeship. In the coming years, Pomerania will become one of the most important energy regions in Poland.

The role of Energa-Operator is by no means limited to the construction and maintenance of infrastructure. It is becoming increasingly vital to strategically plan the development of the network in line with the needs of the energy transition and to ensure that this transition takes place in a safe, stable and beneficial manner for both the economy and the inhabitants of the region.

Recent years have seen an unprecedented increase in the number of applications for connection of new RES plants and the development of energy-intensive industrial projects, including in the offshore wind energy sector. For Pomerania, this means the need for adequate connection capacities, both for large industrial players and for distributed renewable sources. This requires many years of planning, investment in transmission and distribution infrastructure and close cooperation with *Polskie Sieci Elektroenergetyczne* (Polish Power Grid), which involves developing a joint *Concept for the operation of the LV transmission and*

110 kV distribution network as a closed network within the area of operation of Energa-Operator S.A. until 2038.

Currently, over 10 GW of power from renewable energy sources is already connected to the Energa-Operator network, with prosumer micro-systems accounting for a significant share. This represents 29% of Poland's installed RES capacity. Taking the above into account, this scale shows that the distribution grid has become the main place for RES integration. At the same time, the connection agreements concluded and the connection conditions issued indicate a potential of over 6 GW of additional capacity, which could be implemented and connected to the system within the next five years, for example. This means that Energa-Operator may be forced to handle a total of up to 16 GW of renewable generation in the short term (with a projected power demand of 3.5 GW), which presents us with challenges related to grid flexibility and stability, but at the same time confirms the strategic role of the DSO (i.e. Distribution System Operator) as a key link in the energy transition.

According to analyses conducted during the development of the Vision and strategic objectives of Energa-Operator S.A., a conservative analytical approximation suggests that the minimum energy demand for charging electric vehicles in the area covered by Energa-Operator S.A. will amount to 270 GWh in 2030 and 1,270 GWh in 2035.

At the end of the second quarter of 2025, 640 electric vehicle charging stations were connected to the Energa-Operator network, reflecting the growing pace of development of electromobility infrastructure. A total of 580 technical conditions for connection has been issued for various sites, of which as many as 47 relate to stations with a capacity exceeding 3.6 MW — their total connected capacity will be over 204 MW. These figures show that the distribution network is becoming the foundation for further electrification of transport, with distribution network operators playing a key role in ensuring adequate connection capacity and stable system operation in the face of dynamically growing demand from the e-mobility sector.

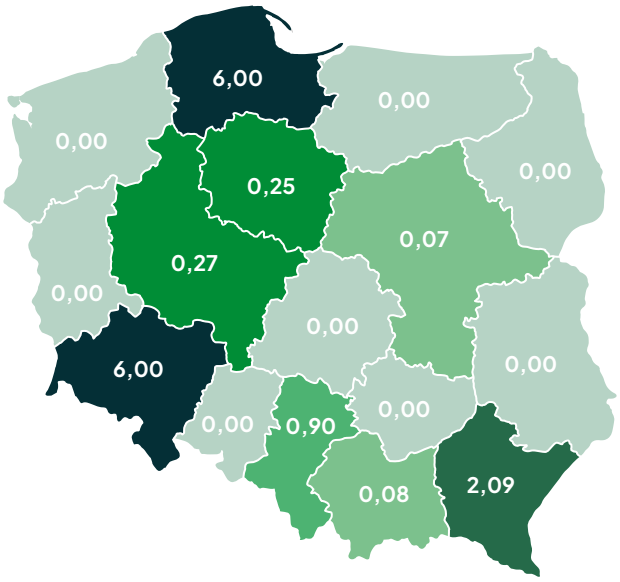
Grzegorz Kuczkowski
Director of the Network Assets Department
Energa-Operator S.A.

The Pomeranian Voivodeship plays a special role in this transition. The region is already an important centre for new investments in the sector, such as Lyten and Scania in the battery sector, and a significant hub for the electronics sector producing components for new mobility.

Pomerania also benefits from its energy potential and strategic location by the Baltic Sea. The region is already home to offshore wind energy projects (see page 16) and green hydrogen production (see pages 18) and will also benefit from nuclear energy (Poland's first nuclear power plant in the municipality of Choczewo) in the future.

These major transition projects and the growing demand for electricity require unprecedented investments in the modernisation of the electricity grid on the part of the local energy operator (see box on previous page), as well as in the storage infrastructure for RES energy.

It is no coincidence that the largest battery energy storage project (implemented by PGE Polska Grupa Energetyczna) is currently underway in Żarnowiec, Pomerania, aiming to stabilise the region's power system (see page 45 for more information about the project). Pomerania is already one of the clear co-leaders when it comes to the capacity of large-scale energy storage facilities in Poland, with a total capacity of about 6 MW in battery systems.



Capacity of large-scale energy storage facilities in Poland
Economic Weekly No. 41/2025, Polish Economic Institute, pie.net.pl

The combination of RES and nuclear will make Pomerania, for the first time in history, an exporter rather than an importer of energy. This paves the way for new energy-intensive projects such as semiconductor manufacturing, advanced batteries or data centre hubs.

POMERANIA'S NEW ROLE AS AN ENERGY EXPORTER

In the coming years, the Pomeranian Voivodeship is set to become more much more attractive to investors. The energy transition and decarbonisation process - which can already be seen today with the construction of wind farms in the Baltic Sea and Poland's first nuclear power plant in the municipality of Choczewo - will make the region an energy producer and exporter rather than an importer for the first time in its history. This is a landmark moment that opens up enormous opportunities for the development of Pomerania's economy.

Access to affordable, low-carbon and stable energy supply will create conditions for high-tech, energy-intensive industries to set up in the region – such as semiconductor manufacturing and electromobility, which will be the sectors of the future for decades to come. This is a unique opportunity to attract new foreign investors

The decision to commence construction of a nuclear power plant is a venture of strategic importance for the region and, at the same time, a tremendous opportunity for local businesses. The Pomerania Development Agency actively supports enterprises in joining this process, striving to build strong Pomeranian „local content". Companies' involvement in the supply chain associated with the nuclear investment project may open the way for them to establish a large presence in this sector in the future. In the long term, this means the development of a new industry — the nuclear industry — in the Pomeranian Voivodeship.

Visualisation of the first Polish nuclear power plant in Choczewo
Source: Polskie Elektrownie Jądrowe, pej.pl

However, the energy transition also poses significant challenges for the education system, both at the higher education and vocational levels. Until now, the Polish economy has not needed nuclear energy specialists, and professions such as reactor operator did not exist in national education programmes. Today, we know that such personnel will need to be trained urgently, which is why universities and vocational schools in Pomerania are already beginning to develop educational programmes that meet these new needs.

Sławomir Kosakowski
President of the Pomerania Development Agency

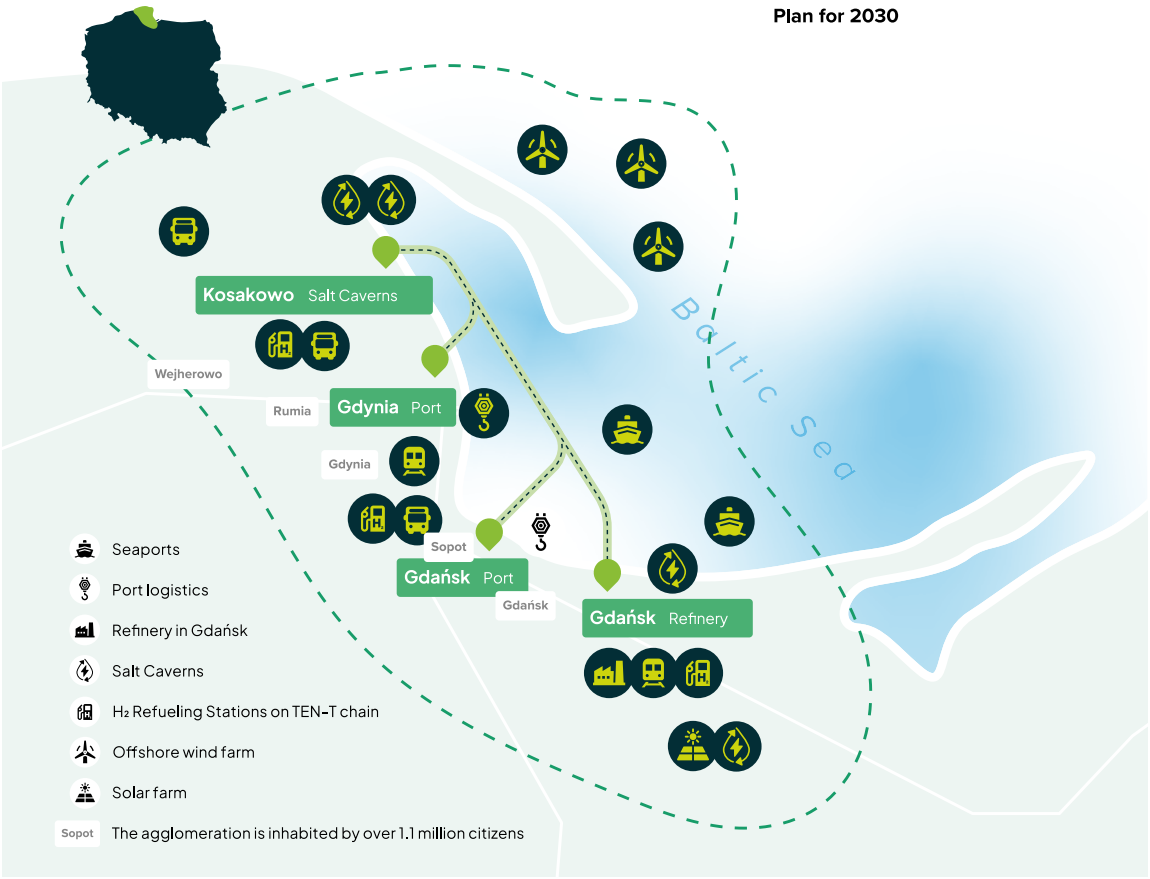
HYDROGEN ECOSYSYTEM IN POMERANIA

The development of the hydrogen economy is becoming one of the key elements of the energy transition and decarbonisation of transport (see page 63 for more on FCEV technology in vehicles). Hydrogen valleys are playing a role in this process as strategic centres of innovation and deployment. They are political, social and economic initiatives that aim to build regional hydrogen markets covering the entire value chain - from production, transmission and storage to application in various sectors of the economy[12].

In 2021, the Polish government adopted the Polish Hydrogen Strategy until 2030 with an outlook until 2040. The strategy is the first national document comprehensively addressing the development of the hydrogen economy in Poland. Hydrogen valleys are to become a place for the creation and testing of Polish hydrogen technologies and, through the involvement of domestic companies, contribute to the development of a new branch of the economy based on green technologies. They will also play a key role in mobilising private investment in projects that are consistent with the EU Taxonomy and the European Green Deal[12]. Hydrogen valleys are already operating around the world, and 11 such projects have been launched in Poland, including two in the Pomeranian Voivodeship — the Pomeranian Hydrogen Valley and the Amber Hydrogen Valley.

The Pomeranian Hydrogen Valley is a project of the Polish Cluster of Hydrogen and Clean Coal Technologies for the Pomeranian Voivodeship, implemented as part of cooperation between the Cluster companies, as well as universities and the Marshal's Office of the Pomeranian Voivodeship. Its aim is to increase the use of hydrogen as a fuel in the region's transport sector. The initiative includes raising environmental awareness and reducing gas emissions, creating a legal framework conducive to the implementation of hydrogen technologies, building international consortia and partnerships between business, science and local government actors, as well as developing „power to gas" projects in the Pomeranian Voivodeship[13].

The Amber Hydrogen Valley is a project led by the Orlen Group, which, together with its partners (including Gdańsk University of Technology, Port of Gdynia, Energa-Operator), aims to create a complete hydrogen ecosystem in the Pomeranian Voivodeship. The initiative includes the construction of infrastructure for the production, storage and distribution of hydrogen, including hubs, a hydrogen pipeline at the bottom of Gdańsk Bay and salt caverns to stabilise supplies. The Amber Hydrogen Valley will specialise in hydrogenising key Baltic ports, where hydrogen refuelling stations (HRS), port equipment and Poland's first fleet of hydrogen vehicles will be built, including a shunting locomotive, terminal tractors, buses, heavy-duty vehicles and cars. Hydrogen will also be used at the Gdańsk Refinery, in the chemical industry, logistics and urban mobility. The project envisages the future integration of hydrogen production with offshore wind power, with the total capacity of the electrolysers in the Pomeranian hubs planned to exceed 300 MW. At the same time, thanks to the expansion of hydrogen infrastructure, it will be possible to import additional volumes of green hydrogen in the form of its derivatives, which will balance domestic demand and support the decarbonisation of the Polish economy[14].



A schematic of the Amber Hydrogen Valley being built by Orlen
Source: Hydrogen Projects Portfolio — ORLEN 2025, orlen.pl

OFFSHORE WIND ENERGY IN POMERANIA

Offshore wind energy is a vital element of Poland's energy transition. By 2030, Poland aims to achieve 5.9 GW of offshore wind energy (OWE) capacity in the Baltic Sea, with a target of approximately 8–11 GW in the following decades.

One of the first endeavours will be Baltic Power, a joint project between Orlen Group and Northland Power. It is a farm with a total target capacity of about 1.2 GW. It will consist of 76 wind turbines of 15 MW each and will feature some of the most efficient wind turbines in the world. The planned operational launch is scheduled for late 2026. Further investments by PGE/Ørsted, RWE and Equinor/Polenergia are in the pipeline[15].

The implementation of these projects brings a number of benefits, including increased energy security through diversified sources, reduced CO_2 emissions, development of local industry (local content) and the creation of new jobs.

The Pomeranian industry is already seeing the positive effects of these investments. The year 2025 saw the launch of Baltic Towers in Gdańsk, Europe's largest wind tower factory (a joint project by the Industrial Development Agency (ARP) and Spain's GRI Renewable Industries), which will employ around 500 people1[6]. Meanwhile, Gdynia-based CRIST is building offshore substations for local investment projects. Leading offshore wind sector companies like Ørsted, Siemens Gamesa and RelyOn (an OWE health and safety training centre) have also set up their offices in Pomerania.

The first foundation of the Baltic Power wind farm
Source: Baltic Power, balticpower.pl

Global economic outlook

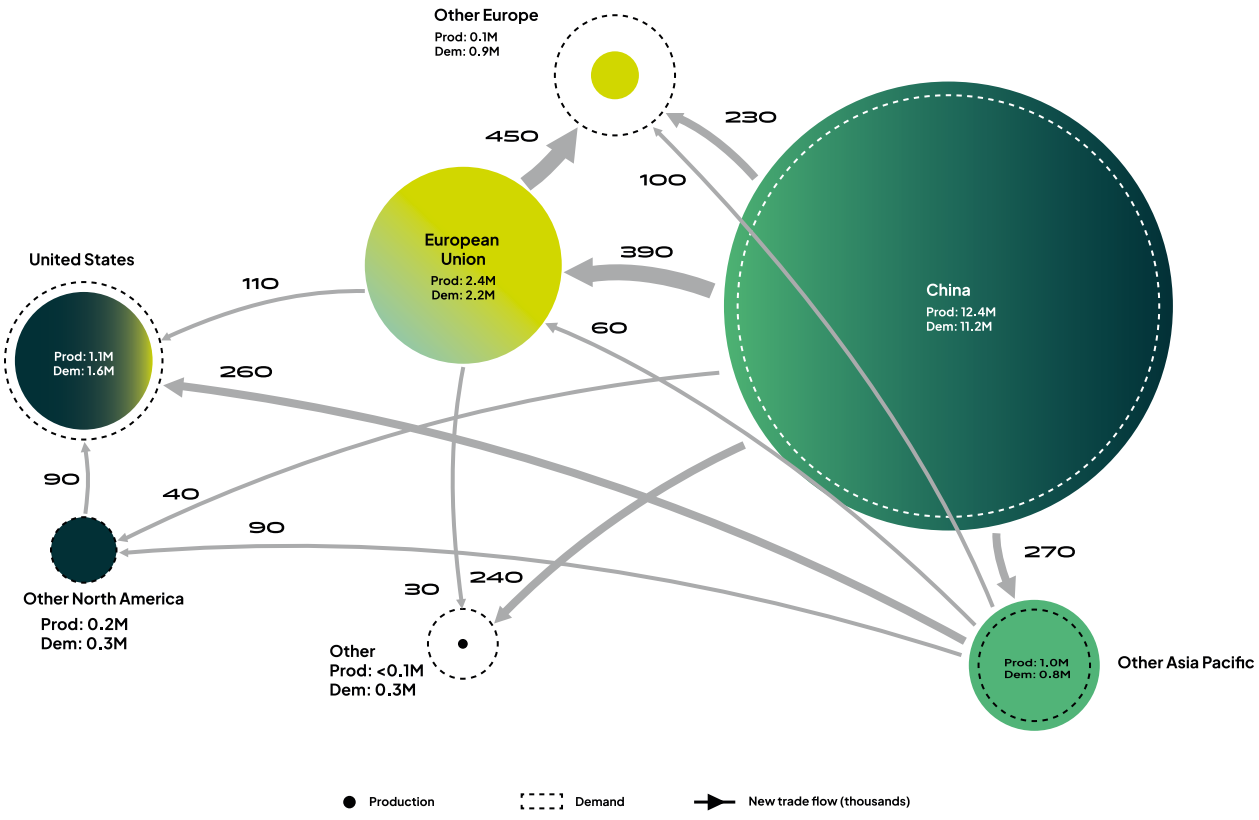
World

The global EV market is growing at an unprecedented rate. More than 17 million EVs were sold in 2024, accounting for over 20% of all new cars worldwide. By comparison, global sales in 2020 amounted to some 3 million. This means that the additional 3.5 million EVs sold in 2024 exceeded global sales figures from just four years prior[17].

China remains the largest market, with more than 11 million EVs sold — nearly half of the global total. Currently, one in ten cars on Chinese roads is electric. In Europe, EV sales have stabilised at around 20% market share, while in the US, EV share has exceeded 10%.

In emerging countries, the growth rate is even higher. For example, in Brazil, sales doubled to 125,000 units (6% share), and in South-East Asia, electric vehicles accounted for 9% of total sales (also almost double the sales in 2023). These regions are now the real growth centres when it comes to the new mobility market.

ICA forecasts indicate that by 2030, at least 40% of new cars sold globally will be electric, and in China the percentage will reach up to 80%. This means that, in the long term, the electric vehicle market will be the cornerstone of the transformation in transport.



Production, demand and trade in electric cars globally
Source: Global EV Outlook 2025 study based on IEA analyses

lectric car production in 2024 was 17.3 million units, with China accounting for as much as 72%. The ambitions of emerging markets are also growing. Brands such as VinFast (Vietnam), Togg (Turkey) and Tito (Argentina) are developing dynamically. At the same time, Chinese EV exports are growing rapidly, accounting for 40% of global EV exports in 2024. The main destinations for Chinese exports are Europe and emerging markets such as Southeast Asia and South and Central America.

So far, electromobility has been mainly associated with passenger cars, but electric heavy-duty vehicles (eHDVs) and e-micromobility, which includes electric scooters, bicycles and scooters, are becoming increasingly important (both market segments are described in *„Trends and innovations in the new mobility sector"*).

The battery market is also dominated by Asian manufacturers: CATL, BYD, LG Energy Solution, Samsung SDI and Panasonic. Europe and the US are engaged in an intense race to build their own gigafactories, but at the same time, Chinese capital is playing an increasingly significant role in European battery investments, including in Poland (where Korean investments currently dominate). The drop in lithium-ion battery prices by around 25% in 2024 has increased the competitiveness of electric cars globally, although prices in Europe and the US remain higher than in China. In China, as many as two-thirds of models are cheaper than combustion cars, accelerating the pace of electrification[18].

New car brands manufactured in rapidly developing markets. Above is the Turkish TOGG, below is the Vietnamese VinFast. Sources: wikipedia.org under a Creative Commons Attribution licence

> There are many Chinese brands that have yet to appear in Europe, and when they do, they could pose a serious threat to our companies. Today, the Chinese have a technological and cost advantage and often benefit from enormous state support, receiving office or production space free of charge, for example. This is not the case at all in Europe. And while we may criticise this model, the truth is that Europe cannot manage the electric mobility transition without Chinese manufacturers - we need their technology and scale.

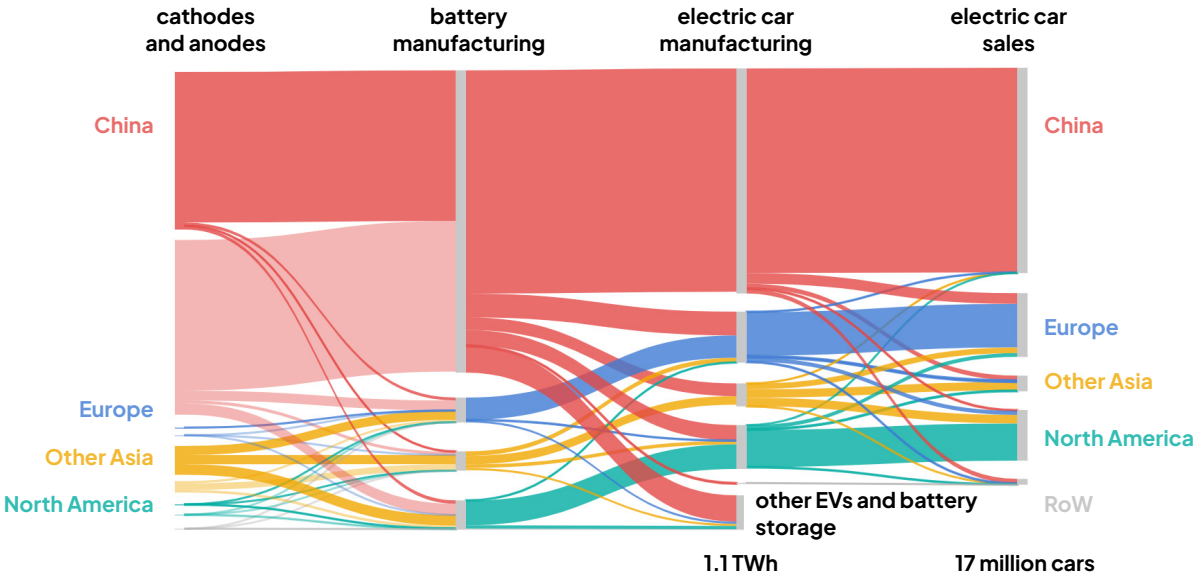
Marek Kwiczala
CEO, Equay

The dynamics of electric car sales in China are further boosted by subsidies and tax breaks introduced by the Chinese authorities over the years. As recently as 2023, buyers of electric cars enjoyed, among other things, an exemption from the 10% purchase tax, which significantly reduced the cost of acquiring an EV. In 2024, a large-scale vehicle replacement programme was also introduced, under which consumers could receive up to 20,000 yuan (approximately USD 2,750) for replacing an older car with a new vehicle. More than 6.6 million drivers took advantage of this programme, with around 60% opting for an electric vehicle. This policy, combined with declining battery prices and competitive models from domestic manufacturers, meant that by 2024, almost half of all cars sold in China were electric.

The number of public charging points worldwide has doubled since 2022, reaching 5 million in 2024. The segment of ultra-fast chargers (above 150 kW) and technologies enabling Vehicle-to-Grid (V2G) charging is developing particularly dynamically. The IEA report indicates that global infrastructure needs to grow ninefold to meet the projected demand in 2030. Smart charging solutions and grid integration of vehicles are an important direction, which can relieve the burden on the electricity system and increase energy security[18].

Tariffs and trade policies are increasingly shaping the global electromobility market. They are becoming tools, both to protect local producers in the US and Europe and to combat competitive pressures against dominant Asian players. In 2024, the European Union and the United States introduced additional tariffs on imports of electric cars and batteries from China to curb their growing cost advantage. In response, some Chinese manufacturers have begun accelerated investment in factories in Europe and Latin America to circumvent tariff barriers and gain access to markets.

At the same time, a number of emerging countries, such as Brazil, Thailand and Indonesia, have temporary duty exemptions for EVs, provided producers commit to launch local production. This mainly benefits Chinese manufacturers. As a result, tariff policy has become one of the main factors determining the location of investments, the structure of global supply chains and the pace of development of the EV and battery market. At the same time, protectionist policies in the form of tariffs are a relatively new instrument of economic competition, less frequently used in the past three decades, and it is still difficult to assess the consequences of their use for the future of the new mobility market worldwide.



China's dominance in the global electromobility supply chain
Source: Global EV Outlook 2025, iea.blob.core.windows.net

The context of technological and economic competition between individual blocs - the US, Europe and China - is also overlaid by the issue of access to critical raw materials necessary for battery production, such as lithium, nickel, cobalt and graphite. Currently, more than 70% of the world's extraction and refining of these materials is controlled by China, making it the dominant player in the entire supply chains of the sector. The EU and the US are responding to this by adopting supply risk mitigation strategies (friendshoring, diversification of sources). Meanwhile, battery recycling - aimed at recovering valuable raw materials - is beginning to be seen as a strategic element of economic security.

Europe

The automotive industry, particularly car manufacturing, has been a cornerstone of the European economy for decades

According to estimates by T&E (the European Federation for Transport & Environment), the industry contributes around EUR 330 billion to the EU's GDP and employs more than 3 million people in vehicle and component manufacturing. The entire value chain comprises around 14 million jobs, making the industry responsible for more than 10% of manufacturing employment in the EU's six member states[19].

In 2024, there were 255 assembly and manufacturing plants in the automotive industry operating in the EU and the UK, including car assembly plants, engine and battery production plants, and plants manufacturing commercial vehicles such as vans, heavy-duty vehicles and buses. Key figures show the diversification of production: 98 plants manufacture passenger cars, 30 manufacture vans, 32 manufacture lorries, 44 manufacture buses, 56 manufacture engines, and 65 manufacture batteries. Importantly, 121 plants (almost half of all vehicle assembly and manufacturing plants) are involved in the production of battery-powered electric vehicles[20].

These plants belong to 16 major European vehicle manufacturers: BMW, DAF Trucks, Daimler Truck, Ferrari, Ford of Europe, Honda Motor Europe, Hyundai Motor Europe, Iveco Group, Jaguar Land Rover, Mercedes-Benz, Nissan, Renault Group, Stellantis, Toyota Motor Europe, Volkswagen Group and Volvo Group. Production is spread across 15 EU countries, with the highest concentration of plants in Germany, France, Poland, the Czech Republic and Italy.

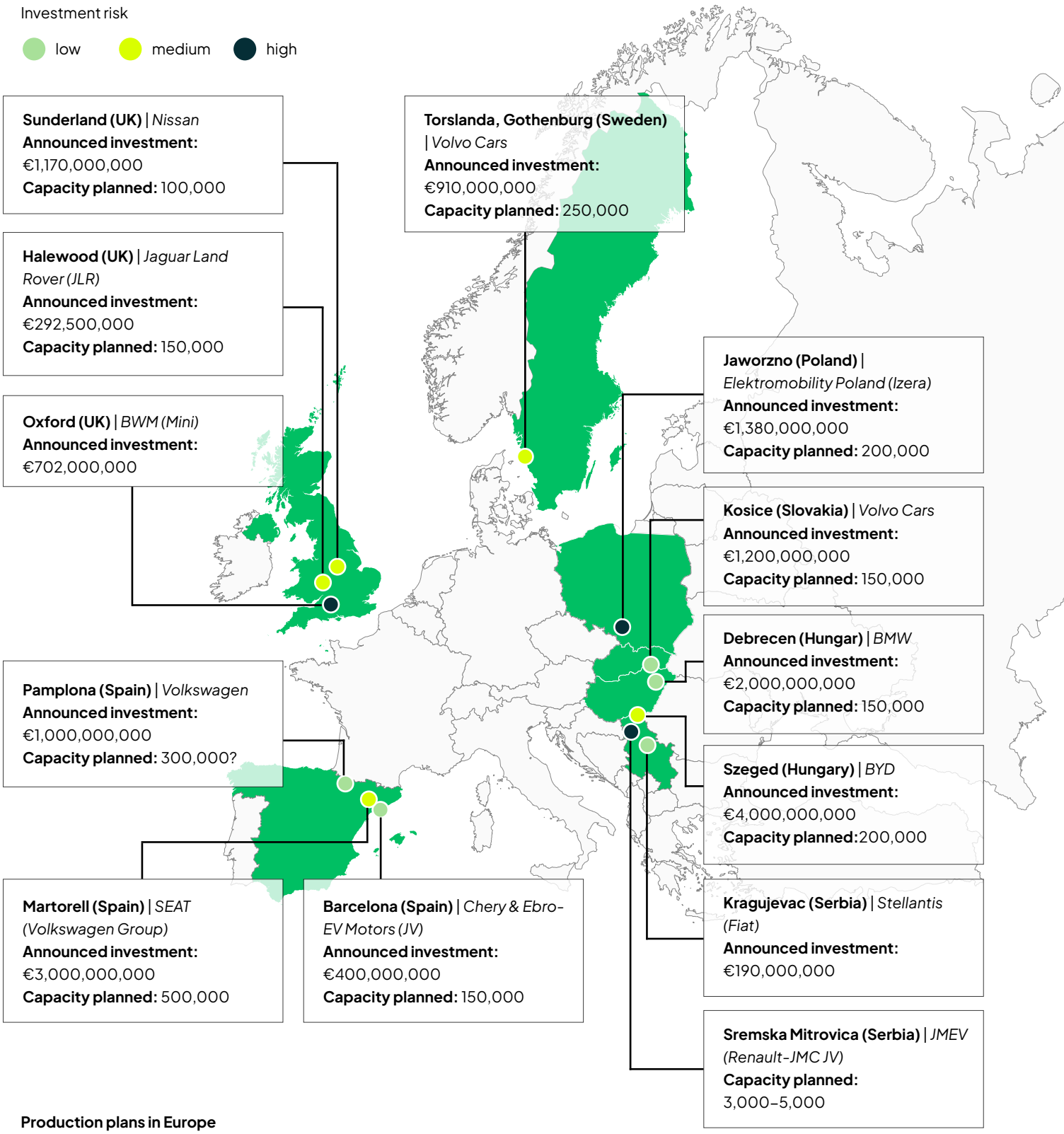
In 2024, approximately 1.8 million battery electric vehicles (BEVs) were manufactured in Europe, with sales reaching 2 million units. Germany remains the largest manufacturer with 1.2 million cars, followed by France with 330,000 units. According to current CO_2 emission regulations, a total of 9.6 million electric vehicles will need to be produced in order to meet the 2030 targets, which will require a significant expansion of production capacity. The current level of production will not be enough to avoid an increase in imports and thus a loss of market share to non-European manufacturers[21].

The answer to these challenges lies in new investments in manufacturing capacity. Out of the 13 projects analysed by the European Federation for Transport & Environment (T&E), five involve the construction of new greenfield factories and eight involve the conversion of existing assembly lines. If all of these plans are implemented, by 2027 Europe will have at least 2.1 million additional production capacity per year, bringing total production to 5.1 million electric vehicles. However, some of these initiatives are at risk of being delayed or interrupted due to uncertainty about the future of the market and regulation[21].

> Europe is late to the electromobility race compared to China. During this time, the Chinese have secured access to technology and raw materials and launched the revolution earlier - by now, they have 90% of the world's lithium processing capacity, and it is not the raw material itself, but the processing that determines their position in the value chain. Europe has opted for NMC technology, which is more efficient but also more expensive. Meanwhile, China has developed cheaper LFP technology on a large scale, which may have a shorter range but is absolutely sufficient for the average user. This has made Chinese cars affordable, mass-produced and cost-competitive, while Europe is still struggling with expensive solutions. That is why we are saying outright: without cooperation with Asian companies, primarily Chinese ones, Europe will not be able to transition to electromobility on its own.

Joanna Podkowa
Head of Strategic Supplier Development
Electromobility Poland

T&E has assessed all thirteen new projects according to four key criteria: project status, construction status, degree of location certainty, and public funding involvement. Based on this, the projects have been classified into three risk categories - low, medium and high - reflecting the likelihood of the project being implemented and the potential risk regarding its completion. Five projects with final investment decisions, currently under construction or already completed, which are scheduled to launch production in 2025, have been classified as low risk. These include 2 new BMW plants in Hungary and Volvo in Slovakia, as well as upgrades to Stellantis in Serbia, as well as Volkswagen and Chery in Spain. Together, they will provide 550,000 vehicles per year and at least 5,550 new jobs, with an investment of €4.8 billion. Five medium-risk projects, including BYD's new factory in Szeget, Hungary (€4 billion) and the conversion of the Seat-Volkswagen plant in Spain (€3 billion), have the potential to create 1.2 million vehicles and 11,000 jobs, but remain vulnerable to economic and political changes. Three projects have been identified as high-risk initiatives, including the Izera project in Poland (see page 43 for more on the fate of the Izera project), the upgrade of the Mini plant in England and the planned JMEV investment in Serbia. These are at an early stage and subject to high uncertainty regarding further investment decisions[21].



Production plans in Europe
Source: European Federation for Transport and Environment AISB, transportenvironment.org

At the same time, the European industry faces trade policy challenges. In October 2023, the European Commission launched an anti-subsidy investigation into China's electric vehicle supply chain, the largest of its kind in the history of EU-China relations. In June 2024, Chinese manufacturers were found to be benefiting from unfair public support, resulting in the imposition of provisional duties ranging from 17.4 % to 38.1%, and in the autumn of the same year, member states supported the maintenance of definitive measures.

In recent years, the automotive sector in Europe has begun to be further regulated by new initiatives from the European Commission to support the transition towards electromobility and decarbonisation of transport. In January 2025, Commission President Ursula von der Leyen initiated a strategic dialogue with the industry, which resulted in an action plan for the automotive sector published in March 2025[21].

The document covers five pillars: (1) innovation and digitalisation, (2) clean mobility, (3) competitiveness and supply chain resilience, (4) skills and social dimension, and (5) level playing field and business environment. The first three are the most relevant for entrepreneurs, including support for the development of autonomous and artificial intelligence (AI) technologies, investment in charging infrastructure, and strengthening battery production and access to critical raw materials[21].

The plan also includes measures to increase consumer confidence, including the introduction of *Battery Passport* by 2026, a revision of the *Car Labelling Directive* and increased transparency of charging costs under the AFIR (see box below)[21, 22, 23]. In the area of marketing and advertising, the focus is on countering greenwashing, particularly in online and social media campaigns[19, 24].

EU REGULATION AS A CATALYST FOR MARKET CHANGE

The development of the new mobility sector is largely governed by European laws and regulations. Regulations set the path for transition in transport and determine the pace of investment in most areas of the market: from battery production to charging infrastructure and the zero-emission vehicle fleet.

A key component and cornerstone of the green transition in Europe is the *Alternative Fuels Infrastructure Regulation* (AFIR). Among other things, Regulation 2023/1804 introduces minimum standards for network density and capacity along the TEN-T, a network of major transport links including road, rail, air, sea and river routes, as well as multimodal platforms and urban nodes. The TEN-T aims to improve the transport of people and goods within the Union itself and to reduce the environmental impact of transport. In addition to laying the groundwork for the creation of the TEN-T, the AFIR unifies payment systems, requiring the possibility of ad hoc payments at each charging station and the transparency of energy prices[25].

Another directive that directly affects the development of the electromobility market is Directive 2023/2413, known as RED III. Its aim is to reduce transport emissions and set a target for the share of RES in transport. In practice, this means enforcing fleet electrification and integrating RES with charging infrastructure[26].

Battery Regulation (2023/1542) introduces obligations regarding battery carbon footprint and responsible sourcing and recycling, supporting the development of a sustainable battery value chain[27]. The *Fit for 55 Package* aims to reduce greenhouse gas emissions by at least 55% by 2030, encompassing ETS reform, a carbon border adjustment mechanism, the development of renewable energy sources and the modernisation of transport and construction, accelerating the transformation of the automotive sector[28].

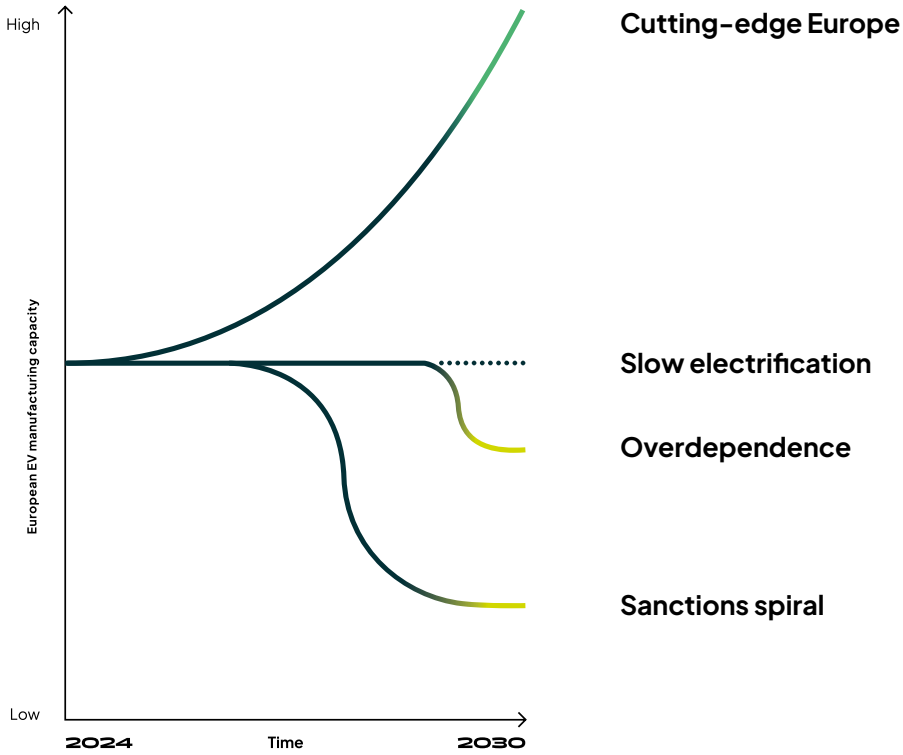
The EPBD (*Energy Performance of Buildings Directive*) romotes the energy efficiency of buildings, the integration of renewable energy sources and the installation of EV charging points, thus supporting the development of electromobility infrastructure[29]. The *Critical Raw Materials Act* guarantees access to strategic raw materials, such as lithium, cobalt and nickel, which are necessary for the production of batteries and electric vehicles, minimising the risk of supply chain disruptions[30]. *Eurovignette* on the other hand, introduces sustainability-related road tolls for lorries, taking into account emissions and noise, promoting low-emission vehicles in road transport[31]. Meanwhile, the *Data Act* gives users of connected devices control over the data they generate, supporting innovation in mobile services and making industrial processes more efficient[32].

Despite these measures, the dynamics of the electric vehicle market in Europe are not the same as global trends. In 2020, BEV sales in Europe and China accounted for around 5% of all passenger cars, and only 2% in the US. Four years later, China has reached 27% market share, while Europe has stalled at 13% and the US at 8%. Integrated industry and consumer policies have played a key role in the success of the Chinese market: from subsidies and tax breaks to the rapid development of charging infrastructure, which has significantly reduced operating costs and increased convenience[23].

However, consumer analyses indicate that the differences in market shares are not due to lack of interest. In China, as well as in Europe and the US, more than a third of consumers say they would like to purchase a BEV. Practical barriers remain a problem: 40% of users complain about range issues, charger availability and charging times. The response to these concerns in China and the US has been the rapid growth of the PHEV (Plug-in Hybrid Electric Vehicle) and EREV (Extended Range Electric Vehicle) segments, which combine the economic benefits of driving on electricity with the ability to use the internal combustion engine for longer journeys. Between 2020 and 2024, PHEV/EREV sales in China grew at a rate of more than 100% per year, while BEV sales grew at a rate of 55%. In Europe, the trend is the opposite: BEVs recorded a 28% increase, while PHEVs and EREVs only saw a 9% increase, which indicates a stronger focus of policy and the market on full electrification[23].

Based on analyses by policy experts, four scenarios for the development of the industry up to 2030 were created. In the „cutting-edge Europe" scenario, the Union and member states introduce comprehensive policies to support the development of domestic production capacity, leading to competitively priced vehicles and a growing share of local technologies, including batteries. In the „overdependence" variant, the EU becomes completely dependent on Chinese supplies, resulting in the marginalisation of European brands and the loss of an industrial base. The „slow electrification" scenario assumes gradual adaptation, with Chinese and American manufacturers dominating the market and limited competitiveness of European companies. The most pessimistic option, known as the „sanctions spiral", involves an escalation of the conflict over Taiwan and a trade war with China, leading to a collapse in electric vehicle production in Europe as a result of cut-offs in access to key components and raw materials[22].

It is also worth noting that the European automotive sector accounts for one-third of total research and development (R&D) investment in the EU. In 2023, carmakers invested around €85 billion in R&D activities, which is more than double that of the pharmaceutical and biotechnology sectors[33]. It is also almost 3 times the investment of Japan, China and the US for that year. It is therefore worth emphasising that Europe, despite its current difficulties, still has some of the most powerful R&D capacities in the world. With consistent investment and a positive economic backdrop, this could translate into regaining competitive advantages and increasing innovation in the European new mobility market.



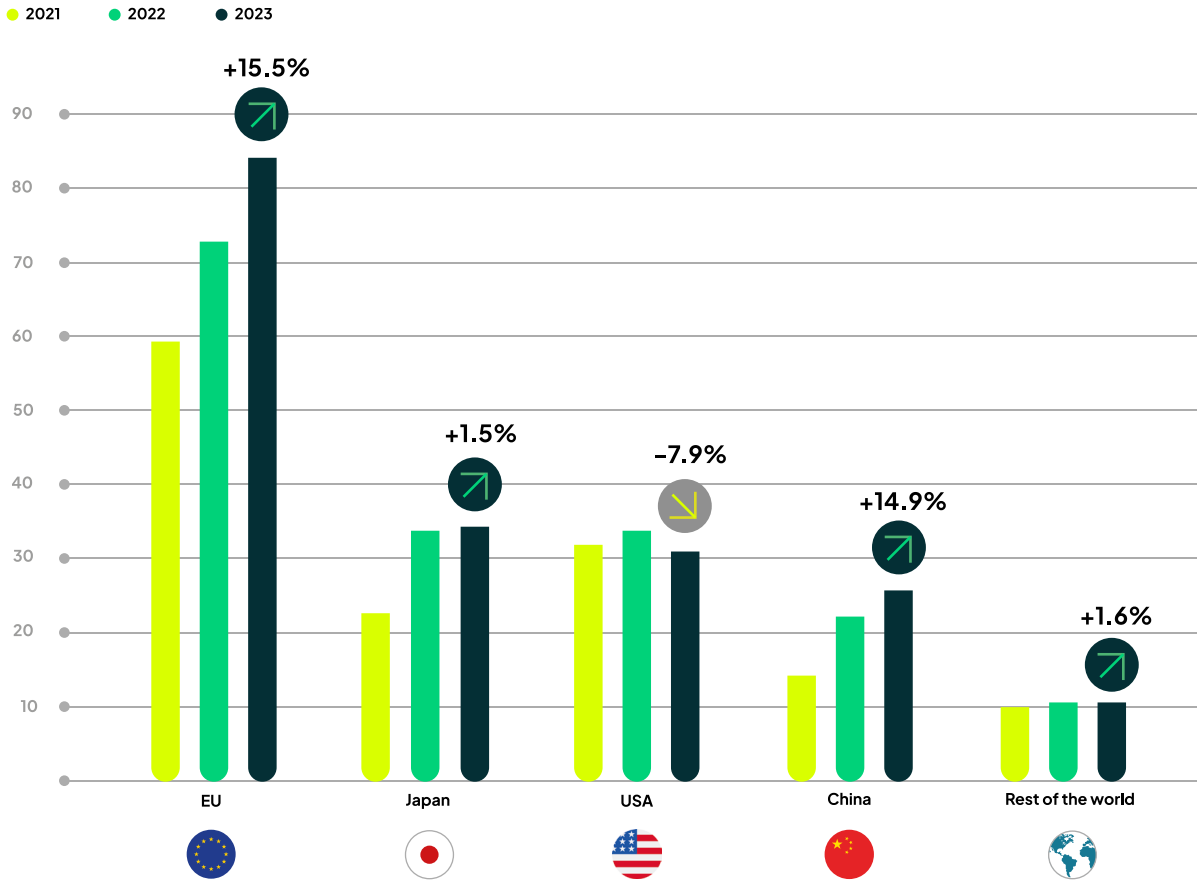
Market scenarios for the electromobility sector in Europe
Source: European Parliamentary Research Service, *The future of European electric vehicles* (2024), europarl.europa.eu

Despite intensive investment, charging and alternative fuel infrastructure remains underdeveloped. More than half of the member states have less than one publicly accessible charging point per 1,000 inhabitants, and 60% of all stations are located in France, Germany and the Netherlands. There are fewer than 300 hydrogen refuelling stations across the EU. Currently, less than 4% of cars on European roads are EVs[24]. At the same time, the production of commercial vehicles in the Union has declined significantly in 2024, while the production of EVs has grown rapidly over the last decade. China accounts for a third of global vehicle production, maintaining its position as the largest producer[34].

At Scania Industrial Batteries, we focus on advanced battery solutions for industrial vehicles and machinery, but energy itself is only one part of the puzzle. For electromobility to grow sustainably, it is equally important to develop the supporting infrastructure and offer new types of services - from intelligent charging and energy management to modern usage models for electric vehicles and machines, such as leasing and subscription-based solutions.

Across the Scania Group, we see how these elements are beginning to form a coherent whole: autonomous vehicles, charging ecosystems, and operational services all demonstrate that the future of transport is an integrated system in which the product, infrastructure, and digital services work seamlessly together.

Waldemar Algrzym
Managing Director
Scania Industrial Batteries in Poland

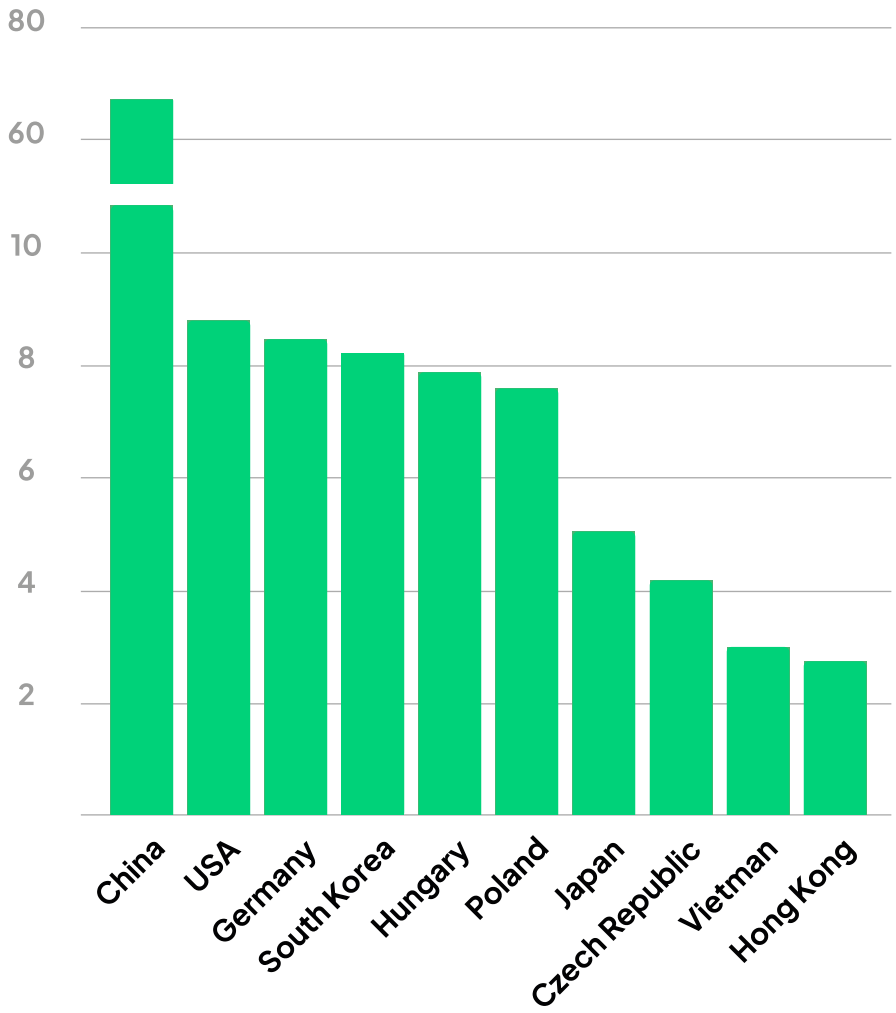


Global automotive R&D investment
Source: ACEA, *The Automobile Industry. Pocket Guide 2025/2026*, acea.auto

Regional economic outlook

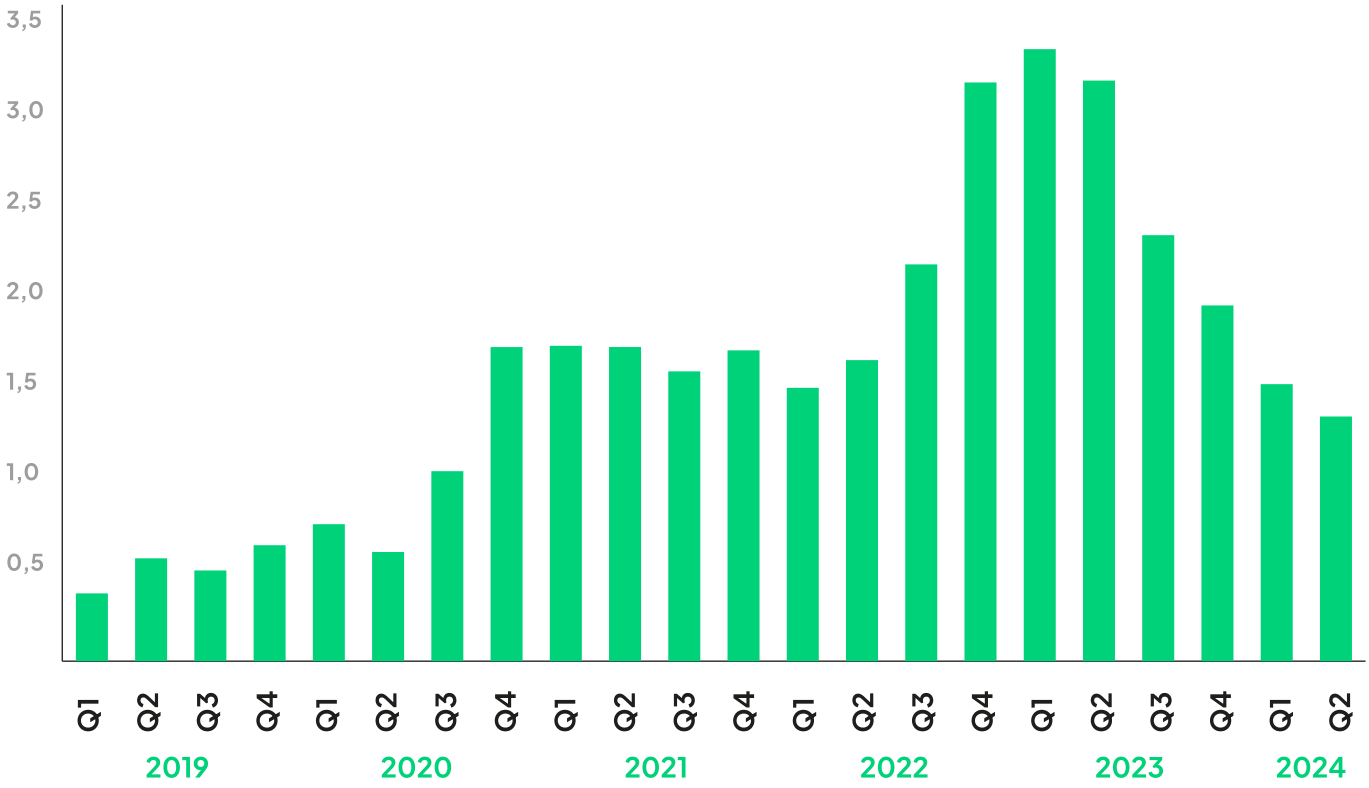
Poland's place in the global value chain of the new mobility sector

Among countries producing lithium-ion batteries, Poland is one of the world's leading exporters and has been in the top positions in Europe for several years (dominating exports of cells, modules and systems). According to trade statistics, in 2023, Poland was the world's second-largest exporter behind China in the HS 850760 group (lithium-ion batteries), with an estimated export value of about USD 11.8 billion (ca. 7% share in global exports), and was ahead of such countries as Hungary and Germany. In 2022, the total battery production capacity in Poland was 73 GWh. This was 35 GWh higher than Hungary, which ranked fourth in the global ranking of producers. It was also more than double the capacity of the German battery industry, whose capacity reached 31 GWh in the same year. This result was the effect of many years of growth and the construction of generation capacity in the country (including by global investors)[35].



TOP10 battery exporters worldwide in 2024 (in USD bn)
Source: ITC calculations based on UN, COMTRADE and ITC statistics

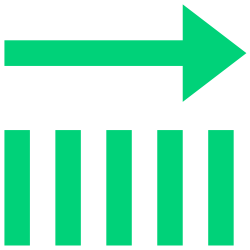
Nevertheless, 2024 brought a significant decline in the value of exports. According to the cyclical analysis of the Polish Economic Institute, exports fell by 58.2% year-on-year in H1 2024 and by around 28–36% year-on-year in January–July 2024. This was due to such things as the decline in BEV registrations in Germany following the sudden end of subsidies (*Umweltbonus*) in December 2023[36]. As a result, Poland's position in the global ranking in 2024 has declined (6th place worldwide). Despite the decline in export value, production in Poland has remained high (estimated at over EUR 5 billion in battery value), and Poland's role in the EU battery value chain has remained unchallenged[37].



Value of exports of lithium-ion batteries in Poland in 2019–2024 (in EUR bn)
Source: Polish Economic Institute, *PIE Economic Weekly 19 September 2024*, pie.net.pl

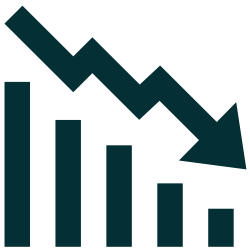
In conditions of oversupply of production capacity (especially in Asia)[38] and the growing dominance of LFP (lithium iron phosphate) chemistry, which already accounted for nearly half of the global battery market by 2024[39], manufacturers were forced to renegotiate prices and adjust their product mix. Consumers - acting under price and regulatory pressure - sought to optimise costs and diversify supply, which contributed to volume shifts and contract delays in the short term.

SCENARIOS FOR POLISH BATTERY AND EV EXPORTS



Baseline scenario (stabilisation and moderate rebound): with the stabilisation of trade rules (EU tariffs on BEVs from China apply for 5 years) and the entry into force of elements of the *Battery Regulation* (footprint declarations from 2025, maximum thresholds from 2027), European manufacturers' demand for EU-made batteries may gradually increase, especially in projects geared towards a low-carbon supply chain. This is conducive to restoring Poland's export volumes to levels similar to those of 2023 within a 2–3-year horizon.

Expansion scenario (acceleration): a further decrease in the cost of cells and systems (economies of scale, cheaper raw materials, LFP/NMC optimisation) and higher availability of BEV models in the mass market price range in the EU may bring a stronger rebound in BEV sales (especially outside Germany). Under this scenario, Poland — taking advantage of its expanded capacity and integration with EU OEM chains — could regain second place globally (in terms of export value), although this requires consistent compliance with carbon footprint requirements and cost competitiveness



Risk scenario (prolonged correction): continued weak demand in Germany and other EU markets, pressure from imports of finished BEVs (including Chinese brands despite tariffs), a rapid move by OEMs to set up production in new EU countries or stricter environmental requirements could prolong lower component export volumes from Poland. This would require an acceleration of diversification and innovation related to, for example, recycling and the chemical industry.

An additional risk factor is the implementation of the *Battery Passport* regulation in the variant proposed by France. France advocates a greater emphasis on the carbon footprint of the country of origin when assessing battery compliance, which would put Polish production at a competitive disadvantage.

THE DOMINO EFFECT AFTER THE EXPIRY OF SUBSIDIES IN GERMANY – CONSEQUENCES FOR THE REGION AND POLISH EXPORTS

One of the reasons for the decline in Germany was the German government's decision at the end of 2023 to stop accepting new applications for subsidies for the purchase of zero-emission cars (*Umweltbonus*) virtually overnight. In 2024, this translated into a significant decline in BEV registrations. For example, in July 2024, the decline reached approximately 37% (year-on-year)[40], and in annual terms, approximately 27% fewer BEVs were registered in 2024 than in the previous year[41]. This event had direct implications for the demand for batteries and drive systems imported from Poland, especially since Germany is the main recipient of Polish batteries. The demand effect in Germany was one of the key mechanisms for the decline in Polish exports in 2024.

In addition, there was prolonged uncertainty regarding the pace of implementation of support policies[42] as well as the base effect, and the investment cycle. After an exceptionally strong 2023 (record exports), the capacity and contracts prepared for 2024 were „confronted" with a year of demand correction in key EU countries (especially Germany, see box above).

Poland is not a significant exporter of BEVs (unlike zero-emission buses), but BEV registrations are growing in the domestic market. At the end of July 2025, the total number of battery electric vehicles (BEVs) registered in Poland exceeded 100,000 (see page 46 for more on this). In turn, the share of BEV ads in the total number of used vehicle listings on the OTOMOTO website was 1.1%[43].

Unlike the BEV passenger car segment, Poland maintains a leading position in the export of zero-emission buses in Europe - mainly thanks to Solaris Bus & Coach. In 2024, Solaris delivered 1,525 vehicles (83% of which were low- or zero-emission vehicles), and its order book exceeded 1,600 units for 2025. The factory in Bolechowo remains one of the main beneficiaries of the „green revolution" in urban transport. A steady demand for e-buses (including hydrogen-powered ones) diversifies domestic electromobility exports and mitigates fluctuations in the BEV passenger car and battery segments[44].

Development of the new mobility sector in Poland

KEY INVESTMENTS

Poland has established itself as one of the most important centres of electromobility in Europe in recent years, primarily by becoming a leader in the production and export of lithium-ion batteries.

In 2022, e-mobility investments in Poland exceeded EUR 1.4 billion, accounting for over EUR 3.7 billion of foreign investment in the entire industry nationwide[45]. According to the Polish Alternative Fuels Association and the Ministry of Development and Technology, the share of this segment in Polish exports already exceeds 2.4%, and the value of foreign sales has increased from around PLN 1 billion in 2017 to over PLN 38 billion (EUR 8.24 billion) in 2022[46].

> Poland has the second-largest production capacity of battery cells in Europe - about 73 GWh per year - which corresponds to roughly 6% of global capacity (and as much as 60% of European capacity).

Thanks to further investments by foreign corporations and the expansion of domestic companies, this index is steadily increasing[47]. TThis dynamic development of the sector translates not only into the value of exports, but also into employment: tens of thousands of jobs have been created, both in production and in the engineering, logistics and R&D sectors. According to analyses by the Jagiellonian Institute and ElectroMobility Poland, the current share of electromobility in Polish GDP is about 1.4%, and may increase to as much as 3.9–5.2% by 2040, making this industry one of the drivers of the country's economic development[48]. The scale of investment shows that Poland has become an attractive location both for global market leaders such as LG Energy Solution, SK Nexilis, Umicore and Mercedes-Benz, as well as for domestic companies like Solaris, PESA and FPS Cegielski, which are building their own technological and manufacturing competencies.

The LG Energy Solution plant in Biskupice Podgórne remains Poland's largest-ever battery project. It has been operating since 2016 and is now Europe's largest lithium-ion cell factory. It currently employs around 10,000 people[49],and several hundred more jobs are planned to be created due ot the expansion of production capacity. The plant's annual production capacity is expected to eventually reach 115 GWh. The current 86 GWh is the best result in Europe, which makes it possible to produce approximately 700,000 EV batteries per year[51]. In 2024, the company announced the expansion of its operations to include the production of batteries for Energy Storage Systems (ESS), further strengthening its strategic position on the European market.

LG Energy Solution plant in Biskupice Podgórne
Source: wroclaw.pl

Another major undertaking is the investment project launched by the Belgian Umicore corporation in Nysa, which is being carried out as a joint venture with PowerCo (Volkswagen). Called „Ionway", the plant for the production of active cathode materials is ultimately expected to reach a capacity of 160 GWh per year. The total project value is estimated at EUR 1.7 billion, of which EUR 350 million is a government grant[50]. The company has started recruitment in 2024 and plans to employ between 450 and 900 people. Production is expected to launch in mid-2026, with the plant set to become a major supplier of battery components in Europe[51].

Equally important is the investment project by South Korea's SK Nexilis in Stalowa Wola, where a production plant for ultra-thin copper foil, a key component in lithium-ion batteries, is being established. In the first stage, investments amounted to around PLN 3 billion, but the target investment value is expected to reach up to PLN 10 billion. The project has also received USD 133 million in grant support. Employment in the first phase is expected to reach at least 500 people, and production, scheduled to start in 2024, will reach 50,000 tonnes of copper foil per year[52].

The German Mercedes-Benz Group also holds a strong position in this line-up. It has been operating an engine and battery factory in Jawor since 2019 and has been building an electric van production plant there since 2023. The project is valued at about EUR 600 million (PLN 2.5 billion) and will employ 2,500 people. The Jawor plant is one of Mercedes' key production centres on the European market in the zero-emission vehicle segment[53].

In turn, Solaris Bus & Coach has been the market leader in electric and hydrogen buses for years. In 2024, the company's revenues reached EUR 927 million, representing a 13% increase over the previous year. Zero-emission vehicles accounted for approximately 83% of sales, confirming the company's position as one of Europe's leading exporters in this segment[54]. AutoSan from Sanok has a smaller but equally significant market share. It is developing electric bus designs with replaceable batteries, in line with the trend for medium-sized vehicles intended for local transport[55].

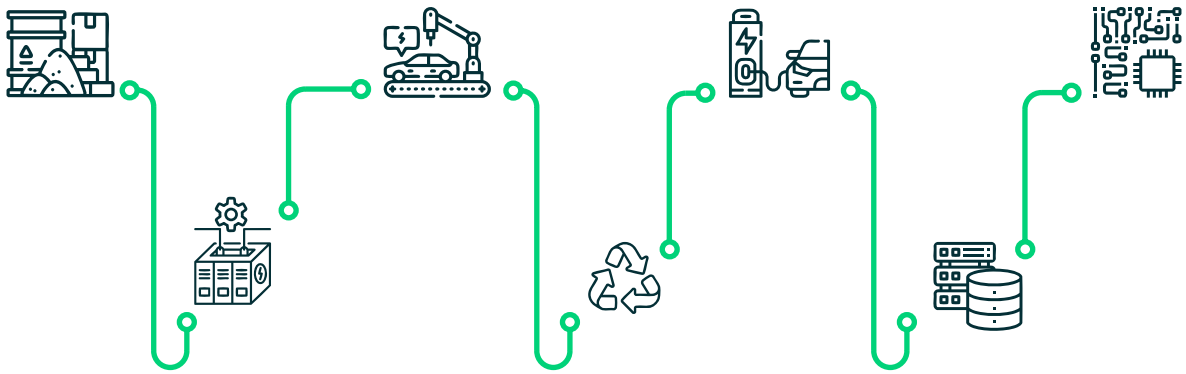
Urbino Electric, a fully emission-free bus from Solaris
Source: Solaris, solarisbus.com

Raw materials and components
(copper foil — SK Nexilis, electrolytes — Capchem, battery systems — BMZZ)

Electric vehicle production
(Solaris, PESA, Mercedes, Adaptive Motors, Stellantis)

Chargers and charging infrastructure
(Enelion, Greenway, Equay)

Automotive contract electronics
(Flex, Jabil, Lacroix)



Cell and battery production
(LG, Umicore/PowerCo, Daimler)

Recycling and the circular economy
(Elemental Strategic Metals, Eneris B&R, MB Recycling, POSCO Holdings)

Production of energy storage system
(Lyten, Scania)

New mobility ecosystem in Poland
Source: Own elaboration based on publicly available data

POLAND'S FIRST HYDROGEN LOCOMOTIVE

PESA unveiled Poland's first hydrogen-powered shunting locomotive at the TRAKO International Railway Fair in Gdańsk in 2023. This is a groundbreaking project, carried out in cooperation with PKP and the Orlen Group, which opens a new chapter in the decarbonisation of rail transport.

The locomotive uses fuel cells and hydrogen storage tanks as an energy source — the only by-product of its operation is water vapour. It can reach speeds of up to 120 km/h and has an operational range of hundreds of kilometres, making it a viable alternative to diesel units on non-electrified lines.

The unveiling of the hydrogen locomotive demonstrates that Poland is emerging as a location for innovative solutions that respond to European climate goals and global trends in the transport sector.

PESA is investing nearly PLN 500 million in expanding its plant in Bydgoszcz, where it plans to manufacture and deliver 25 such hydrogen locomotives. To that end, new construction and assembly halls as well as a new parts warehouse will be built.

SM42-6Dn hydrogen locomotive
Source: TVP Bydgoszcz, bydgoszcz.tvp.pl

PESA, based in Bydgoszcz and with facilities in Mińsk Mazowiecki, plays a significant role in the railway sector and has been developing hybrid and electric units for several years. In 2024, the company generated revenues of PLN 2.57 billion, with a net profit of nearly PLN 24 million. The company currently employs around 4,000 people and is investing PLN 500 million, creating an additional 500 jobs. PESA's order book is already worth over PLN 14 billion, which demonstrates the strong push towards electromobility in the railway market[56].

Investments and projects developed by rolling stock manufacturers, including Fabryka Pojazdów Szynowych „H. Cegielski" (FPS Cegielski) in Poznań, part of the ARP Group, which for several years has been improving its expertise in the field of electric rolling stock, especially electric multiple units and hybrid multiple units. Several contracts have already been signed for the delivery of both types of vehicles, including for the Lubuskie and Lubelskie Voivodeships. In 2024, FPS Cegielski was awarded a contract for the supply of 300 railcars (plus 150 railcars as an option) for PKP Intercity, estimated at PLN 4.239 billion gross, and up to PLN 6.358 billion with the optional carriages[57].

In turn, NEWAG S.A. from Nowy Sącz is one of the most dynamically developing private railway companies in Central and Eastern Europe. In the first five months of 2024, the Newag Group signed contracts with a total net value of PLN 3.435 billion, including for the delivery of 35 hybrid multiple units, 96 EU160, as well as 15 and then 63 EU200 multi-system locomotives (with a maximum speed of 160km/h and 200km/h, respectively, with an option for a further 32 locomotives) for PKP Intercity[58] and several dozen Impuls 2 electric multiple units in various versions for such operators as Koleje Śląskie (*Silesian Railways*) and the Pomeranian Voivodeship[59]. Throughout 2023, Newag generated revenues of PLN 1.6 billion. These results testify to a strong order book that guarantees production continuity and high operational efficiency[60].

BMZ Poland from Gliwice, a European leader in the production of smart battery systems for bicycles, mopeds, power tools, buses and warehouse vehicles, also plays an important role. The company employs more than 800 people, has been in business since 2010 and is constantly expanding its facilities, including halls and laboratories[61]. Capchem Poland's investment project in Śrem is similar in nature. The plant, owned by the Chinese Capchem Group from Shenzhen, manufactures electrolytes for lithium-ion batteries. The investment in this project amounted to around EUR 50 million and employment is estimated at around 60 people[62].

In 2025, Adaptive Motors Poland's announcement of the construction of the first Polish electric car factory in Kleszczów caused quite a stir. The company plans to launch production of the VanPL electric delivery van in Q3 2028. The value of the project is estimated at PLN 590 million (part of which is to come from the National Recovery Plan), and it will employ over a thousand people[63]. Meanwhile, in Tychy, Stellantis began preparations in 2023 for the production of the electric Jeep Avenger and e-Ducato. The investment budget was estimated at over PLN 755 million[64].

Also worth mentioning is Daimler's project in Jaworzno to build a battery factory for EVs. The outlays for this are estimated at around EUR 200 million. The project is part of a strategy to create a complete electromobility value chain in Poland, combining the production of cells, components, finished vehicles and energy storage systems[65].

The Scania Group, now a major manufacturer of buses and commercial vehicles, has strengthened its presence in Pomerania by opening the Global Knowledge Centre Europe in 2025. This is one of three global HR shared services centres, alongside locations in South America and Asia, focusing on handling human resources and operational processes for the entire organisation. The decision to set up the Centre in Gdańsk was made due to the availability of qualified staff, the local market's experience in shared services and the stable economic environment. The Centre will soon provide employment for experts in various fields of human resources. Still, this is not Scania's only venture in the region. The company has acquired the industrial division of Northvolt Systems in Gdańsk and now operates a production facility there, employing around 150 people to develop electrified solutions for off-road vehicles. The presence of both the Knowledge Centre and the ex-Northvolt site demonstrates Scania's strategic commitment to the development of electromobility and shared services in the region, making Gdańsk a key location in the group's structure[66].

> Northvolt, which was supposed to be a European alternative to Asian dominance in the battery market, now has a chance to be reborn under the banner of the US company Lyten. Lyten is an innovative, highly technologically advanced company dealing with so-called supermaterials. Their groundbreaking solutions include 3D graphene, used in the cathode of lithium-sulphur batteries. The solution allows sulphur, which would normally degrade, to be stabilised, making the battery more efficient and durable. Lyten has a broad portfolio of innovative technologies, and this acquisition gives them the ability to rapidly scale their operations in Europe. This provides them with a significant competitive advantage and opens up opportunities for us in the region to participate in a venture that, unfortunately, Northvolt has not been able to fully realize.

Robert Chryc-Gawrychowski
CEO, Lyten Poland

In turn, July 2025 saw Lyten, a US company specialising in innovative lithium-sulphur solutions, acquire Northvolt Dwa ESS in Gdańsk - Europe's largest battery energy storage system (BESS) factory, with an area of 25,000 m² and an annual production capacity of up to 6 GWh, with the possibility of expansion to over 10 GWh. The plant was operational from 2023 and had orders to secure production until 2026. Lyten resumed production almost immediately, fulfilling existing orders and expanding its product range to include BESS systems based on lithium-sulphur batteries, which offer high energy density, improved thermal stability and lower raw material costs (without the use of nickel, cobalt and manganese). The acquisition has solidified Lyten's position in the European energy storage sector and highlighted the strategic importance of local engineering expertise and the use of Gdańsk's port infrastructure[67].

ELECTROMOBILITY POLAND (EMP) HUB

Electromobility Poland (EMP) is a state-owned company established to accelerate the transition of the Polish automotive sector to electromobility and modern technologies. EMP's activities are wide-ranging; the company acts as a production and development hub, which is intended to stimulate long-term economic and technological change in the country.

A key element of the company's activities is the construction of a factory in Jaworzno, where a new generation of electric cars will be built. The site, designed to expand over many years, is expected to reach a production scale of up to 300,000 vehicles per year, creating thousands of stable jobs.

Electromobility Poland aims to collaborate with global technology leaders, particularly those based in Asia, where the most advanced and cost-competitive battery technologies are currently developed. Partnering with a strong industry player opens up access to state-of-the-art platforms and know-how, while also creating space to gradually build national engineering competencies. In this way, EMP is not just an importer of solutions, but actively participates in technology transfer, which in the long term is expected to allow Poland to develop in this sector on its own.

> If Poland does not build its own R&D and decision-making capabilities, we will end up as a supplier of cheap labour. Production based on such a competitive advantage can easily be relocated. Automotive is all about research, development, design and strategic decisions. Half of all automotive jobs in countries like Germany and France are held by engineering and management staff. In Poland or Slovakia, it is only 20%. This demonstrates that the Polish automotive industry focuses on the production of vehicles and parts, but we have no influence on IP development or strategic decisions. This will not change unless we own the projects and investments. Electromobility Poland is intended to be a tool that will change this situation by creating a decision-making centre that not only manufactures but also develops technologies, awards contracts and opens up opportunities for Polish engineers. Only in this way can we go higher up the value chain and create a sustainable competitive advantage.

Joanna Podkowa
Head of Strategic Supplier Development
Electromobility Poland

Integrating the local supply chain is also an important part of the project. Automotive is an industry with a significant impact on the labour market and economy, which is why EMP emphasises sourcing as many components and services as possible from local companies. Including domestic companies in the production process not only creates additional jobs but also strengthens the position of national suppliers in the global structures of the industry. In the long term, this should enable Polish companies to develop their own innovations and gradually move up the value chain, increasing their margins and competitiveness.

Poland also has high competencies in battery recycling. One of the largest investment projects related to this industry is the Elemental Strategic Metals site in Zawiercie. Launched in 2024, this plant has the capacity to recycle 12,000 tonnes of batteries per year, which corresponds to approximately 28,000 car battery packs. It is the first facility of its kind in CEE and one of the largest in all of Europe. The undertaking, co-financed by the EU with over EUR 70 million, includes not only black mass recovery, but also a planned facility for lithium extraction and cathode material production, to be established by 2026. The project is being carried out in cooperation with the US company Ascend Elements, with which Elemental has established AE Elemental. This cooperation envisages further expansion into the European market, including the construction of a plant in Germany with a target capacity of 25,000 tonnes per year. As a result, Poland has become an important link in the European battery sector value chain and one of the leaders in the region[5, 68].

The Elemental Strategic Metals Group's state-of-the-art lithium-ion battery recycling plant in Zawiercie
Source: Elemental press materials

The undertaking in Zawiercie has also been recognised as strategic for the entire European Union. The European Commission has included the POLVOLT project on its list of projects of particular importance to contribute to Europe's independence from imports of critical raw materials. The facility in Zawiercie has been designed as an environmentally friendly site, powered by renewable energy and equipped with its own 37 MW photovoltaic farm, which is in line with the EU's low-carbon policy[69].

Eneris is also a major investor in the battery recycling market, having launched its Eneris B&R (Batteries & Recycling) facility in Żarki. It is currently the largest operational lithium battery recycling plant in Europe. The site is designed to process 27,000 tonnes of batteries per year, making a significant contribution to addressing the recycling capacity deficit in Europe. The plant uses a sustainable, mechanical processing method powered by renewable energy, enabling the recovery of black mass — containing lithium, nickel and cobalt — as well as metals such as copper, aluminium and polymers, which are converted into alternative fuel[70]. Other significant investments in the circular economy include the plants of MB Recykling and the Korean company POSCO Holdings in Brzeg Dolny.

Poland is also becoming increasingly prominent in the field of battery energy storage systems. In Żarnowiec (Pomeranian Voivodeship), construction has just begun on one of the largest BESS facilities in Europe. The PGE Group's PLN 1.5 billion project will ultimately reach a capacity of approximately 981 MWh and a power of 262 MW — almost as much as the total power of all large-scale and prosumer energy storage facilities currently operating throughout Poland. The batteries for the site are being made at the LG Energy Solution plant in Biskupice Podgórne. The Żarnowiec Energy Storage Facility is scheduled to be launched in mid-2027.

STATE OF THE NEW MOBILITY SECTOR AND GROWTH PROSPECTS

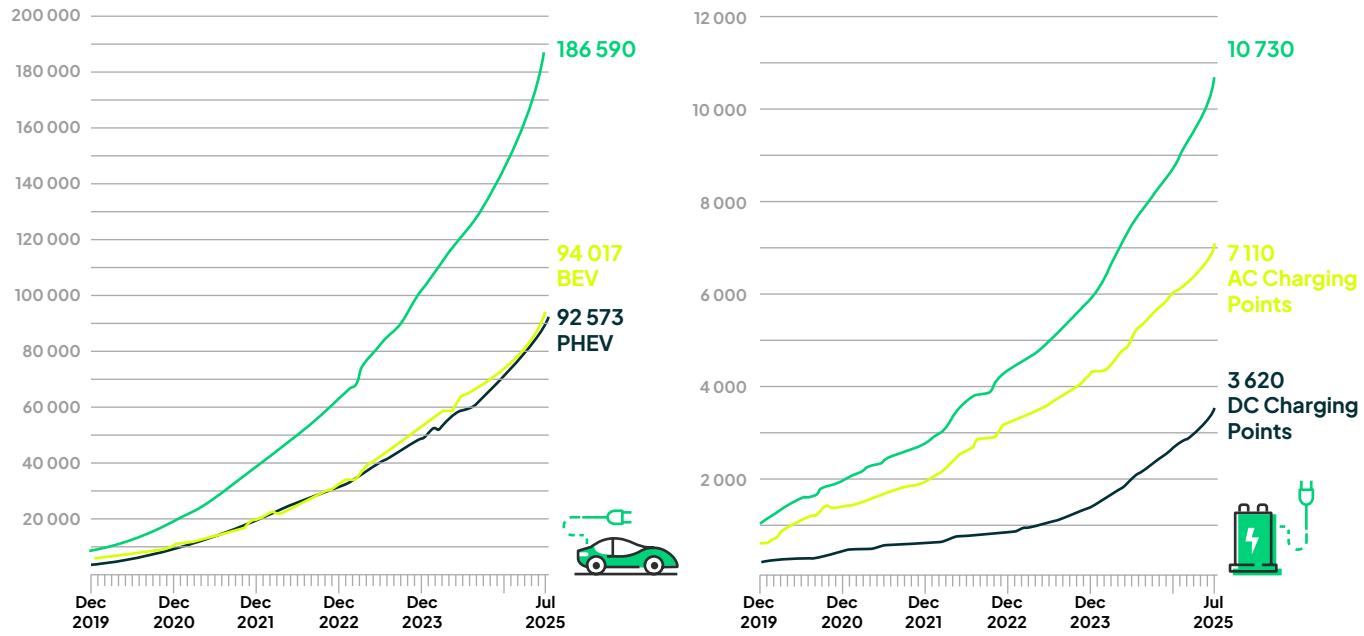
The Act on Electromobility and Alternative Fuels (Dz.U. /Journal of Laws/ of 2018, item 317, as amended) is one of the most important regulations concerning the Polish electromobility industry. It defines vehicles and infrastructure, emphasises the importance of public charging station operators and charging service providers, and regulates the obligation to install charging infrastructure in residential buildings with a large number of parking spaces. Examples of practical solutions introduced by the Act include Low Emission Zones (LEZs), which have already been introduced in Warsaw, Kraków and Wrocław, among other cities. They involve designating an area in the city where only vehicles that meet specific emission standards are allowed to operate. The act is backed by a range of subsidies and support programmes designed to encourage individuals and businesses to join the green transition[71].

> Legislation at EU and central government level has an absolutely decisive, direct impact on the development of electromobility in Poland and other member states. The most important pieces of legislation in this area include Regulation (EU) 2019/631, which imposes obligations on automotive companies operating in the European Union to gradually and significantly reduce the emissions of passenger cars and light commercial vehicles sold. To avoid steep fines, OEMs must sell more and more zero-emission vehicles - in practice, this means BEVs. This results in an expansion of the model range, an increase in travel range and charging power, as well as a pricing policy that is increasingly attractive from the buyers' perspective. It is this piece of legislation that introduces the much-talked-about „ban" on the sale of combustion cars from 2035.

Jan Wiśniewski
Director of the Research and Analysis Centre
Polish New Mobility Association (PSNM)

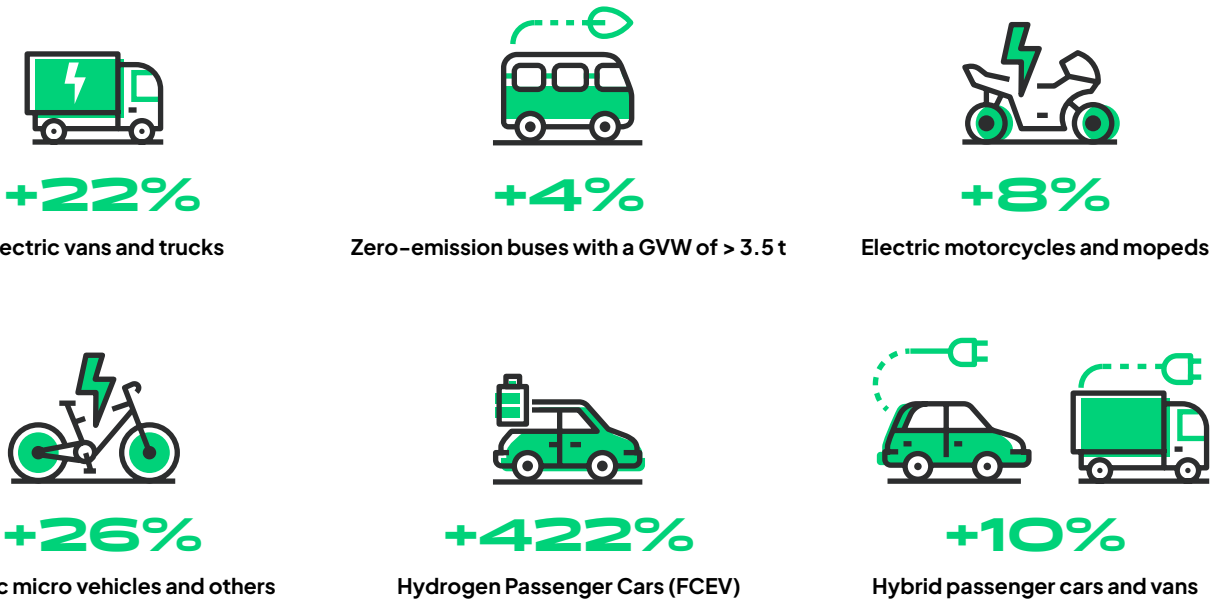
In addition to EU and national regulations, local initiatives are also being implemented in Pomerania. Gdańsk has already adopted an Electromobility Development Strategy until 2035, which indicates directions for the expansion of the charging network and electrification of public transport. Further, a Sustainable Urban Mobility Plan (SUMP) has been developed for the Gdańsk-Gdynia-Sopot Metropolitan Area (OMGGS), which combines electromobility issues with transport policy and spatial planning[72].

The year 2025 is a landmark time for new mobility. PSNM data shows that there are as many as 186,000 electric cars on Polish roads as of July 2025. This represents an increase of as much as 75% compared to the number of electric cars from the previous year. This figure includes 94,000 battery electric vehicles (BEVs) and 92,000 plug-in hybrid vehicles[73].



The number of electric passenger cars and charging points is growing rapidly. Figures as of July 2025
Source: psnm.org

Apart from passenger cars, the number of registered electric delivery vehicles is also steadily increasing. With a stable growth of 22% compared to last year, there are 9,600 such vehicles registered in Poland as of July 2025. A high percentage increase can also be seen in the case of electric micro vehicles[75].



PNSM Electromobility Counter. Development dynamics of the new mobility sector in Poland
Source: psnm.org

The growth for zero-emission buses (1,600), electric mopeds and motorcycles (mopeds: 23,000, motorcycles: 3,000) and hydrogen passenger cars (530) was lower but still stable[75]. The figures presented are even more impressive when compared with those for 2023. From this perspective, the number of electric vehicles on Polish roads has almost doubled. The rapid and steady growth in the number of electric and hybrid cars suggests that electric vehicles will become a regular feature on Polish roads[74].

The charging infrastructure in Poland is developing rapidly — by July 2025, the number of publicly available charging points had increased to 10,700, including 7,100 AC (Alternating Current) chargers and 3,600 fast DC (Direct Current) stations. The growth curves indicate an acceleration in the last two years, which means not only increasing network density, but also a rising share of high-power devices. This trend is crucial for servicing the rapidly growing fleet of electric vehicles and adapting the system to new challenges, such as the electrification of heavy transport and the development of V2G (Vehicle-to-Grid) and smart charging services.

Warsaw continues to rank first among Polish cities with the highest number of charging points, remaining the Polish capital of electromobility[75]. Despite the dominance of the capital, Gdańsk is also prominent when it comes to the density of its EV charging points (2nd place in Poland). The city itself has around 350 public charging points, making it an important transport hub, and more tenders are on the way. The rest of the Tricity metropolitan area is also keeping pace with the changes. Gdynia, too, has more than 100 charging points throughout the city, and new solutions are being tested, such as installing chargers in lamp posts by the harbour[76].

AFIR requirements (described on page 29) require the construction of charging stations at major transport corridors and nodes, which directly contributes to the development of the entire system in Pomerania. As Poland's two largest ports, Gdańsk and Gdynia are key transport hubs and have a well-developed network of charging points. Moreover, the authorities of the individual cities are investing in the electrification of public transport, expanding the network of charging points for electric buses and ordering zero-emission buses. In 2024, hydrogen bus tests were conducted in Gdańsk, and Gdynia authorities signed a tender for 17 new zero-emission vehicles in May 2025[77].

> According to PSNM forecasts, the fleet of electric passenger cars and delivery vehicles in Poland may increase from approximately 100,000 units currently to over 700,000 units by the end of 2030. This means that we are only at the beginning of the development of mass electromobility.

Jan Wiśniewski
Director of the Research and Analysis Centre
Polish New Mobility Association (PSNM)

The development of electromobility is an unstoppable megatrend. Only a few years ago, the development was mainly based on climate regulations and European Union policy; today the manufacturers' offer itself is becoming more and more important. We are seeing that in many segments electric cars are becoming cheaper than combustion cars, and consumers are starting to choose them not because they have to, but because they want to. The stereotypes that electric cars are impossible to travel in have been overcome.

This is also evident in Poland - last year, EVs accounted for around 3% of sales, and today that figure is almost 8%, with this trend set to accelerate. Manufacturers from China are also having an increasing impact, bringing affordable and modern cars to the market. All this means that demand for our services will grow exponentially, and charging infrastructure will become one of the cornerstones of this transition.

Rafał Czyżewski
CEO, Greenway Poland

NEW MOBILITY IN POMERANIA

The Pomeranian Voivodeship has been attracting investors from high-tech industries for years, including the rapidly developing automotive and new mobility sector. It is there that global corporations set up their research and development centres and production facilities, and local technology companies create innovative solutions for the transport of the future.

Below are profiles of selected companies operating in Pomerania — both large international players and companies with Polish capital. Their activities demonstrate the diversity and complementarity of the ecosystem: from battery and power module manufacturers to charging infrastructure providers to engineering centres developing autonomous driving technologies.

enelion

Enelion is the first example of a company developing in the field of electromobility in Pomerania. Although it employs just over forty people, its operations demonstrate how a local entity can build a competitive advantage through specialisation and the ability to react quickly to market changes.

Enelion's core business is alternating current (AC) chargers. The company specialises in devices with power ratings of up to 22 kW, which are characterised by flexibility and relatively low costs compared to direct current (DC) chargers. While DC chargers are dominant on motorways and at fast charging hubs, AC chargers are increasingly seen as part of everyday infrastructure — known as destination charging. They are found at offices, restaurants, residential car parks and detached houses.

Enelion focuses on supplying hardware, leaving cloud software development to specialist companies. Thanks to compatibility with the OCPP (Open Charge Point Protocol), the company's devices can operate in systems from operators such as Elocity and GreenWay. In practice, this means that Enelion chargers are used in large fleet projects, such as in the case of L'Oréal, which replaced its entire fleet of sales representatives' vehicles with electric vehicles, installing stations both at the office and at employees' homes. Similar projects have also been carried out for AstraZeneca and Coca-Cola.

A unique element of the company's strategy is modularity. Enelion is one of the few manufacturers in Europe to develop charging stations whose individual components can be easily replaced in the event of failure. Such a solution is important for public network operators, for whom service costs are often a greater burden than the initial investment. Thanks to the modular design, the service technician does not need to diagnose the whole device or replace it entirely - it is sufficient to replace the faulty component, which significantly reduces repair time and costs.

The company is already developing prototypes of Vehicle-to-Grid chargers, testing new communication modules (such as LAN, Wi-Fi, LTE) to ensure redundancy and investing in the integration of devices with renewable energy systems. Enelion chargers can work with photovoltaic systems, heat pumps and energy storage systems, becoming part of a larger energy management system in buildings.

LYTEN

Lyten Inc. is a US company specialising in advanced lithium-sulphur battery materials and technologies. Headquartered in San Jose, California, the company was founded in 2015 and has been developing innovative solutions for a variety of sectors, from drones to electric vehicles and space technology.

Northvolt Dwa ESS, the largest energy storage systems manufacturing facility, which was acquired by Lyten.
Source: trojmiasto.pl

The acquisition of the Northvolt Dwa ESS plant in Gdańsk marks a key stage in Lyten's expansion into the European energy storage market. The site, covering an area of almost 25,000 m², is Europe's largest energy storage system factory, equipped with both production lines and R&D facilities. Lyten has resumed work on existing orders and launched new ones, utilising lithium-sulphur battery technology. The plant currently has a production capacity of 6 GWh per year, with the possibility of expanding to over 10 GWh. It is powered by renewable energy, and orders are secured until the end of 2026 - the Gdańsk plant meets the needs of local and European customers looking for production based on secure and geopolitically stable supply chains.

> Lyten has brought back both research and development and energy storage production to Gdańsk. This is crucial, as we were already in the process of starting up the factory, achieving our targets and building the team's unique competencies. The acquisition means that neither the infrastructure nor the experience of the people who have been developing the industry in Poland for years will be wasted.
>
> The Americans make it clear that they want to make the most of what has been created here: a modern plant - one of the largest in Europe - a strong technological and engineering base, and the potential of the region. And that is of immense value. Gdańsk has already proven to be an ideal location: access to talent, the maritime industry, new technologies and renewable energy.
>
> With Lyten, we can continue to develop this ecosystem and build a strong European innovation centre for energy storage.

Robert Chryc-Gawrychowski
CEO, Lyten Poland

The acquisition is part of Lyten's broader strategy to acquire additional Northvolt assets, including a lithium-metal battery manufacturing facility in California (Cuberg) and other European locations, including in Sweden and Germany. These acquisitions enable Lyten to rapidly scale production and deploy its innovative technologies in strategic markets.

GreenWay Polska is part of the international GreenWay Group, which is active in the field of electromobility. It is the fastest-growing electric car charging network in Central Europe. The company has been in existence since 2011 (in Poland since 2016) and aims to support and develop electromobility to make Central and Eastern Europe cleaner, healthier and less dependent on oil.

Currently, the network comprises nearly 3,000 charging stations, including over 1,850 in Poland. Most of these are high-powered fast charging stations, meeting the needs of modern mobility. The entire group is currently managed from Poland, and GreenWay employs about 180 people, 120 of whom work from Poland.

The company's activities are focused on two main areas. The first is building its own network of charging stations and offering charging services to electric car users. GreenWay specialises in direct current (DC) fast charging stations with capacities of up to 400 kW. Several hundred such devices have already been

built throughout Poland, and the company's goal is to provide drivers with the ability to charge efficiently on the road and in areas where they do not have access to charging at home or work.

The second pillar of the business is the implementation of large infrastructure projects for fleet and industrial customers. GreenWay designs, builds and operates private charging hubs dedicated to partners such as InPost, which is electrifying its delivery fleet, as well as Holcim, where solutions are being implemented for heavy vehicles working in open-pit mines. In this model, the company is responsible not only for the installation of the equipment, but also for its service, management and optimised operation throughout its life cycle.

GreenWay is also developing its own technology solutions. In Gdynia, a system was developed to manage the capacity of charging stations, which allows energy to be dynamically distributed among multiple points connected to a single connection, which is crucial in situations of limited supply capacity on the part of network operators. In turn, Bratislava is home to a team developing a mobile application, a customer registration system and a billing platform. The company does not manufacture chargers, but specialises in technology integration, connection construction, solution selection and management of entire projects.

GreenWay's project
Source: GreenWay press materials

> GreenWay is headquartered in Gdynia - a great location to do business. Pomerania gives access to qualified staff, especially engineers from Gdańsk University of Technology, who are the core of our team. We also see that Tricity is attracting employees from other parts of Poland and even abroad because of its quality of life, climate and good infrastructure. This is extremely valuable to us, as it allows us to build a team in a place that people choose not only for their careers, but also for their lives. On top of that, we have excellent office facilities and local transport links - our office is perfectly connected to the entire Tricity area. Of course, there are certain challenges, such as its northern location and the lack of some air connections, but in general, Pomerania is an outstanding place to develop a technology company.

Rafał Czyżewski
CEO, Greenway Poland

Pomerania plays a strategic role in GreenWay's operations — it is here, in Gdynia, that the main management centre is located, and the region provides access to qualified engineering staff. The company says it will continue to expand its network in Poland and abroad, focusing on serving both individual drivers and large transport fleets.

With a combination of experience, innovation and local roots in Pomerania, GreenWay is becoming one of the key players in the transformation of transport in Poland and the CEE region.

EQUAY

Equay is a Polish company focused on the field of electromobility. Established in 2019 as a company originating in the electrical industry, it began its dynamic development in the EV charging infrastructure sector just one year later. It quickly recognised the potential of this market, responding to growing demand from business and institutional customers. From the outset, the company's premise was to provide comprehensive services, covering the full investment cycle from concept, design and construction to commissioning and subsequent maintenance. In 2021, Equay implemented its own station management platform, which enabled it not only to deploy physical infrastructure, but also to provide customers with comprehensive software and charging network management services.

One of Equay's many projects. Commissioning of two DCs for DHL Supply Chain
Source: Equay press materials

The company's business model is primarily based on B2B partnerships. Equay provides services to third-party investors, offering them comprehensive technology and service solutions. The company's customers are mainly large corporations, fleet operators and financial institutions, as well as dealer networks, which receive ready-to-use and fully functional charging systems thanks to this cooperation. While the company also sets up infrastructure for individual customers, this segment represents only a small part of its business. Equay's greatest value lies in its ability to provide a full range of services, including business consulting, infrastructure deployment, software implementation, user acquisition, and subsequent system maintenance.

Pomerania plays a special role in Equay's operations. It is in the Tricity and its nearby areas that the company has completed many significant projects, working with such entities as local car dealers. This cooperation began with some singular charging stations, but as demand grew, it evolved into large-scale projects involving hubs with several charging points. A good example is the Plichta network, which, thanks to its cooperation with Equay, now has over 80 charging stations in various locations. The Pomeranian region is characterised by a high level of motorisation of the population and an increasing interest in electromobility, both from individual customers and company fleets. An additional advantage of Pomerania is the presence of large ports in Gdańsk and Gdynia, which creates potential for the development of electromobility in heavy and container transport. Equay sees this as an opportunity to implement charging infrastructure for heavy-duty vehicles, municipal vehicles and specialised machinery used in port logistics.

The company cooperates flexibly with various equipment manufacturers, both Polish and foreign. It utilises equipment from such suppliers as the Dutch company Alfen, the Polish company Enelion, as well as renowned Chinese and Portuguese manufacturers. The choice of suppliers is based primarily on the criteria of reliability, quality and ease of servicing the equipment. This enables Equay to offer its customers solutions tailored to their individual needs — from lower-power AC stations to advanced DC stations. Another important element of the offer are dynamic power management systems, which enable optimal use of power connections in residential and office buildings, as well as Vehicle-to-Grid technologies, which allow electric cars to be treated as energy storage facilities. With innovation and flexibility in the choice of solutions, the company is building a reputation as a partner capable of delivering top-quality projects.

Equay has ambitious development plans that focus on two main areas. The first is the further expansion of its service and commercial activities, including the sale, construction and servicing of charging stations. The second is the development of a company dedicated to servicing charging networks and end customers. The company declares that it is open to cooperation with external investors who would like to build networks of stations under their own brand or as part of Equay's brand. At the same time, the company intends to engage in market deregulation, raising public awareness and working with universities and vocational schools. In this way, Equay aims to play the role of a stable and reliable partner in the transformation of transport, both in Pomerania and throughout Poland.

APTIV

Aptiv PLC is a global leader in providing advanced hardware and software solutions to support the transformation of mobility towards greater safety, ecology and connectivity. The company innovates at the intersection of disruptive trends in the mobility market, designing vehicles of the future and systems that find applications not only in automotive but also in other industries.

Aptiv factory in Gdańsk
Source: Aptiv press materials

Aptiv has more than 190,000 employees in over 40 countries. In Poland, the company operates in three locations: Jeleśnia and Gdańsk, where its production plants are located, and Kraków, where its Technical Centre has been operating since 2000. It is one of Aptiv's largest and most innovative R&D laboratories in the world, employing +2,000 engineers and several hundred corporate specialists. The projects developed there include the first gesture recognition system for automobiles and active safety technologies.

> Aptiv is a global leader in delivering advanced hardware and software across industries. Our ability to innovate at scale depends not only on global reach but also on strong regional ecosystems. This region offers strong logistical infrastructure to supports international operations and great universities and technical schools with emerging talent.

Tomasz Miśniakiewicz
Country Director, Aptiv Poland

Pomerania is an important part of Aptiv's presence in Poland. Gdańsk is home to a manufacturing plant specialising in high-tech products supporting autonomous driving and producing radios and control panels used in cars. The site is an important link in the company's global supply chain, serving key customers from around the world. Thanks to its proximity to the Gdańsk University of Technology and the developed business infrastructure of the Tricity, Aptiv has access to highly qualified engineers and specialists to support the development of global projects. Its location in Gdańsk is also strategically important in terms of logistics and geography. Pomerania, with its seaports and good connectivity to the rest of Europe, enables efficient distribution of manufactured components.

Aptiv focuses on the design, development and delivery of complex systems for vehicle safety, electrification and connectivity. It creates advanced vehicle architectures including computer systems, control software, as well as power and communication networks for efficient data and energy transfer. Aptiv's technologies are scalable and designed to operate in harsh environments where reliability is paramount.

Working with customers across sectors, Aptiv has a unique perspective of global learning processes to implement improvements across fleets and systems. The data collected is used for central optimisations, resulting in greater consistency in safety, efficiency and flexibility.

Aptiv's mission is to build safer, greener and smarter connected mobility by developing advanced safety technologies, including artificial intelligence, machine learning and sensor fusion, which together are shaping a software-defined future.

Scania AB (TRATON Group) is a global leader in transport solutions — a manufacturer of lorries, buses and engines for industrial and marine applications. The company operates in over 100 markets and employs approximately 59,000 people. In 2024, Scania delivered 96,400 lorries, 5,600 buses and 11,200 powertrains, generating revenue of SEK 216.1 billion.

Scania has been present in Pomerania for more than 30 years. In line with its bus business restructuring strategy, the company ceased production of bus bodies in Słupsk in Q1 2024 while maintaining chassis production in Kobylnica (about 300 jobs). In addition, in July 2025, Scania announced the establishment of Knowledge Centre Europe in Gdańsk — one of three global shared services hubs. In the first stage, the Centre is focusing on HR processes, with plans to gradually expand its scope.

In April 2025, Scania acquired Northvolt Systems Industrial, including the production facility for off-road battery systems in Gdańsk. The entire acquired business comprises around 260 employees, of whom approximately 150 are located in Gdańsk. The plant on Elbląska Street carries out serial production of complete battery systems used in mining, construction, agriculture, and port logistics machinery. The production process is supported by a team of engineers, service technicians, and specialists responsible for warehousing, logistics, procurement, finance, HR, and quality. Scania Industrial Batteries also employs a highly skilled engineering workforce dedicated to continuously improving the products themselves and directly supporting customers. Locating these functions right next to serial production enables efficient communication and fast implementation of changes in manufacturing processes.In 2026, the Gdańsk facility is scheduled to begin production of a new, more compact battery system.

eadquartered in Nagaoka, Japan, Nippon Seiki Co., Ltd. is an established global manufacturer of premium electronic components and displays for the automotive industry. The company has made a name for itself primarily by developing innovative solutions like head-up displays (HUDs) for vehicle windscreens that allow drivers to read key information without taking their eyes off the road.

The Gdańsk office mainly employs specialists involved in the specification, design, development and testing of software for on-board information systems. Design and development activities in Gdańsk are carried out in cooperation with other Nippon Seiki Group engineering centres. These include system design, software development, system testing and diagnostics, as well as the design of electrical, optical and mechanical subsystems.

Jabil is a US leader in Electronics Manufacturing Services (EMS), offering comprehensive design, engineering and manufacturing services and advanced supply chain management for a wide range of industries - from electronics and automotive to medtech and data centre infrastructure equipment. In Pomerania, Jabil operates in Kwidzyn - the plant was established as a result of the spin-off and sale of the Philips factory (manufacturing TV heads) in 2002 to Jabil Circuit.

Today, the Kwidzyn facility is one of the largest EMS centres in the region: it serves global customers, offering a full value chain - from NPI and prototyping, system integration, clean room assembly and testing (including software/firmware) to serial production and logistics. The location enhances the company's operational strengths: proximity to the ports of Gdańsk/Gdynia, as well as major road/rail corridors and aviation facilities, shortens delivery and distribution times to European markets.

LACROIX is a French technology company listed on the French stock exchange, with a tradition dating back to 1936. Today, the group focuses on activities in the electronics sector.

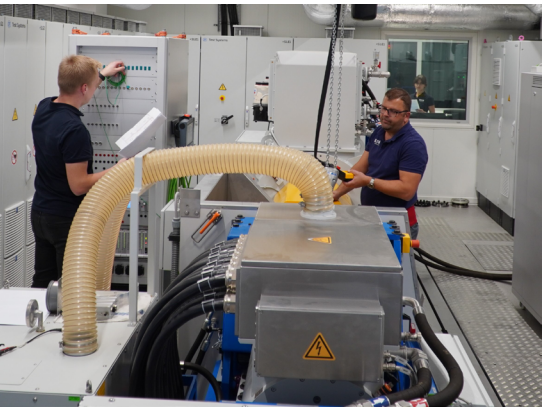
LACROIX Electronics provides design and manufacturing services (EMS): from concept to series production for key sectors: automotive, industrial, smart buildings, aerospace and defence, as well as healthcare. The company ranks in the TOP50 worldwide and TOP10 in Europe among contract electronics suppliers.

The Kwidzyn plant has been in operation since 1997. It specialises in SMT (surface mount technology), selective soldering, coating, testing and product integration, manufacturing more than 120,000 parts per day for a range of about 500 products. The production profile includes orders for automotive, industrial and building automation. The Kwidzyn plant is a mature EMS hub serving the automotive (including e-mobility) and Industry 4.0 supply chain. It currently employs around 1,000 people.

AQ Wiring Systems STG - a Polish subsidiary of the AQ Group - specialises in the design and manufacture of wiring harnesses and electromechanical modules for a wide range of sectors, including industrial, agricultural, railway, automotive, marine, household appliances and medical. The plant is located in Linowiec near Starogard Gdański. The company also holds a Ministry of Defence licence authorising it to supply products to the defence sector.

The company handles the entire production cycle - from requirements analysis and computer-aided design (CAD) to cutting and preparing wires and insulation, crimping terminals and assembly to electrical and visual testing and regular deliveries. Its customers include global companies (such as Scania, ABB, Bombardier, and Komatsu). Every year, as the company emphasises, the length of cable it uses could circle the Earth twice.

Eaton is a global leader in energy management, operating continuously since 1911, whose vision is to improve quality of life and protect the environment through safe, reliable and sustainable power technologies. The group serves customers in the commercial and industrial buildings, utilities/energy, data centre, OEM and automotive and aerospace sectors, among others.



Eaton has announced the upgrade of its production facility in 2025
Source: press materials

In 2018, Eaton established its eMobility unit and then merged it with its Vehicle Group in 2023 to form the Mobility Group, integrating electrical and automotive expertise for passenger cars and commercial vehicles.

In Pomerania, the company has a centre in Tczew, which, following extensive modernisation announced in 2025, serves as a European testing hub for ICE and EV powertrains. The centre benefits from Eaton's global network of laboratories, including facilities in the state of Michigan[78].

thyssenkrupp is developing two pillars of its business in Gdańsk: global business services and the production of machines and drive systems for electric cars. thyssenkrupp Group Services Gdańsk provides process services to Group companies worldwide, including finance and accounting, HR, IT and real estate support.

Meanwhile, thyssenkrupp Automation Engineering has launched a plant in Banino near Gdańsk that manufactures machines and assembly systems for EV powertrains. Production commenced in 2022, and the opening of the plant, which currently employs around 50 people, was announced in 2023.

Nowa Tepro is a rapidly growing company specialising in the design and construction of industrial machinery for the automotive sector, with a particular focus on assembly lines and testing lines for EV batteries and electric motors. It offers comprehensive services ranging from the development of technical documentation (2D) to mechanical, electrical, hydraulic and pneumatic assembly to machine modernisation, internal testing, commissioning and servicing.

In 2022, Nowa Tepro became part of Lyric Automation Germany GmbH, paving the way for it to design and manufacture complete equipment for the assembly and testing of EV battery modules and packs, as well as electric motors, within local European supply chains. This enables it to provide complete automation solutions for OEM customers and EV battery manufacturers.

China International Marine Containers (CIMC) is a global logistics and energy equipment supplier based in Shenzhen and the largest container manufacturer in the world. It is developing the semi-trailer segment in Europe through CIMC Trailer Poland.

In 2015, CIMC launched a semi-trailer assembly plant in Gdynia with a production capacity of approximately 2,000 units per year and employs approximately 40 people. The facility includes a hall with two overhead cranes, and the assembled vehicles are distributed to markets in Central, Eastern, and Western Europe. The choice of location was motivated by its proximity to ports and road infrastructure. The site was touted as the first Chinese manufacturing investment project in Pomerania.

BIBUS MENOS is a Polish-Swiss engineering company based in Gdańsk that has been present on the market since 1994 (initially as MENOS). The company has progressed from a distributor of pneumatics (Camozzi) to an integrator of complete solutions for industry.

Its portfolio includes over 65,000 articles and projects in the fields of mechatronics, automation, power hydraulics, filtration, rail technology, 3D printing and eco-mobility. It also offers AC/DC chargers, mobile charging stations and hydrogen solutions for electromobility. The company provides a full range of services: consulting, design, production and system integration, training, as well as on-site and off-site service.

Tenneco is one of the world's largest suppliers of automotive technology - ranging from emission control systems and components to suspension solutions. The company serves both OEMs and the aftermarket. Tenneco is present in Pomerania through Federal-Mogul Bimet S.A., a manufacturer of plain bearings and bimetal strips for the automotive industry.

Zoeller Tech is a Polish company belonging to the international Zoeller Group, headquartered in Mainz, Germany. The company has a global workforce of approximately 3,000 employees (2023 data). The company has been operating in Poland since 1992 and is currently recognised as the largest manufacturer of municipal vehicle bodies in the country.

The site in Rekowo Górne (Puck County) employs approximately 800–900 people. Over 1,000 municipal vehicles leave the plant every year, sold under the Zoeller and Ekocel brands.

Trends and innovations in the new mobility sector

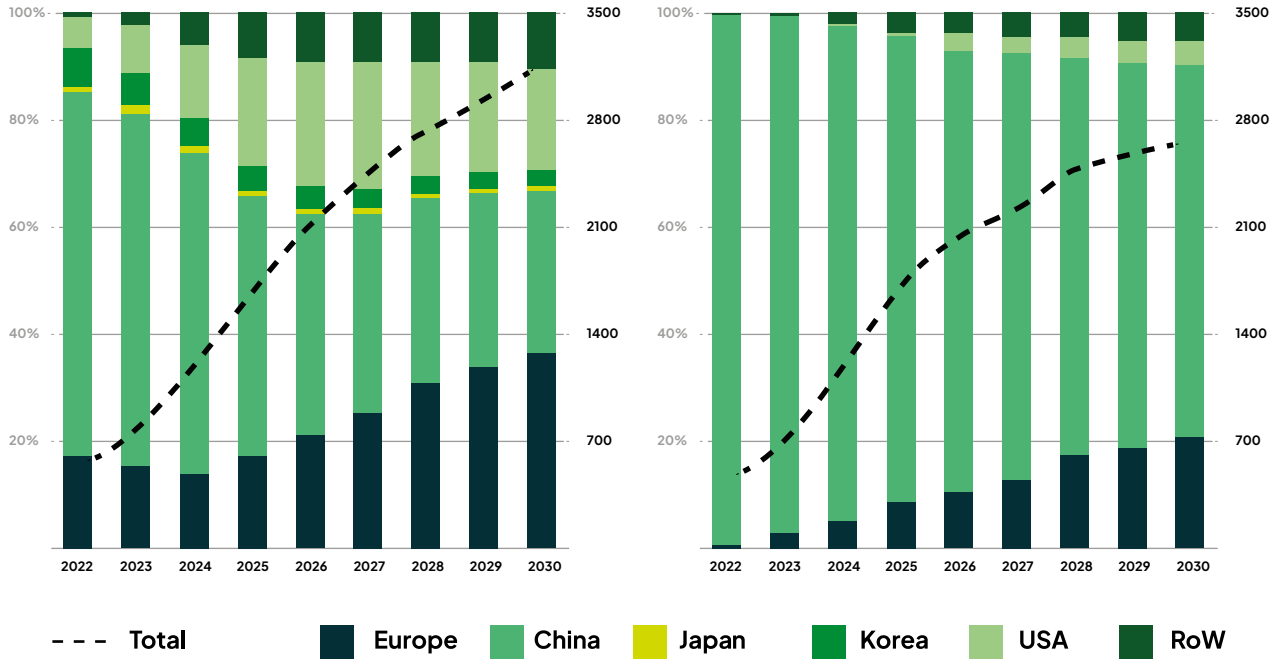
Battery technology and energy storage

THE ECONOMICS OF BATTERY DRIVES

The battery market remains the cornerstone of the global energy transition and electromobility, with lithium-ion cells as its backbone. In 2023, global lithium-ion battery production reached 2.5 TWh, an increase of 780 GWh compared to 2022, with a total production capacity of approximately 2.6 TWh[79,80]. The oversupply of capacity was therefore significant, adding to downward pressure on prices in subsequent years.

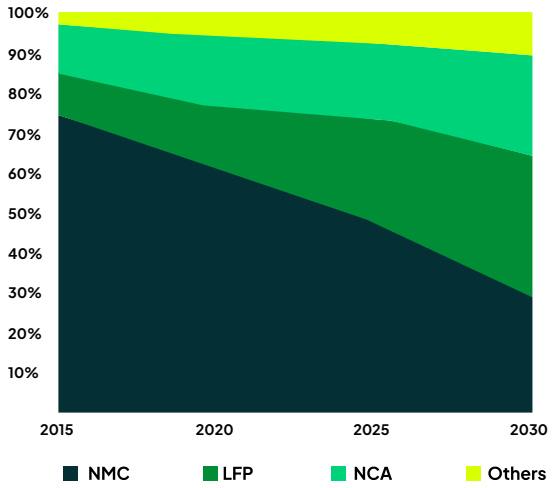
The dominance of lithium-ion batteries is evident in both the automotive sector and stationary energy storage systems. Two chemistries are key: NMC (nickel-manganese-cobalt), which provides higher energy density and is preferred in premium cars and long-range EVs, and LFP (lithium-iron-phosphate), which dominates the ESS and mainstream BEV market due to its lower cost and longer lifetime. Since 2021, LFP has become the de facto standard in energy storage[81].

China controls much of the global lithium refining and cobalt processing, which affects raw material availability and production. China itself uses LFP technology because of its lower cost, safety and longer life. In contrast, NMC batteries - more common in Europe and the US - are more energy dense and often chosen for premium vehicles.



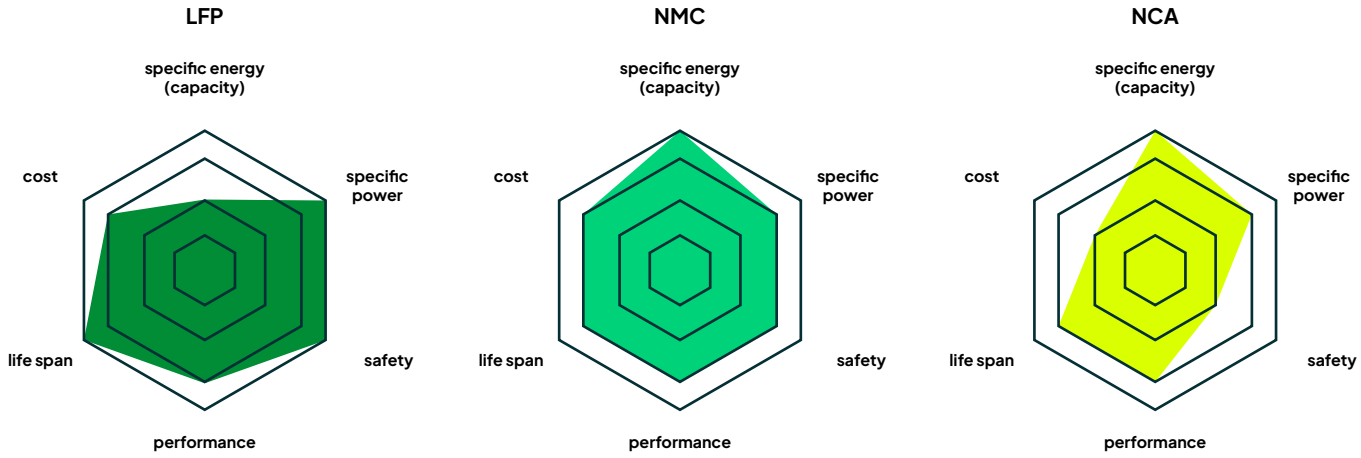
The market share of different battery types, broken down by country of manufacture
Source: isi.fraunhofer.de

In 2024, the cost of LFP cells in China fell below USD 60/kWh, and that of entire battery packs fell below USD 90/kWh. This made them exceptionally competitive compared to NMC, which remained at around USD 103/kWh[82].



The market share of different battery types
Source: npplithium.com

The battery cost is therefore a key factor in the competitiveness of new mobility. In 2024, the global average price of lithium-ion battery packs fell to USD 115/kWh, representing a 20% year-on-year decline — the largest since 2017[82].



Differences between the most popular lithium-ion battery types
Source: mdpi.com

The largest reductions in battery prices were recorded in China (about 30%), while in Europe and the US the decreases amounted to only 10–15%[83]. In practice, this means a lasting price advantage for Chinese producers such as CATL and BYD, whose share of global production exceeded 50% (CATL: 260 GWh; BYD: 111 GWh in 2023)[84].

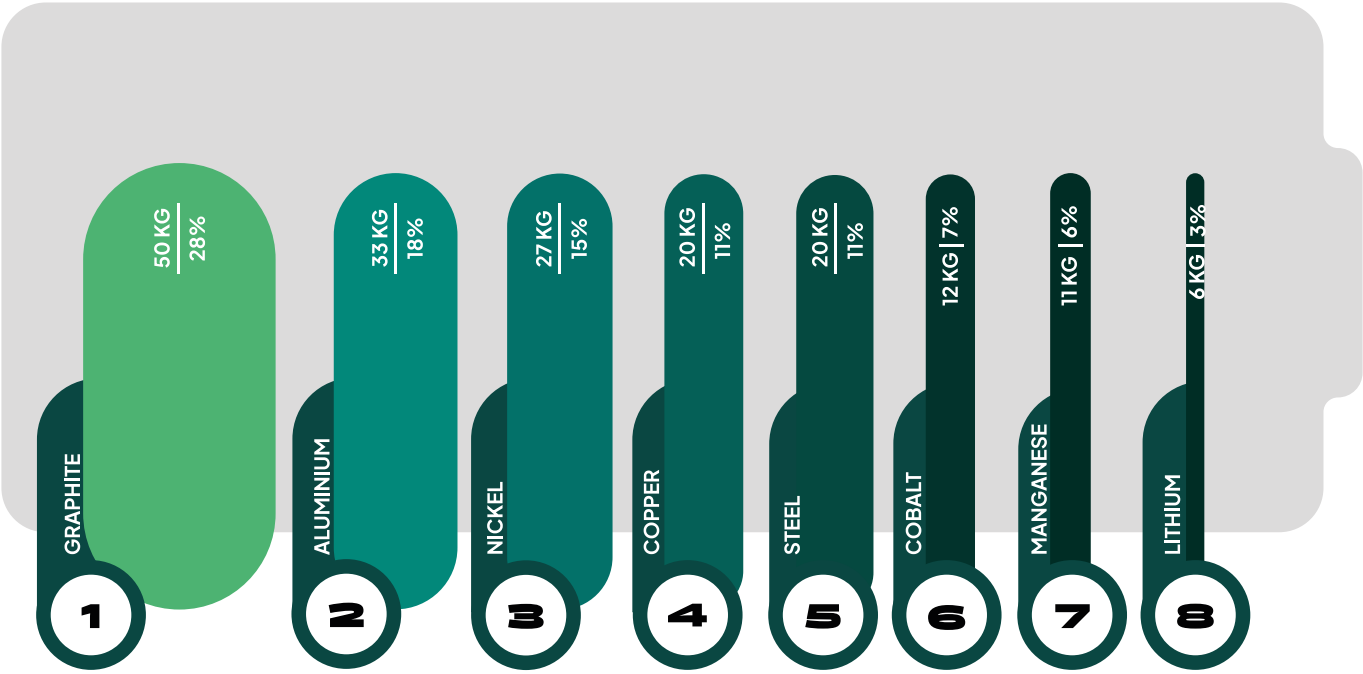
The factors behind the price reduction were multifaceted. The most important of these were: (1) falling metal prices (prices for lithium fell by 86% from their 2022 peak), (2) aggressive market competition in China, and (3) global oversupply of capacity. In 2023, production amounted to 2.5 TWh, more than double the demand of approximately 950 GWh[82,83,85]. For manufacturers in Europe and the US, this means a structural problem: investment in gigafactories requires billions of dollars financed in a high-interest-rate environment.

In the context of alternative drives, battery-powered electric cars remain the mainstream and the largest consumer of cells (60–80 kWh per vehicle in 2024), but other solutions are being developed in parallel. Plug-in hybrid vehicles play a bridging role, especially in Europe, where some consumers are still concerned about the limited range of BEVs. In the heavy transport sector, fuel cell electric vehicles (FCEVs) are attracting growing interest due to their fast refuelling and long range. Range-extended electric vehicles (REEVs) and CNG/LNG powertrains are mainly used in niche segments.

The differences between these powertrains have a direct bearing on battery requirements. While the average battery capacity in BEVs in 2024 was 60–80 kWh, FCEVs only use small buffer packs with a capacity of around 10 kWh[83]. This means that even a moderate increase in BEV market share generates a disproportionate demand for cells.

OVERVIEW OF BATTERY TECHNOLOGIES

Alternative technologies are emerging on the horizon. Sodium-ion batteries, being developed by such companies as CATL, offer lower costs by eliminating critical raw materials. The manufacturer has announced the launch of mass production of sodium-ion cells in December 2025[85].



The composition of the world's most popular NMC lithium-ion battery
Source: based on Transport & Environment

Lithium-sulphur solutions, e.g. those developed by Lyten in Gdańsk, use 3D graphene to reduce sulphur degradation and achieve very high energy density. They offer an extremely high theoretical capacity, which could dramatically increase EV range while maintaining a lower pack weight. ZEBRA high-temperature sodium-nickel technologies offer stability and higher energy density than lead-acid batteries, but they require special thermal insulation. Although all these technologies are currently at an earlier technology readiness level, they could be important additions to the market in the future.

Fuel cells, especially hydrogen fuel cells, are also an important area of development. They enable rapid refuelling and long range, making them an attractive solution for heavy-duty vehicles and long-distance transport. The energy density of hydrogen per unit mass is very high, but per unit volume it remains a challenge. This makes it necessary to store hydrogen in composite tanks at a pressure of 350–700 bar, which increases the cost and weight of the entire system.

HYDROGEN AS A COMPLEMENT TO BATTERY ELECTROMOBILITY

Hydrogen fuel cell vehicles (FCEVs) are particularly important in the context of the development of alternative road transport powertrains. They are seen as a complement to the development of battery electromobility, especially in the heavy commercial vehicle segment[86]. FCEVs are more efficient than conventional combustion engine vehicles and do not emit harmful exhaust gases - they only release water vapour and warm air[87]. However, FCEVs also have limitations: the network of hydrogen refuelling stations is still very underdeveloped, the costs of manufacturing and purchasing vehicles remain high, and hydrogen should be produced from renewable energy sources in order for these vehicles to be truly environmentally friendly. Today, most hydrogen is produced from natural gas, which involves CO_2 emissions. Consequently, the development of electrolysers, i.e. green hydrogen production technology, is inextricably linked to the expansion of the hydrogen economy. Their growing installed capacity will provide the foundation for powering hydrogen vehicles and hydrogen valley projects (see page 18 for more on the Pomeranian Hydrogen Valley).

The use of hydrogen in road transport is growing rapidly: in 2023, demand increased by approximately 55% compared to the previous year, while in 2022 the growth rate was approximately 40%. This growth was mainly driven by hydrogen lorries and buses in China. Globally, heavy-duty vehicles accounted for nearly 85% of the growth. Despite this, global hydrogen consumption in road transport remains low, amounting to only around 60 kt in 2023, or less than 0.1% of total hydrogen demand. In South Korea and Japan, development continues to focus on passenger vehicles, but the pace of growth in this segment is beginning to slow down[89].

Recent technological innovations include hybrid hydrogen-electric systems, in which the fuel cell acts as a range extender, as well as the development of liquid hydrogen refuelling technology (a project by Daimler and Linde), which is expected to enable a range of over 1,000 kilometres. Manufacturers such as MAN and Volvo are also planning to introduce hydrogen combustion engines as an interim solution. At the same time, the range of models is expanding thanks to new partnerships (e.g. Honda–Isuzu, Quantron–Ford) and companies involved in lorry retrofitting. All this shows that hydrogen in road transport is increasingly focused on commercial and utility vehicles that best exploit the advantages of this technology[89].

There are currently two publicly accessible hydrogen refuelling stations in the Pomeranian Voivodeship. These are the NESO stations in Gdańsk and Gdynia, which offer the possibility of refuelling cars (in 4 minutes) and buses (in 15 minutes)[88]. This infrastructure is used by such operators as the Gdańsk-based company GAIT (Gdańskie Autobusy i Tramwaje), which refuels city buses there — its fleet includes 10 hydrogen-powered vehicles. In mid-2027, a plant for the production of green hydrogen through water electrolysis will be commissioned at the Gdańsk refinery. This is the first project of its kind in the region and is being implemented as a turnkey solution by Electrum[89].

Hydrogen-powered lorry: Nikola Tre by Nikola
Source: hydrogeninsight.com

Supporting technologies include ultracapacitors, which are characterised by very high power density and longevity, making them ideal for recovering energy from braking or short-term acceleration. Nonetheless, their low energy density does not allow them to be used as primary storage in EVs. In parallel, mechanical solutions such as flywheels are also being developed to enable rapid charging and discharging of energy, although these are still of limited use in automotive applications due to the low energy density and high weight of the systems.

Hybrid systems combining different technologies - e.g. lithium-ion batteries and ultracapacitors or fuel cells - are becoming increasingly vital. This approach combines the advantages of high energy density with the ability to discharge power quickly, meeting the needs of both passenger and heavy-duty vehicles. Research indicates that hybrid systems may be key in the interim period before next-generation technologies reach commercial maturity[90].

THE FUTURE OF THE BATTERY MARKET

In 2024, global demand for EV batteries exceeded 950 GWh and, together with energy storage, reached 1 TWh for the first time ever. IEA forecasts indicate that demand will more than triple by 2030, exceeding 3 TWh, with heavy transport's share increasing from 3% to 8%[83].

One of the key technological trends that determines the usability and efficiency of electric vehicles is ultrafast charging. It saves a significant amount of time by charging the battery in just a few minutes instead of several hours, which is typical for standard charging stations. This increases the practicality and competitiveness of electric vehicles against combustion cars. However, safely accelerating the charging process requires advanced energy management systems and efficient cooling to protect the cells from overheating and degradation.

> While lithium-ion batteries are a mature technology, there is still a great deal of work being done to improve them by increasing energy density, reducing charging time, and improving durability. The introduction of silicon into anodes has considerable potential, significantly increasing capacity and enabling faster charging. In parallel, alternatives such as sodium-ion cells, which can be built without critical elements, as well as flow cells and fuel (hydrogen) cells, which open up new possibilities for energy storage and conversion, are developing rapidly. It all comes down to one thing: greater efficiency and more sustainable technologies.

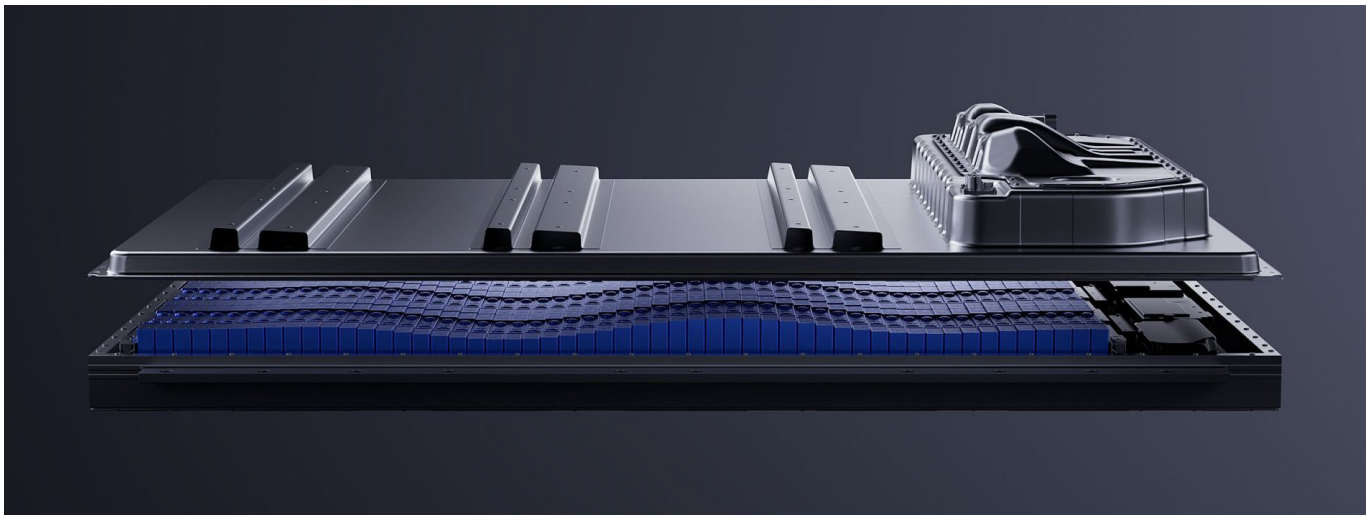
Prof. Monika Wilamowska-Zawłocka
Department of Energy Conversion and Storage
Gdańsk University of Technology

In 2024, the global stock of ultra-fast chargers, capable of delivering 150 kW or more, increased by more than 50% and now accounts for almost 10% of all chargers of this type. The reason for this growth was a 20% drop in their cost between 2022 and 2024. China remains the biggest player in this area — the number of ultra-fast chargers in that country has reached 1.6 million, accounting for 80% of the global growth. Meanwhile, the European Union is expanding its network, with over 77,000 chargers planned for 2024, which is 60% more than in the previous year[91].

In Europe, as many as 20% of ultra-fast chargers already had a power output of at least 350 kW in 2024, and the number of devices above 150 kW nearly doubled year-on-year[92]. Although the development of this infrastructure is progressing, the question of vehicle and grid compatibility remains. For heavy-duty vehicle and bus fleets, ultra-fast charging is becoming a prerequisite for commercial operation.

Another area of focus is improving battery life, i.e. the ability of the energy storage device to maintain high capacity and efficiency over many charge and discharge cycles. This reduces operating costs and environmental impact through less frequent replacement. In practice, however, fast charging often shortens cell life, requiring innovative material solutions. Manufacturers are increasingly emphasising the importance of LFP chemistry and its variations (e.g. LMFP), which enable up to several thousand cycles of operation. In parallel, advanced battery management systems (BMS) and thermal strategies are being implemented to extend cell life.

A recent but increasingly vital trend is the use of artificial intelligence in battery manufacturing. AI supports quality control through vision systems, predicts the state of health (SOH) and end of life (EOL) of batteries, and enables the optimisation of production processes and reduction of waste.



The new battery unveiled by Chinese manufacturer CATL Shenxing Pro in September 2025 is a revolution in terms of battery life. According to the manufacturer, it is expected to offer a service life of 12 years or 1 million kilometres driven
Source: CATL press material

BATTERY RECYCLING – TOWARDS A CIRCULAR ECONOMY

In the context of the development of electromobility, it is also worth highlighting the role of recycling and second life of batteries. Reusing spent batteries in less demanding stationary applications can reduce pressure on the supply chain for critical raw materials such as lithium, cobalt and nickel.

Integrating the circular economy with new battery regulations, including a mandatory battery passport, will be a key element in building a sustainable and competitive electromobility sector in Europe in the future. Fraunhofer ISI forecasts that by 2030, European facilities will be able to process batteries equivalent to more than 1 TWh per year[92]. Transport & Environment, in turn, indicates that between 2030 and 2040, 30% to 40% of the raw materials used in new batteries may come from recycling[93]. This is fundamental not only for costs, but also for raw material security, e.g. in Europe or the USA.

Recycling of lithium-ion batteries is a multistep process to recover critical raw materials and reuse them in the production of new cells. It begins with mechanical grinding, which results in the formation of a so-called black mass containing lithium, cobalt, nickel, manganese, graphite and non-ferrous metals. Subsequently, hydrometallurgical processes are used to extract these elements and purify them to industrial quality. Ultimately, they can be used to produce cathode material precursor (pCAM) and active cathode material (CAM), which are necessary for the production of new lithium-ion batteries. This process is the foundation of the circular economy and responds to the growing demand for raw materials in the electromobility industry[94].

> The recovery of critical elements such as cobalt, nickel and lithium is one of the biggest challenges for the future of electromobility. These raw materials are not only rare, but also geopolitically sensitive, which is why they must be effectively recycled. The issue is that there is a huge variety of battery technologies on the market today. Each type requires a different approach to recycling, which means that new recovery methods need to be developed. Without the development of these recycling technologies, we will not be able to ensure a stable supply of raw materials and reduce the pressure for new extraction

Prof. Monika Wilamowska-Zawłocka
Department of Energy Conversion and Storage
Gdańsk University of Technology

Europe already has some competencies in this field. Many countries have plants that recover black mass and, to a limited extent, also process it into chemical compounds used in the production of cathode materials. Examples include investments by companies like Hydrovolt in Norway (a joint venture between Northvolt and Hydro) and Umicore in Belgium, developing hydrometallurgical technologies[95]. One of the largest lithium-ion battery recycling plants in Europe is the Elemental plant in Zawiercie (see page 44).

Europe's advantages also include its well-developed scientific and research base, supported by programmes such as Horizon Europe. EU regulations, including the Battery Regulation, impose an obligation to increase the share of recycled raw materials, which further stimulates the development of the sector. Nonetheless, the mass industrial infrastructure needed to close the cycle from collection to large-scale production of cathode materials is still lacking. Lithium recovery remains the biggest challenge, with Europe still developing its technologies and China remaining the global leader[96].

Europe's strength lies in its regulatory system and financial support. The new regulations require that, from 2031, all batteries placed on the European market contain a specified minimum of recycled materials: 6% lithium and nickel and 16% cobalt. This creates pressure to develop new technologies and increase recycling capacity. The difficulty, however, is that current recycling capacity in Europe is far from sufficient to meet projected demand. Despite a strong scientific and regulatory position, Europe is lagging behind in terms of scale[97].

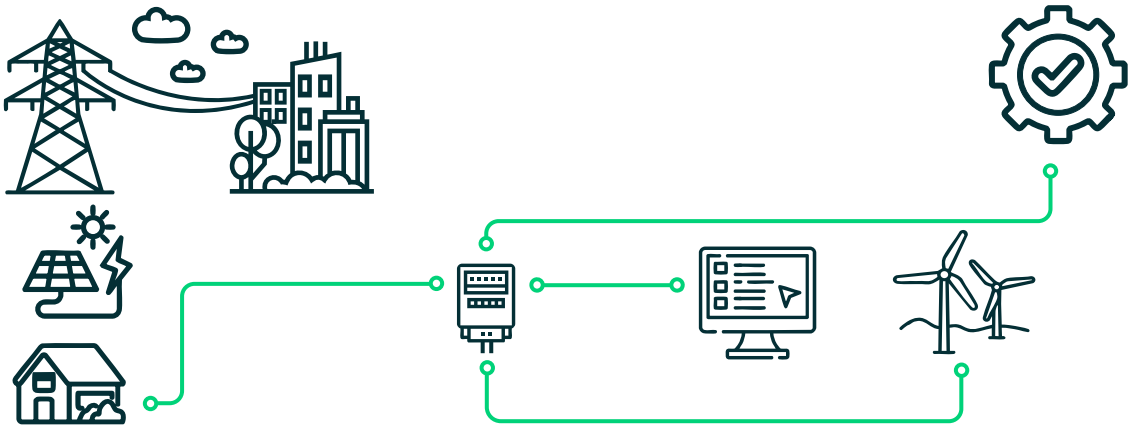
Charging infrastructure and electricity balancing

Modern electromobility will rely heavily on the efficient management of the electricity grid. A skilful combination of the capabilities of the energy network with renewable energy sources, infrastructure and energy storage facilities will prevent overloads and significantly facilitate the entire process - for producers and consumers alike.

> The underlying trend we see today is a huge increase in demand for electric vehicle charging infrastructure. Our analyses show that over the next decade, demand in this area will increase a hundredfold compared to 2023 — a scale that will transform the entire industry.

Rafał Czyżewski
CEO, Greenway Polska

One of the basic concepts of modern, digital grid management solutions is the smart grid. It is a smart energy network that can, using available resources — including adapted algorithms — independently make the right decisions based on changing factors: external (e.g. environmental, affecting energy supply or potential failures) and internal (e.g. infrastructure condition, changes in consumer preferences shaping the structure of energy demand) [98].



Smart grid – intelligent energy network
Source: iotdunia.com

Such solutions have given rise to a number of technologies that directly improve the performance of the power grid. One of the most important is Vehicle-to-Grid (V2G) technology, which involves a two-way transfer of energy between an electric car and the electricity grid. In the traditional model, the car is purely an energy consumer, whereas V2G allows it to also act as an active storage facility. The vehicle not only draws energy from the grid but — under certain conditions – can also return it, supporting the stability of the power system[99].

The key elements of this technology are grid-integrated smart AC and DC chargers. Vehicle-to-Grid charging means that every electric car can not only draw electricity but also be an active link in the entire energy chain. The communication protocol between the vehicle, charger and grid operator is also an important element, ensuring a smooth flow of information. Another part of this process is the energy management system, which determines when the car should charge and when it should discharge energy[100].

> The future of AC chargers is for them to be Vehicle-to-Grid systems so that they can not only charge the car but also give energy back to the grid or home storage. In reality, charging stations are not complicated in terms of electrical engineering; the difficulty lies in the logic of the device, communication and integration with other system components. When you add the ability to manage surplus energy from solar panels or heat pumps, the charger becomes part of a larger, smart ecosystem. This can already be seen in developed markets - there, chargers are treated like sockets on the street, fully integrated into the energy system. This is the direction we will follow in Poland as well, because otherwise we will not be able to balance the grid with the growing number of electric cars.

Jan Kamiński
Business Development Director
Enelion

Thanks to V2G technology, it is now possible to introduce many new functions and services that improve the operation of the entire network. V2G enables such things as integrating surplus RES energy with its storage in vehicle batteries. The grid itself can also react instantly to frequency dips or spikes and overloads. In extreme circumstances, a car can even power a building (Vehicle-to-Building) or a house (Vehicle-to-House).

End consumers also benefit from V2G technology. By using its physical components, such as smart meters and dynamic energy tariffs, the average household can significantly reduce its electricity bills and charge its car at a low price.

Another example of energy management technology is smart charging. This is a way of charging electric cars in which the process is dynamically controlled by an energy management system. Unlike classic plug & charge, where the vehicle immediately draws the maximum possible power, smart charging allows you to adjust the power and charging time and optimise energy costs. This solution brings mutual benefits: the network operator gains reduced congestion and better adaptation to variable RES production, while the user benefits from lower charging costs and longer battery life.

> We should treat an electric car differently from a combustion car. It is not a tank that we fill to capacity once a week. It is more like a larger phone — we charge it where we are. I am at 30% charge, but I am at the gym, so I plug in for two hours and recharge another 20–30%. Next time, I will do it while shopping or at work. That way the car is always ready and never gets discharged, just like a phone. The problem in Poland is that there is no dense network of AC chargers in cities, so people treat it like refuelling: they drive around specifically looking for a station. And this is the wrong approach and a major mental barrier. We need to educate customers that charging an electric car should be a background activity, woven into everyday life, rather than a once-a-week logistical expedition. If this can be changed, electromobility will be perceived in a completely different light — not as a problem, but as a convenience.

Marek Kwiczala
CEO, Equay

> When considering the electrification of heavy machinery, it is important to think not only about the battery itself but also about logistically and cost-efficient ways to charge or replace it. Underground mining equipment offers a great example that rapid battery exchange is entirely feasible. Our customer, the Swedish company Epiroc, can remove and install a multi-tonne battery using an overhead crane in just about 10 minutes - even in the demanding conditions of an underground mine.

Waldemar Algrzym
Managing Director
Scania Industrial Batteries in Poland

A less researched, yet pioneering project is battery swapping technology, which involves replacing a depleted battery with a fully charged one in just a few minutes. The process looks similar to refuelling and is most rapidly developing in China. The technology may work better in countries with a centrally managed market. However, the logistics and standardisation required for its success may prove too challenging[101].

Another direction for infrastructure development is Electric Road Systems (ERS). It is road infrastructure that allows EVs to charge while driving. In this way, vehicles — especially lorries and buses — do not need to have very large batteries, as energy is supplied directly while driving. ERS works in two models: the first is based on pantographs, which are extendable „hooks" that connect to an overhead line above the lane; the second utilises induction coils embedded in the road surface that generate an electromagnetic field, and vehicles with corresponding receivers draw energy wirelessly. Such solutions are already being built, especially in Sweden. Yet, this solution has a significant disadvantage in the form of high construction costs[102].

A roughly 21-kilometre stretch of an ERS road feeding an electric bus in southern Sweden (Skania)
Source: electrek.co

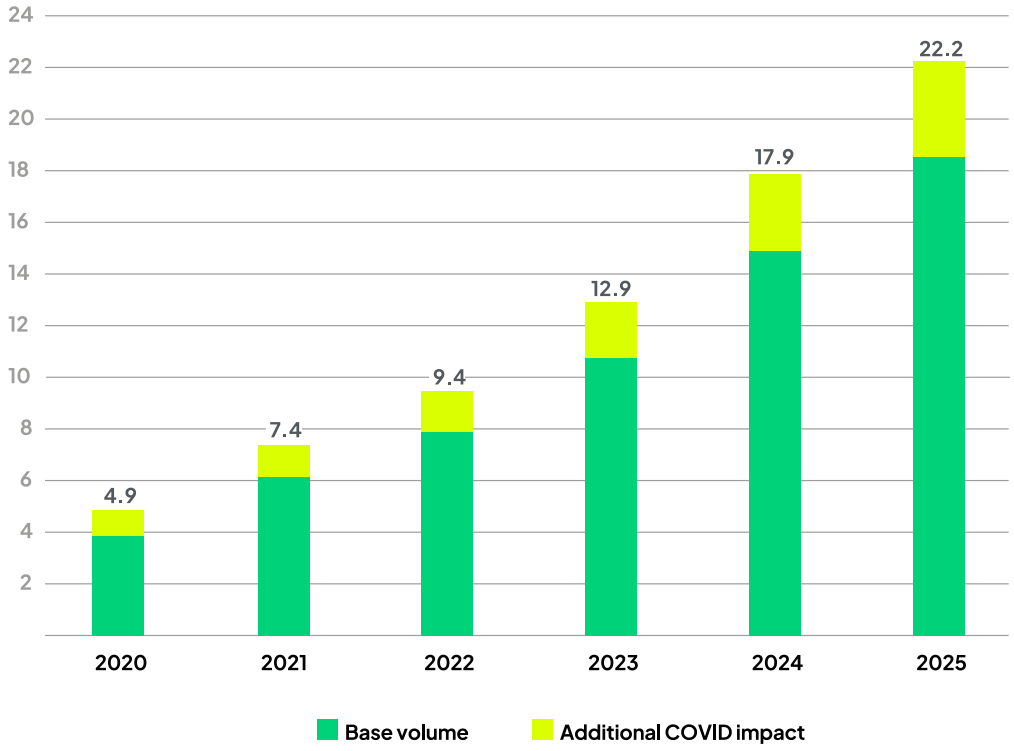
Another interesting technology is V2X (Vehicle-to-Everything), which remains a concept for the time being, but is already generating a lot of interest in the new mobility market. V2X involves the creation of a communication ecosystem in which vehicles communicate with each other and with their surroundings to enhance safety, traffic flow and integration with energy infrastructure. In practice, this means that travelling vehicles will be able to exchange information with other cars (warnings about sudden braking, accidents, slippery surfaces, traffic jams), road infrastructure (detours, road works, road surface conditions), the operator's network (traffic data, maps, weather forecasts) and, as in the case of V2G, the energy network. All these technologies are still in the testing phase, but they already paint a very specific picture of the future, which will be made possible by further technological breakthroughs in this sector[103].

Electric vehicles and driving autonomisation

FROM PRIVATE TO CORPORATE, FROM OWNERSHIP TO USE. CHANGES IN VEHICLE OWNERSHIP AND USAGE MODELS

Until recently, car ownership — in both the private and corporate segments — was the dominant model for meeting mobility needs. The purchase of a vehicle (for cash, on credit or through leasing) was treated as an investment in a durable means of transport, and in the case of individual customers, also as a symbol of social status. Today, however, this paradigm is undergoing some changes.

Changing consumer and business expectations are making flexible vehicle usage models such as subscriptions or Vehicle-as-a-Service solutions increasingly important[104]. Car ownership is no longer seen as an advantage — for many, it has become a burden associated with costs, formalities and depreciation of vehicle value.



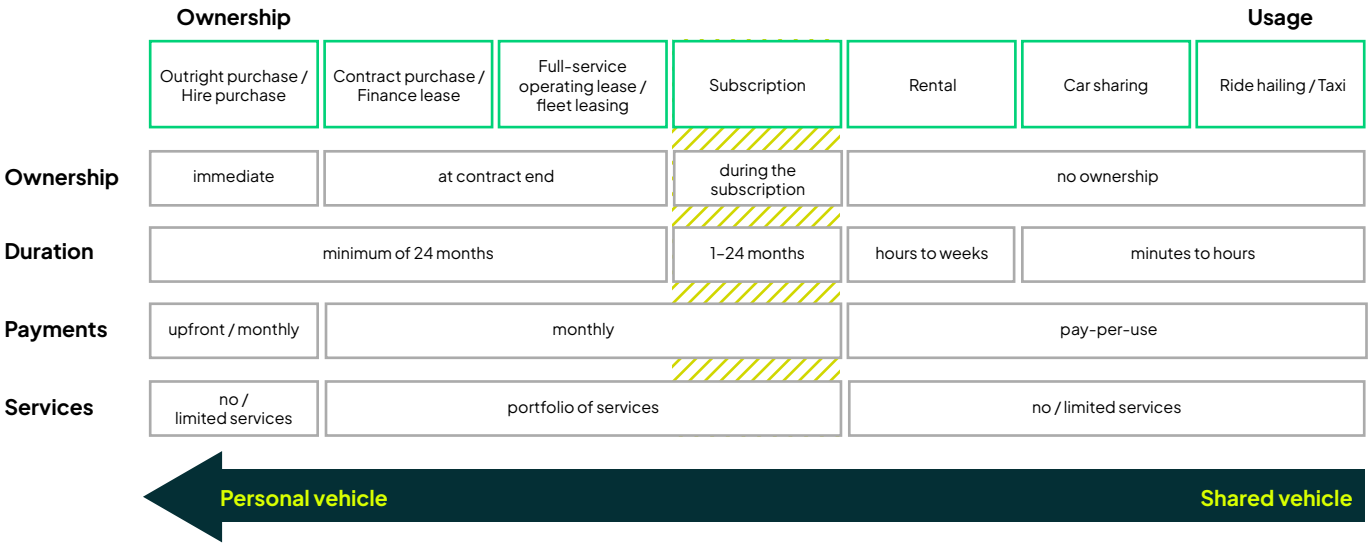
New vehicle subscriptions in the EU5 for private owners and companies (in EUR bn)
Source: deloitte.com

New forms of access to mobility combine the advantages of traditional ownership (having a car at your disposal for a specific period of time) with the benefits of shared services (no long-term commitments, ease of changing vehicles, full service support). Car subscriptions thus respond to the growing need for convenience, simplicity and cost transparency[107].

The transformation is also evident in the corporate segment. Companies that have hitherto preferred leasing are increasingly opting for subscriptions and service-based fleet solutions[107]. For them, cost optimisation, greater flexibility in fleet management and the ability to adapt the number of vehicles to current business needs are key.

Notably, subscriptions are also becoming attractive for used cars. Vehicles can thus be reused several times in successive life cycles, which increases their profitability and promotes the circular economy model[107].

Analyses show that as early as 2025, more than EUR 22 billion of annual car financing in Europe will shift to the subscription segment[107]. This means that around 8–10% of new registrations in key EU5 markets will be subscription-based. This phenomenon affects both private and business customers, and the main source of the „shift" will be existing leasing contracts.



Product portfolio in the mobility sector
Source: deloitte.com

The transition from ownership to use is of particular importance in the context of the development of the electromobility sector. Subscription- and service-based models lower the entry barrier to electric vehicle use by minimising the risks associated with rapid technological progress, uncertainty about battery residual value and the availability of charging infrastructure. This makes both private and corporate customers more willing to test and deploy EVs under flexible models of use, accelerating EV adoption[107].

Fleets are a major driver of today's electromobility market in Poland. Large companies that need to meet ESG targets are replacing entire fleets with electric ones and installing chargers both at company car parks and at employees' homes. This is allowing people to become accustomed to using cars in this way - first they use a company car, charging it at work or at home, and then they buy their own EV because they already know that it works and that it is possible to use it daily. This is a clever way to make electromobility commonplace - through fleets, through practice and everyday life, and not just through regulations or subsidies.

Jan Kamiński
Business Development Director
Enelion

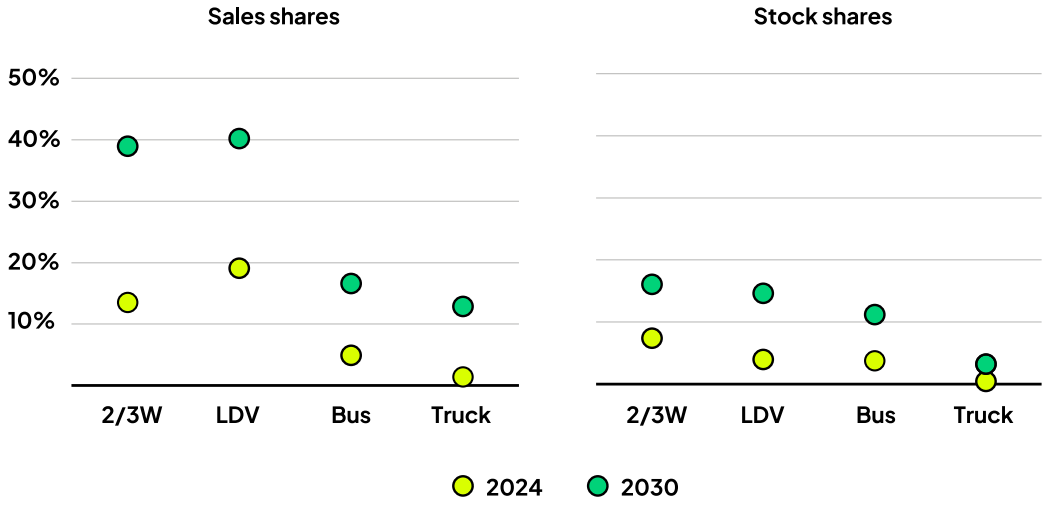
ELECTRIC HEAVY-DUTY VEHICLES

In terms of global trends in new mobility, the electric heavy-duty vehicle segment is growing the slowest of all vehicle categories. Forecasts indicate that the share of electric heavy-duty vehicle (eHDVs) sales in the global market will reach approximately 13% by 2030. Still, they will account for only 3% of the total fleet of heavy-duty vehicles. This means that although progress is being made, heavy-duty vehicles remain the most difficult mode of transport to electrify. The main factors stimulating the development of this segment are increasingly stringent emission standards for heavy-duty vehicles and the gradual improvement in the economic viability of operating eHDVs[105].

In 2024, global sales of electric lorries increased by nearly 80%, reaching around 2% of the segment's market share, with China remaining the clear leader in terms of vehicles sold - these totalled 75,000, accounting for over 80% of global sales. This was made possible, among other things, by a programme to scrap conventional lorries.

In Europe and the United States, the market shares have remained at a level similar to that of 2023. Yet, the model range has expanded significantly. The number of available electric lorry models has increased from less than 70 in 2020 to over 400 in 2024, enabling them to serve an ever-growing number of transport applications.

While the purchase price of eHDVs is still 2–3 times higher than that of their diesel counterparts, the total cost of ownership is already lower in China. Europe and the US are forecast to reach economic parity in long-distance transport by 2030. Driver working time regulations are also an important factor supporting their uptake. In the European Union, the mandatory 45–minute break allows a lorry battery to be charged for an additional 150 km of range using a 350 kW charger, or up to 400 km with megawatt charging[108].



Electric vehicle sales and market share by mode of transport for 2024 and 2030
Source: Global EV Outlook 2025, iea.bloc.core.windows.net

The rise in electric lorry usage is closely linked to the development of suitable charging infrastructure. Today, charging at bases and depots remains the dominant solution. However, long-distance transport requires high-power fast chargers, including megawatt devices, which have begun to be implemented in Europe and the United States. Although the infrastructure market for eHDVs is only just taking shape, public and private investment is accelerating its development and EU regulations are setting specific targets for the density and power of charging stations. It is the expansion of the charging network that is one of the most important conditions for the wider electrification of heavy transport[108].

The electric lorry market in Poland is still at a very early stage of development. 2024 saw a slight increase in registrations in this segment, but the scale remains marginal. According to data from late November 2024, only 89 new eHDVs appeared on the roads.

Nonetheless, the situation is expected to change in 2025, with the launch of the „*Support for the purchase or leasing of N2 and N3 zero-emission vehicles*" scheme by the National Fund for Environmental Protection and Water Management (NFOŚiGW). The National Fund for Environmental Protection and Water Management has announced calls for applications for three support programmes, comprising:

- subsidising the purchase and leasing of zero-emission heavy-duty vehicles,
- development of a network of public high-power charging stations for heavy transport,
- construction and modernisation of the energy connections necessary for such infrastructure.

Their implementation is considered to be one of the most groundbreaking steps in recent years towards the electrification of heavy transport in Poland[106].

> Meanwhile, the electric heavy-duty transport segment, in which Poland plays a special role as a key logistics player in Europe, is developing as well. We are already commissioning the first charging points for lorries and implementing dozens more projects, because we know that growing demand will define the market trends in the coming years.

Rafał Czyżewski
CEO, Greenway Poland

Currently, the lack of suitable charging infrastructure remains the key barrier to the development of the eHDV segment. Data from the Polish New Mobility Association indicates that Poland has fulfilled only a minimal portion of its obligations under the EU's AFIR regulation. With regard to the TEN-T core network, the fulfilment of the obligations is less than 10%, and in the case of infrastructure for heavy-duty vehicles, no progress has actually been made yet. Importantly, none of the 30 largest urban hubs in the country have yet established a charging zone dedicated to eHDVs. Here, too, there are many parallel investments in high-power charging stations, which will meet the growing eHDV market demand in Poland, as noted by Rafał Czyżewski from Greenway Poland (see quote above).

The development of the eHDV segment is also strongly influenced by EU regulations. Amended in 2024, Regulation (EU) 2019/1242 of the European Parliament and of the Council tightened CO_2 emission standards for new heavy-duty vehicles: they are to be reduced by 45% from 2030, by 65% from 2035 and by as much as 90% from 2040. Such ambitious targets will be one of the main drivers behind the development of eHDVs by manufacturers and will encourage transport companies to purchase them[107].

Globally, the range of eHDVs offered is growing rapidly and now includes more than 400 models. The models vary in terms of battery capacity (from a few hundred to over 600 kWh), providing travel ranges from around 200 km in urban transport to over 500 km in long-haul versions. As technology advances, manufacturers are announcing the next generation of vehicles with larger batteries, megawatt charging capabilities and increasingly better performance.

In Europe, manufacturers such as Volvo Trucks, Mercedes-Benz, Scania and MAN are leading the way. Volvo Trucks has a wide range of eHDV models, ranging from the urban FL and FE Electric to the FM and FMX Electric for construction and distribution applications to the FH and FH Aero Electric for regional and inter-regional transport, all of which offer zero emissions, high efficiency and suitability for different market segments[107].

Scania electric lorry
Source: Scania press materials

The Mercedes-Benz eActros 600, which received the *International Truck of the Year 2025* award, is a long-haul eHDV with a range of around 500 km. Thanks to LFP batteries, megawatt charging from 20% to 80% is possible in half an hour, and a powertrain with an output of up to 600 kW, combined with the ProCabin cab and driver assistance systems, ensures efficiency, comfort and safety[108].

The ETM6 Cargo eHDV from Chinese company BYD sold on the European market
Source: BYD materials

Scania's eHDVs feature a modular design approach, allowing the chassis, powertrain and cab to be customised to suit a variety of applications from urban to regional to long-haul transport. Thanks to new batteries with a capacity of up to 728 kWh, they can achieve a range of as much as 600 km, combining high energy efficiency with full load capacity and zero emissions[109].

MAN's eTGX, eTGS and eTGL models are available in a range of variants for long-haul, distribution, construction and municipal transport, offering a range of up to 750 km thanks to modular batteries. They combine high ergonomics, fast charging of up to 750 kW with MCS and long-lasting batteries manufactured in Germany, guaranteeing effective useful life of up to 1.6 million kilometres[110].

Various models of eHDVs are available in the United States, including the Freightliner eCascadia, Tesla Semi and BYD 8TT, designed for port and long-haul transport, with planned solutions for megawatt fast charging. Meanwhile, China remains the largest market for eHDVs, with a wide range of models from manufacturers such as BYD, FAW and Dongfeng, which are used in both urban and regional transport. As technology and charging infrastructure develop, the range of electric vehicles available in the heavy goods vehicle segment will expand, and their applications will become increasingly diverse.

MICROMOBILITY

Micromobility encompasses lightweight means of transport, usually electric, which are used to cover short distances in cities. This category includes bicycles, electric bikes and scooters, balance scooters and mopeds, among other things. They can be privately owned or operate on a shared model. Their growing popularity is due to the fact that they offer a flexible and environmentally friendly alternative to cars, helping to reduce congestion and CO_2 emissions[111].

This is particularly evident in large cities — from the tidy Citi Bike racks in New York to hundreds of Lime scooters in Berlin to local initiatives in smaller urban centres. What they all have in common is the desire of cities and operators to create modern, integrated short-distance transport services that increase residents' mobility.

According to McKinsey analyses, the global micromobility market was worth approximately USD 160 billion in 2022 and could reach as much as USD 340 billion by 2030. In some regions, the market is expected to more than double in size. In Europe, this increase is expected to reach up to USD 140 billion, in South Asia up to USD 45 billion, and in the Middle East and North Africa up to USD 20 billion. China, which is forecast to become the largest micromobility market, is expected to double its value to USD 80 billion, while India and Indonesia — with growth rates exceeding 60% per annum — will become the second and third largest markets for electric two-wheelers by 2030, respectively. In North America, the micromobility market is also growing — its value is expected to increase from USD 20 billion in 2022 to USD 35 billion in 2030, which, although more moderate than in Asia or Europe, still means almost doubling in scale[112].

The biggest challenge of modern cities remains the over-reliance on private cars. In 2023, there were approximately 1.3 billion of them on the roads worldwide. This leads to congested infrastructure, traffic jams and wasted time. For example, drivers in Munich spend an average of 87 hours per year in traffic jams. In pre-pandemic Los Angeles, this figure was as high as 119 hours. Cars also take up huge areas of urban space, require expensive road investment projects and generate high emissions. Micromobility is thus becoming one of the tools for reducing these burdens, offering an effective alternative for short-distance travel[112].

Key trends and growth areas include:

1. the rapid growth of shared services — electric scooters and bicycles are becoming an everyday mode of transport in cities, while modern applications and technologies (GPS, geofencing and mobile payments) are improving user convenience and operator efficiency;

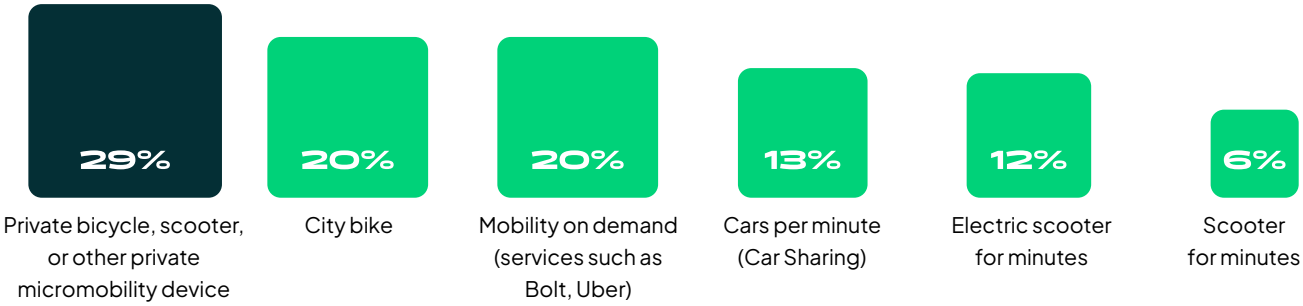
2. change in consumer attitudes — a 2025 McKinsey global survey found that as many as 46% of respondents declared that they would be willing to give up their private cars in favour of other means of transport within a decade;

3. geographical diversity — bicycles and electric bikes dominate in China and EU countries, electric scooters have gained the most popularity in America and Europe, and electric scooters and mopeds are particularly popular in India, China and Southeast Asia[112].

Global distribution of mobility by mode of transport in 2022
Source: mckinsey.com

Germany is the largest market for shared scooters in Europe. Favourable regulations and the openness of society to new forms of mobility have contributed to its success. Nevertheless, it is worth noting that operators have achieved a competitive advantage through business models (e.g., subscription packages instead of unlocking fees) and operational excellence - i.e., efficient fleet management, adequate vehicle availability, and service depot locations - rather than through the vehicles themselves[112].

Although the growth prospects are very high, micromobility operators face several serious challenges: (1) adapting services to local transport habits, (2) managing and maintaining a diverse fleet of vehicles, (3) providing adequate parking and charging infrastructure, and (4) integrating micromobility with public transport and urban policy[112].



Results of the PSNM survey on the propensity/preference to use new mobility transport modes
Source: Barometr Nowej Mobilności, psnm.org

In Poland, new mobility services such as urban bicycles, electric scooters and shared cars are gaining importance, although they still play a somewhat complementary role to traditional means of transport. For most users, they are a convenient alternative when public transport or their own car proves to be less accessible or practical. This is a characteristic stage of early market development, in which the lack of full integration with public transport systems, limited infrastructure and the relatively high cost of use mean that micromobility remains mainly an ad hoc choice rather than the dominant mode of travel. According to a PSNM survey, „around 68% of Poles use new mobility services, with 15% of respondents declaring their use at least once a week and 3% almost every day”[112].

LOCAL MICROMOBILITY REVOLUTION

MEVO is one of Europe's most modern bike sharing systems and by far the largest project of its kind in Poland. The fleet comprises more than 5,000 bicycles, the vast majority of which are electric[113]. Users have access to over 700 parking stations, as well as more than 50 battery charging points and several service points. The system operates across 17 municipalities of Metropolitan Area Gdańsk Gdynia Sopot[114].

MEVO uses high-quality electric bicycles by Segway, which are adapted to intensive use in urban areas. The battery allows users to travel up to 100 km on a single charge, and additional features — a speedometer, a phone holder with an inductive charger, tubeless tyres and automatic gear shifting — increase riding comfort and safety.

The system is operated by the Spanish company City Bike Global, part of the Moventia Group (also known as Marfina), which specialises in public transport services and manages a fleet of over 30,000 bicycles worldwide. While the operator is also active in such locations as Rotterdam, Cambridge, Helsinki and Lima, it is the MEVO project that stands out from others in terms of scale and innovation.

The MEVO system operates across much of Metropolitan Area Gdańsk Gdynia Sopot
Source: Mevo press materials, gdansk.pl

In July 2025, the MEVO system surpassed the impressive milestone of half a million registered users. Currently, it is used by over 530,000 people, who have made 5 million journeys since the project was launched, covering a total of over 16 million kilometres. These figures confirm that MEVO has become an integral part of everyday mobility in the Metropolitan Area - especially on working days, when nearly 70% of all rentals take place. The average distance of one trip is around 3.5 kilometres, demonstrating that the MEVO system's bicycles perfectly fill the urban transport gap for short distances[114].

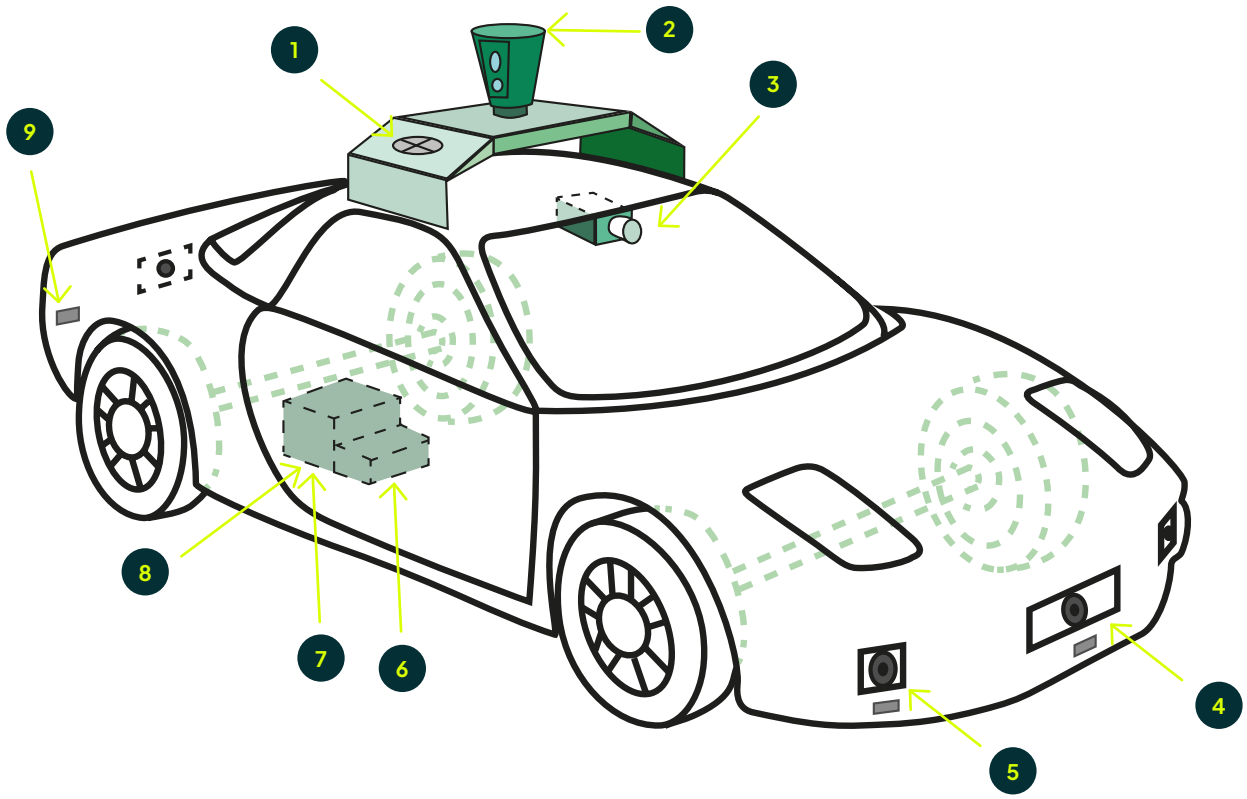
Bike sharing systems operate in many Polish cities, although each of them develops in a slightly different way. Residents of Kraków can take advantage of long-term rentals through the LajkBike system (1,000 bicycles, half of which are electric) and the Park-e-Bike pilot programme, which makes it easier to combine car and bicycle travel thanks to Park & Ride infrastructure. Warsaw, in turn, is developing a system called Veturilo, which has been operating since 2012 and currently includes 3,500 bicycles, including 330 electric ones. Similar solutions are also available in smaller urban centres like Bydgoszcz, where users have access to 365 traditional bicycles deployed across 62 stations. Still, the MEVO system, which covers over a dozen municipalities, stands out among these initiatives. Due to its scale, modern technologies, and the dominant role of electric bikes, it is considered the most innovative city bike project in Poland and one of the most interesting in Europe[115].

DRIVING AUTOMATION

Driving automation is a trend consisting in the development and implementation of systems enabling partially or fully autonomous driving of vehicles.

Autonomous vehicles (AVs) are also referred to as self-driving vehicles, driverless vehicles and automated vehicles.

The technology used in autonomous vehicles depends on their level of autonomy and includes cameras, sensors, radars, LIDARs, GPS and inertial navigation systems2 (three-axis gyroscopes and/or accelerometers), which enable precise tracking of the vehicle's attitude and movement in space. With these solutions, the vehicle can move autonomously with limited human input or completely autonomously.



Autonomous vehicle technologies
Elaborated based on: css.umich.edu

1. **Global Positioning system** (GPS) – locate the vehicle by using satellites to triangulate its position. A;though GPS has improved since the 2000s, it is only accurate within several meters.

2. **Light Detection and Ranging** (LIDAR) – a 360–degree sensor that uses light beams to determine the distance between obstacles and the sensor.

3. **Camera** - frequently used inexpensive technology however, complex algorithms are necessary to interpret the image data collected.

4. **Radio Detection and Ranging** (RADAR) – a sensor that uses radio waves to determine the distance between obstacles and the sensor.

5. **Infrared sensors** - allow for the detection of lane markings, pedestrians, and bicycles that are hard for other sensors to detect in low lighting and certain environmental conditions.

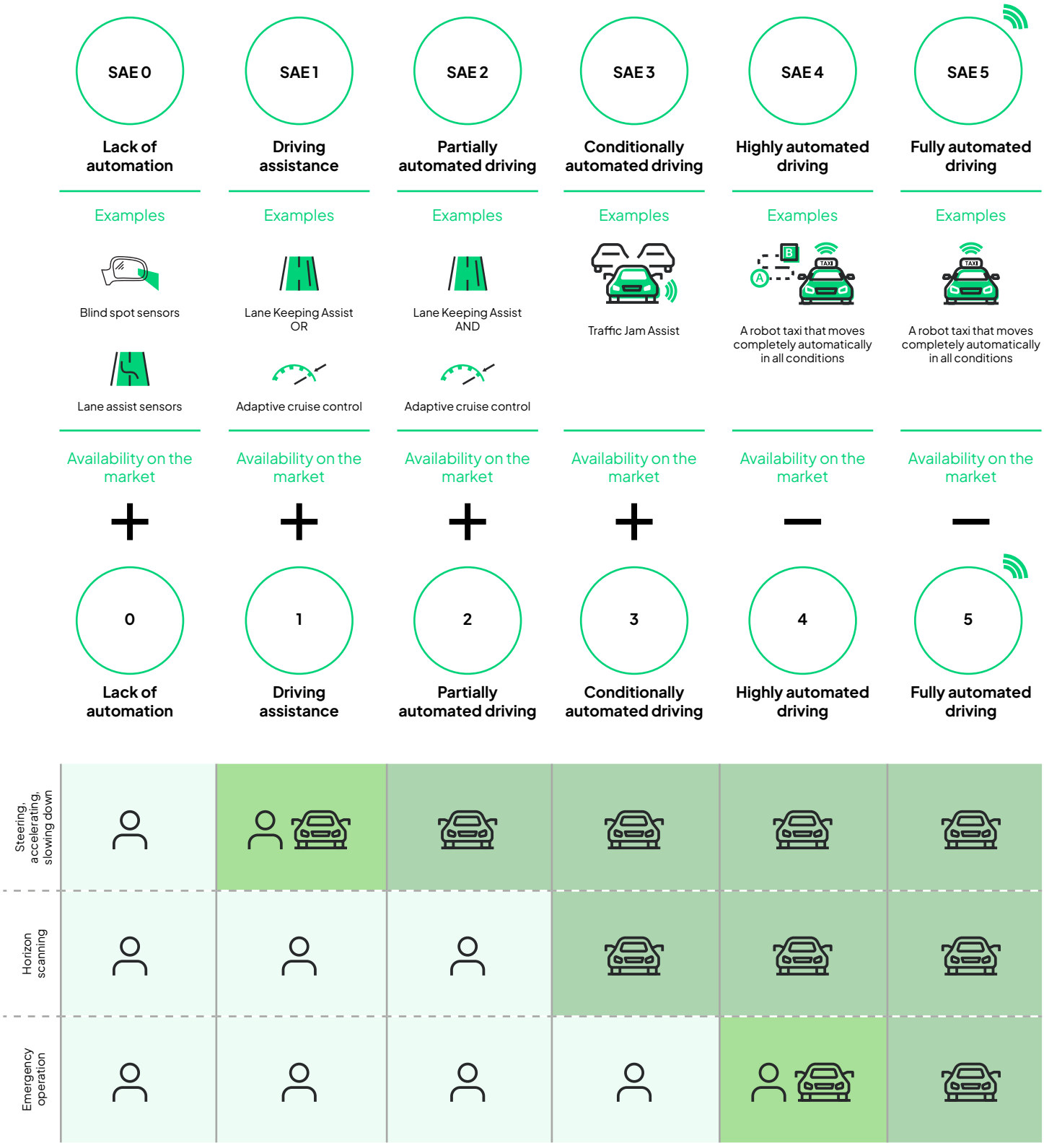
6. **Inertial Navigation Systems** (INS) - typically used in combination with GPS to improve accuracy. INS uses gyroscopes and accelerometers to determine vehicle position, orientation, and velocity.

7. **Dedicated Short-Range Communication** (DSRC) - used in Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) systems to send and receive critical data such as road conditions, congestion, crashes, and possible rerouting. DSRC enebles platooning, a train of vehicles that collectively travel together.

8. **Prebuilt maps** - sometimes utilized to correct inaccurate positioning due to errors that can occur when using GPS and INS. Given the constraints of mapping every road and drivable surface, relying on maps limits the routes an AV can take.

9. **Ultrasonic sensors** - provide short distance data that are typically used in parking assistance systems and backup warning systems.

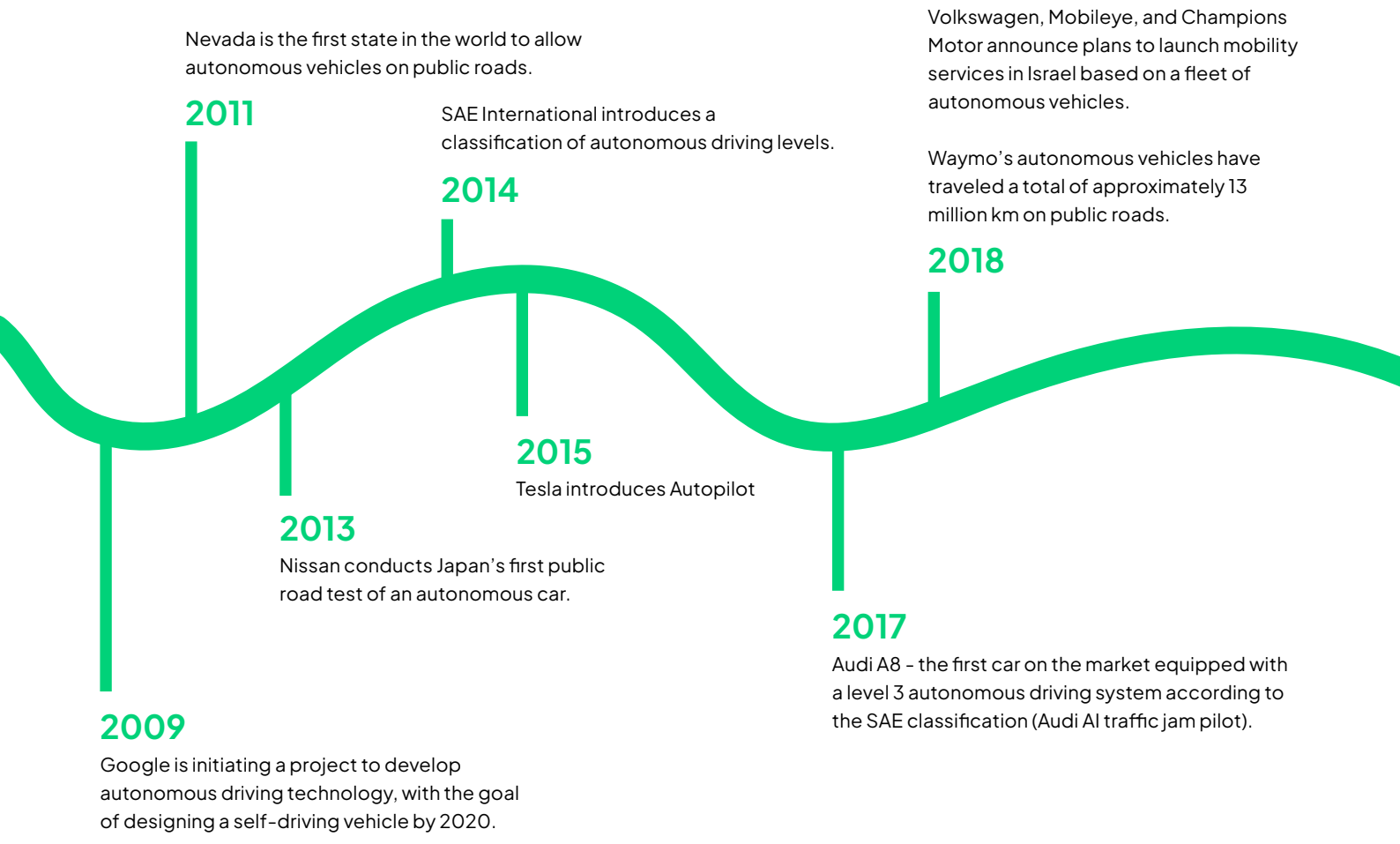
In 2014, Society of Automotive Engineers International (SAE International) developed a classification of six levels of driving automation, which underwent further revision in 2016. By decision of the National Highway Traffic Safety Administration (NHTSA), it has become the official standard in the United States and is also widely used in analyses of autonomous vehicle technology in Europe[116].



Levels of driving automation
Source: narzedzia.elektromobilni.pl

The history of autonomous vehicle technology dates back to 1925 and the unveiling of the radio-controlled *„American Wonder"* vehicle. The following decades saw groundbreaking innovations, such as the introduction of cruise control in the Chrysler Imperial (1957) and work on LIDAR-based distance control systems (Mitsubishi Debonair, 1992). The 1980s saw the launch of *PROMETHEUS* (1987–1995), the largest R&D project in this field, involving leading car manufacturers. In the following years, further driver-assistance technologies were brought to market, including active cruise control (Mercedes-Benz S-Class, 1999), lane-keeping (Nissan Cima, 2001) or automatic braking (Honda Inspire, 2003).

The breakthrough came in 2009, when Google began work on an autonomous vehicle, and in 2011 Nevada became the first state to allow tests of such cars on public roads. Tesla has been offering its *Autopilot* system since 2015, and the Audi A8 (2017) became the first production car with SAE Level 3 driving automation. By now, autonomous vehicles have covered millions of kilometres, and more and more companies are investing in their development and commercialisation[117].



History of the development of autonomous driving technology
Source: based on narzedzia.elektromobilni.pl

We see a global shift toward edge-based intelligence, where vehicles and connected systems process data locally to enable faster, safer, and more reliable decisions. This is increasingly critical as automation, electrification, and connectivity scale across markets. The ability to act in real time, close to where data is generated, has become foundational to delivering the next generation of mobility solutions worldwide.

By processing and acting on data directly at the source—rather than relying solely on the cloud—our customers can achieve faster, more resilient, and safer operations in environments where timing is critical.

Tomasz Miśniakiewicz
Country Director, Aptiv Poland

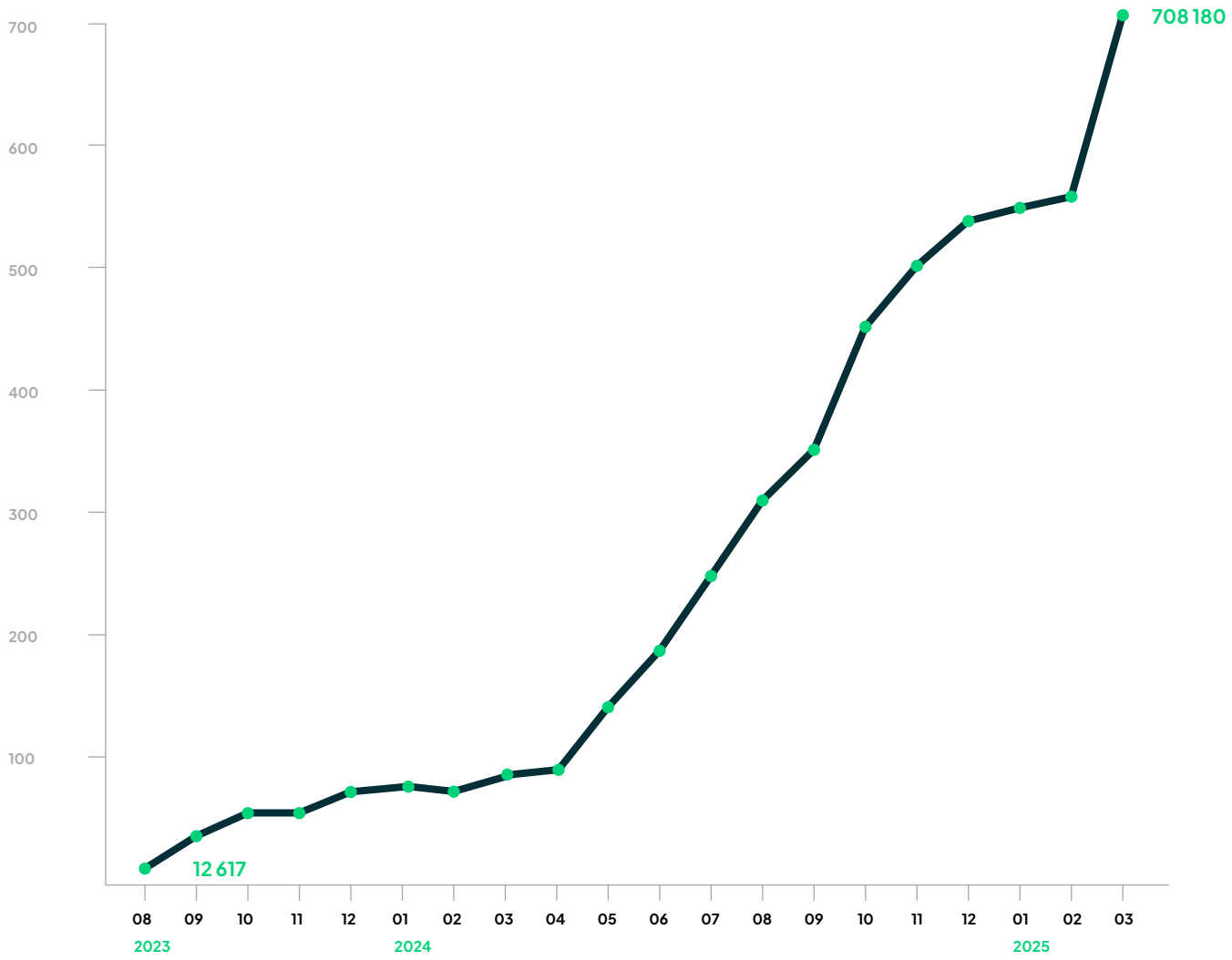
The development of autonomous vehicles is closely linked to electromobility, primarily due to the easier management of electric powertrains compared to traditional internal combustion engines[117]. Despite dynamic technological advances, autonomous vehicles still face significant challenges that limit their wider deployment in cities around the world.

Further development of self-driving cars implies the creation of a comprehensive ecosystem, including urban infrastructure enabling communication between self-driving vehicles and the surrounding environment. Such solutions aim to increase traffic flow and improve safety for road users. The integration of vehicles with cloud solutions is also anticipated, aiming to enable connectivity with smart home systems and other modern technologies. According to a 2010 National Highway Traffic Safety Administration (NHTSA) study, the implementation of advanced vehicle-to-vehicle communication systems could potentially reduce traffic accidents by up to 79%[118].

Currently, AV systems mainly operate in selected metropolitan areas such as Phoenix, San Francisco (Waymo) and Beijing (Baidu) and rely heavily on detailed HD maps and adaptation to local road conditions. Attempts to expand their operation to more complex urban environments encounter technical barriers resulting from the so-called Curse of Dimensionality (CoD) — the growing number of variables, such as weather, traffic intensity and road configuration — and the Curse of Rarity (CoR), i.e. the occurrence of rare, critical scenarios, such as sudden, unexpected pedestrian behaviour.

Failure analyses indicate that 96.5% of autonomous vehicle incidents occurred in good weather and road conditions, highlighting the safety challenges in standard urban conditions.

Despite these limitations, the largest AV platforms are achieving significant operational results. Waymo covers over 1 million miles per week, completing approximately 150,000 paid journeys in cities such as Phoenix, Los Angeles and San Francisco. Baidu Apollo demonstrates a similar scale of operations, having completed nearly 900,000 journeys in Q2 2024[119].



Waymo's monthly rides in California (in thousands of rides)
Source: voronoiapp.com

However, user confidence remains a significant constraint. Research by AAA (American Automobile Association, 2025) shows that only 13% of drivers in the US are comfortable using autonomous vehicles[120], highlighting the need for further technology development and educational efforts to build public awareness and trust.

Autonomous vehicle development represents a significant step towards modern mobility, combining advanced sensor technologies, communication systems and electromobility. Despite numerous technical challenges and limited public confidence, autonomous vehicles are demonstrating increasing independence and safety in urban traffic. Their further development will require improvements in technology, integration with smart infrastructure and user education, which will help to leverage the full potential of this innovative form of transport.

Education and labour market

Talent pool in Pomerania

TALENT POOL — HIGHER EDUCATION

The Tricity is one of the most important academic centres in northern Poland. The entire Pomerania region, with its unique combination of a strong technical, maritime and engineering tradition with a modern approach to technology, energy and sustainability, is laying a solid foundation for the energy transition and the development of the electromobility sector.

+92k
students

20k
graduates every year

28
Universities in Pomerania

There are currently over 92,000 students in Pomerania, with nearly 20,000 graduates leaving university each year and joining the regional labour market as highly qualified specialists. There are 28 higher education institutions in the region, including well-established centres such as the Gdańsk University of Technology, Medical University of Gdańsk, University of Gdańsk and Gdynia Maritime University.

On a national scale, Pomerania undoubtedly specialises in fields related to renewable energy sources and the maritime sector. This is in line with the current and future competence profile of the region, focusing on economic development linked with offshore wind energy and the development of the supply chain in this sector, among other things. Nuclear energy-related courses are also appearing (such as the Nuclear Energy course at Gdańsk University of Technology). Another characteristic feature is the highly specialised engineering courses, e.g. nanotechnology, automation and robotics. Pomerania's third specialisation is courses related to environmental protection and recycling. In this context, it is worth mentioning the *„Resource Recovery and Energy Engineering"* course, which currently has 51 students at Gdańsk University of Technology.

POLISH-CHINESE STUDIES IN ELECTROMOBILITY AND RENEWABLE ENERGY SOURCES

The Gdynia Maritime University is preparing to launch Poland's first international engineering studies devoted to electromobility and renewable energy sources in cooperation with a Chinese academic partner. The project is being developed under the *KATAMARAN* programme and is part of a broader strategy to internationalise the university and develop competencies for green transition.

It will be an eight-semester first-cycle programme, implemented in a 2+2 model - two years in China and two in Poland. The content of the programme covers the full spectrum of issues related to electromobility - from the design and construction of electric vehicles to energy storage to energy management systems and renewable sources. The plan is for students to obtain a double diploma - both from GMU and a Chinese university, which will make the course more attractive to students.

The classes are to be conducted in English, but the university authorities are also considering launching a parallel path in Polish, which will allow the developed curriculum to be used in the national education system as well. The project is part of GMU's and the region's development strategy; this includes competence building in green energy, technological innovation and international cooperation. The Chinese partners have offered extensive cooperation, including an apprenticeship component in factories, e.g. for batteries, energy storage or propulsion, as well as in technology centres related to electromobility.

Recruitment will commence in the next academic year.

10,557

Total number of students in fields related to new mobility (directly and indirectly) in Pomerania

about 2,000 per year

Total number of graduates in occupations related to new mobility (directly and indirectly) in Pomerania

An analysis of data from Statistics Poland for the 2024/2025 academic year shows that approximately 10,500 students in the region are enrolled in technical and engineering programmes directly or indirectly related to new mobility. In terms of competencies related to electrical engineering, electronics and industrial automation alone, Pomerania has a potential of around 3,000 students.

Field of study		Number of students	Number of graduates
Fields of study directly related to the new mobility sector	Automation, cybernetics and robotics	110	16
	Automation and robotics	498	69
	Automation, robotics and control systems	474	85
	Electronics and telecommunications	975	201
	Electrical engineering	918	229
	Industry 5.0 technologies	42	-
	Hydrogen technology and electromobility	152	-
Fields of study indirectly related to the new mobility sector	Technical systems operation and diagnostics	120	-
	Power industry	629	93
	Resource recovery and energy engineering	51	-
	Logistics	3439	746
	Mechanics and mechanical engineering	1241	242
	Mechatronics	472	53
	Transport	862	187
	Transport and logistics	353	49
	Transport, forwarding, logistics	205	-
	Production management and engineering	16	107

Academic talent pool – fields of study related to the new mobility sector
Own elaboration based on Statistics Poland data (academic year 2024/2025)
„(-)" indicates no graduates in the given academic year.

New fields of study, such as hydrogen technologies, electromobility and Industry 5.0 technologies, indicate that universities are rapidly adapting their programmes to the requirements of the energy and industrial transition. The high number of graduates in the fields of electronics, mechatronics and production management also reflects the market demand for specialists who combine engineering knowledge with digital skills.

Complementing Pomerania's profile are IT competencies, which are strongly rooted in the Tricity region. According to an ABSL report, the modern business services sector (BPO, SSC, IT/ITO) in Poland has been growing for years, and the Tricity — due to its access to well-educated staff, transport connections and friendly conditions for investment — is one of the key centres of this sector in the north of the country. Today, the Tricity already has approximately 41,000 employees working in this sector[121]. The region is home to a number of shared service centres, IT centres and outsourcing centres, which carry out global assignments, creating demand for specialists in programming, data analysis, process automation and IT systems management.

These digital services, which dominate the region, are in line with the educational profiles of Pomeranian universities — engineering students often also acquire skills in programming, algorithms, artificial intelligence, machine learning and data analytics. Combining these skills with technical knowledge enables graduates to join development teams at companies in the electromobility industry, e.g. working on projects involving smart energy management systems, charging infrastructure and battery consumption prediction.

> Electromobility is by no means limited to vehicles alone - it is an entire sector of the economy encompassing batteries, energy storage, management systems, charging infrastructure and logistics. Each of these elements requires specialists - and this is where Pomerania is building its advantage. Our universities offer courses and specialisations focused on renewable energy sources, electromobility and offshore wind energy, while also conducting projects in cooperation with enterprises - from energy companies, shipyards and port operators to battery manufacturers and creators of IT solutions for the energy sector. Students do more than just study in lecture halls - they participate in research and development projects, internships at production plants, and study visits to factories. They build vehicle prototypes in research clubs, gaining practical experience. This is not just theory - it is preparation for real work in industry. Therefore, whenever an investor comes to Pomerania, we can say: you have a ready-made ecosystem: personnel, universities and business partners who understand the market and are able to work together to build innovative solutions. This is an advantage that makes the region one of the most attractive places for electromobility development in Poland.

Prof. Sambor Guze
Deputy Rector for Education
at Gdynia Maritime University

TALENTS OF THE FUTURE IN POMERANIA

The Pomeranian Voivodeship is a place of development for more than 92,000 students from across Poland and abroad. The region's development is evident not only in economic indicators, but also in the growing interest in studying in Pomerania.

Today, Pomerania attracts not only those who want to undertake full-time or part-time studies, whether first- or second-cycle, but also an increasing number of people who choose postgraduate studies, modular education, as well as training and courses, which are plentiful in Pomerania.

At Invest in Pomerania, we support initiatives that bring business and universities together, bringing about a qualitative leap in teaching. August 2025 saw the Q-Con event, accompanied by Q-Camp, of which we were also partners. This is an initiative by Kainos, carried out in cooperation with the University of Gdańsk. For a week, Gdańsk was the centre of deliberations and promotion of quantum technologies, as the University of Gdańsk is home to the ICTQT (International Centre for Theory of Quantum Technologies), headed by one of the world's leading and most renowned quantum physicists, Professor Marek Żukowski.

Pomerania is home to numerous international and interdisciplinary projects, many of which are innovative. Recently, we have been discussing a combined study programme to be implemented under the Sea-EU project, as well as the Enhance project at the Gdańsk University of Technology. In turn, Digi-Wind, an interdisciplinary educational programme in the field of renewable energy, is an out-of-the-box and modern take on education. Meanwhile, the Gdynia Maritime University is launching a joint Polish-Chinese first-cycle degree programme in electromobility and renewable energy sources. Pomerania also offers unique fields of study and specialisations. Only here can you study corrosion or delve into the secrets of the Finnish language.

Notably, there are a growing number of grassroots student initiatives in Pomerania. An excellent example is the PG Racing Team, a project carried out by students of the Gdańsk University of Technology. The team builds innovative electric racing cars, which compete in the prestigious Formula Student competition. This venture not only allows students to put their theoretical knowledge into practice, but also develops their engineering, managerial and team competencies. Thanks to such initiatives, young people learn cooperation, project management and creative problem-solving — skills that are highly valued on the labour market.

More and more interesting initiatives are also emerging under the Fahrenheit Union of Universities (FarU). A good example of this is the FarU Champions of Cooperation contest, which helps students to develop their thinking in terms of project activities and also enables them to pursue their own ventures. This enables young people to transform their knowledge into concrete actions that often have the potential to make a real impact on the region's development.

Karolina Nawrocka-Mucha
Project Manager University Relations
Invest in Pomerania

TALENT POOL — VOCATIONAL EDUCATION

The development of the electromobility sector requires not only engineers and scientists, but also highly qualified technicians and operators who can operate modern electronic, plant and energy systems. Currently, almost 13,000 students are enrolled in first and second level vocational schools and technical colleges throughout Pomerania.

12,636

Total number of students in vocational schools (first and second level) and technical colleges in fields related to new mobility (directly and indirectly) in Pomerania.

Professional specialisation	Relation to the new mobility sector
Electromechanical engineer	Direct
Automotive electromechanical engineer	Direct
Electronic engineer	Direct
Electrician	Direct
Mechatronics technician	Direct
Automation technician	Direct
Electronics technician	Direct
Electrical technician	Direct
Energy technician	Direct
Mechanical technician	Direct
Robotics technician	Direct
Renewable energy devices and systems technician	Direct
Driver and mechanic	Indirect (transferable competencies)
Motorcycle mechanic	Indirect (transferable competencies)
Motor vehicle mechanic	Indirect (transferable competencies)
Mechanic — fitter of machinery and equipment	Indirect (transferable competencies)
Mechanic — operator of agricultural vehicles and machinery	Indirect (transferable competencies)
Yacht and boat fitter	Indirect (transferable competencies)
Marine hull assembler	Indirect (transferable competencies)
Marine mechanical technician	Indirect (transferable competencies)
Mechatronics technician	Indirect (transferable competencies)
Motor vehicle technician	Indirect (transferable competencies)

Vocational talent pool – vocational specialisations related to the new mobility sector
Own elaboration based on Statistics Poland data

Besides technical and electrical engineering skills, vocational schools in Pomerania can and should integrate IT modules - programming, ICT networks, embedded systems operation, data analysis and process automation - as an integral part of technician and operator training. This synergy gives graduates the ability not only to operate equipment, but also to monitor it, perform remote diagnostics, and optimise performance parameters and energy efficiency. In the context of electric vehicles and renewable energy systems, the importance of control software, energy management systems, predictive diagnostics and IoT (Internet of Things) communication interfaces is growing. Incorporating such content into the curricula of vocational schools strengthens the possibility of competence transfer between the IT and industrial sectors.

> Poland needs to strengthen cooperation between schools, universities and businesses, while technical, vocational and engineering curricula should focus on teaching integrated and process-based thinking. Dual education, which allows students to acquire theoretical and practical knowledge by attending classes both at universities and at potential future workplaces, may prove helpful in this regard. New mobility is a complex, multifaceted trend, so building the potential of graduates of Polish schools in this field requires the introduction of new vocational titles such as electromobility technician or electric vehicle mechanic. The process of educating qualified personnel should also be supported by equipping schools with the necessary teaching materials, e.g. by making selected components of electric powertrains available for teaching at vocational and technical schools.

Jan Wiśniewski
Director of the Research and Analysis Centre
Polish New Mobility Association (PSNM)

This is why an increasing number of Pomeranian companies are choosing to collaborate with vocational schools. One notable example is the partnership between Equay and the Refrigeration and Electronics School Complex in Gdynia.

Equay, which specialises in the production and testing of components for the electromobility and energy storage sector, began working with the school several years ago, seeing the potential to attract future staff. The cooperation also includes teacher support. Equay shares its knowledge of current technologies and industry solutions so that the school's curriculum meets the real needs of the labour market. This cooperation is not merely an image-building project; the company treats it as an investment in future cadres - people who understand the product from the inside out.

> We work with the Refrigeration and Electronics School Complex in Gdynia — it is an excellent technical school whose students already have experience with electronics, programming and automation. We demonstrate to them how these skills are used in practice in the e-mobility industry. Initially it was a collaboration based on apprenticeships, but it quickly developed into a partnership model. We invite students to laboratory classes and workshops where they learn about the real processes of manufacturing, testing and assembling systems used in electromobility.

Marek Kwiczala
CEO, Equay

Notably, from 1 September 2024, vocational schools in Poland (technical colleges and second-level vocational schools) may officially offer training in the new profession of electromobility technician, in accordance with the Regulation of 27 December 2023 on the classification of professions in vocational education.cxxii The classification of this profession includes two key qualifications: MOT.02 - operating, diagnosing and repairing mechatronic vehicle systems, and MOT.07 - organising and conducting maintenance and repair of zero- and low-emission vehicles.

The introduction of the profession of electromobility technician is a significant step towards adapting vocational education to the real needs of the electric transport market. The new profile enables the training of technicians with specialist skills in the operation and repair of electric and hybrid vehicles - from working with high voltage to battery and drive system diagnostics to integration with new infrastructure.

Simulating the recruitment pipeline for a major investment project in the new mobility sector

Chapter prepared by HAYS

SPECIFICS OF RECRUITMENT IN POLAND

Poland is continually attracting new investors, strengthening its position as one of the more attractive manufacturing locations in Central and Eastern Europe. Its distinguishing features include access to employees with high technical qualifications, advanced expert knowledge and soft skills, which is of significant value to the electromobility sector, but also to other manufacturing sectors.

For many years, the Polish market was mainly perceived as a source of relatively low-cost labour. Today, Poland is seen as a mature market, offering highly qualified personnel with experience in various business sectors. In many cases, positive experiences associated with launching production in Poland result in further projects and expansion of a company's operations. There is also a noticeable trend towards locating comprehensive investment projects in Poland that integrate various areas of activity. For example, some projects combine production plants with research and development centres or shared service centres (SSC), which handle a variety of processes, often with a global reach.

A key factor for investors analysing the potential of specific locations in Poland is the availability of existing talent pools, as well as the presence of facilities carrying out similar processes or manufacturing similar products in a given region. The development potential of a given location is also crucial, as investors want to ensure that it will be possible to expand the operation in that location by dozens or even hundreds of new jobs.

Since Poland has had low unemployment for years, investors starting up on the Polish market need to plan their recruitment strategy carefully so they can hire the right staff when they need them. This is because recruitment success largely depends not only on the attractiveness of the offer made by the employer, but also on properly planned recruitment activities.

Despite the rising labour costs that we have observed in recent years, Poland remains a market where it is possible to find employees with high-quality competencies, and the quality-to-cost ratio is still attractive. Salary levels are rising, especially for specialists with niche skills and when staff need to be relocated.

Łukasz Grzeszczyk
Executive Director CEE, Investors Consulting & Talent Location Strategy, Hays Poland

When considering what to offer employees, it is worth remembering about non-wage benefits, which play a key role in creating effective recruitment and retention strategies. Standard benefits include a sports card, life insurance and a basic private medical care package. From the perspective of manufacturing sector employees, the possibility of customising their benefits package according to individual preferences is a particularly attractive solution. Although this is not yet common practice, new investors can use it as a competitive advantage. Professionals are also bound to welcome specialised knowledge-enhancing courses and flexible working hours, while manufacturing employees will particularly appreciate various financial bonuses.

Compared to other business sectors, manufacturing is less competitive in terms of employment flexibility, as remote working opportunities are limited. Nevertheless, some engineers and specialists have the option of using a hybrid working model. This most often applies to positions in international research and development centres, roles related to logistics and purchasing, as well as back office positions.

The manufacturing job market is constantly evolving, offering excellent opportunities for candidates to develop their skills. Employees expect to be supported by their employers in developing and expanding their skills, so it makes sense to provide adequate training at all levels within the structure from the outset.

In Poland's current job market, candidates with technical skills, specialist knowledge and soft skills have the greatest competitive advantage. This means that employers looking for employees must have a carefully designed recruitment strategy and an attractive offer to successfully attract the right candidates.

To acquire the best talent, investors should operate efficiently and have a well-planned recruitment process, which increases the chances of hiring the best people.

Iwona Sączawa
Evecutive Manager
Hays Poland

Visualisation of the Pomeranian Technology and Industrial Park in Wojanowo
Source: Own elaboration by Invest in Pomerania

KEY ISSUES TO CONSIDER WHEN DEVELOPING A RECRUITMENT STRATEGY

Staff availability and quality

Is there a workforce with the necessary technical skills and relevant experience available in the location under consideration?

Location and infrastructure

Are there plants with similar production processes within a 60–70 km radius?

What is the access to local infrastructure like, and will it be necessary to provide transport for employees?

Working model and organisation

Is it possible to adapt the shift system and working hours to local standards and staff expectations?

Are there any plans to introduce hybrid working for office and specialist positions?

Employment costs and benefits

Are the planned salary levels and benefits in line with market standards? What will enhance the attractiveness of the offer?

Employment flexibility

Should the workforce consist of permanent staff, or will it be necessary to use flexible forms of employment?

Is it planned to include foreign staff in the recruitment strategy — what percentage of staff are they expected to be?

HR team building and partnership with agencies

Are there any plans to establish a local HR department with experience in the manufacturing sector?

Are there any plans to partner with recruitment agencies?

Recruitment and retention strategy

What is the short- and long-term recruitment strategy?

SIMULATION OF THE RECRUITMENT PROCESS FOR A MAJOR INVESTMENT PROJECT IN THE NEW MOBILITY SECTOR AT THE POMERANIAN TECHNOLOGY AND INDUSTRIAL PARK IN WOJANOWO (NEAR GDAŃSK)

The development of the new mobility sector in Europe is reflected in the growing demand for specialists and production workers capable of operating modern battery technologies, energy management systems and automated assembly lines.

To estimate the region's actual workforce potential, Hays Poland conducted a model simulation of the recruitment process for a large electromobility manufacturing plant that could be built in the Pomeranian Technology and Industrial Park in Wojanowo, near Gdańsk. The analysis considers both the availability of potential candidates in the region and the dynamics of the entire recruitment process — from obtaining applications to the end of notice periods.

The simulation aims to show what the process of building a team for a site employing 500 people — including 450 in production and 50 in specialist and managerial positions — would look like in practice. The data is based on actual recruitment rates and salary ranges provided by Hays, taking into account the local labour market and the availability of talent in the Pomeranian Voivodeship.

500 people
Total personnel

450 people
Production positions

50 people
Specialist and managerial positions

POMERANIAN TECHNOLOGY AND INDUSTRIAL PARK IN WOJANOWO **(see page 106 for site overview)**

	Site Director	Managers/ Directors	Specialist positions	Blue Collar positions
Availability	High	High	Moderate	Moderate
Ease of recruitment	Easy	Easy	Moderate	Moderate

Workforce availability*

*The area of search for local candidates is: Tricity, Reda, Wejherowo, Bytów, Chwaszczyno, Czersk, Człuchów, Malbork, Elbląg, Pruszcz Gdański, Rumia

RECRUITMENT PROJECT TIMETABLE

Month	Week	Site Director	Managers / Directors	Specialist positions	Blue Collar positions
1st month	1	●			
	2	●			
	3	●			
	4	●			
2nd month	5	●			
	6	●			
	7	●			
	8	●			
3rd month	9	●			
	10	●	●	●	●
	11	●	●	●	●
	12	●	●	●	●
4th month	13	●	●	●	●
	14	●	●	●	●
	15	●	●	●	●
	16	●	●	●	●
5th month	17	●	●	●	●
	18	●	●	●	●
	19	●	●	●	●
	20	●	●	●	●
Staffing levels after 5 months of recruitment Total — 275 employees		1	10	39	225
6th month	21				
	22				●
	23				●
	24				●
7th month	25				●
	26				●
	27				●
	28				●
8th mont	29				●
	30				●
	31				●
	32				●
Staffing levels after 8 months of recruitment Total — 500 employees					225

● **Sourcing the desired candidates**
● **Conducting interviews**
● **Presenting the offer to the selected candidates**
● **Candidate notice period**

	Weeks needed for each phase of recruitment			
	Site Director	Managers / Directors	Specialist positions	Blue Collar positions
Sourcing the desired candidates	4	3	3	3
Conducting interviews	3	3	3	3
Presenting the offer to the candidates	1	1	1	1
Candidate notice period	12	4	4	4
Total (entire recruitment process)	20	11	11	11
Resumes to be collected	4	30	117	675
Resumes per position	4	3	3	1,5

REMUNERATION

The table below lists the positions in the production site, together with the estimated level of expected remuneration. The gross monthly amounts are expressed in PLN.

Position	Min	Opt	Max
An establishment employing 100 or fewer people			
Plant Manager (up to 100 FTEs)	25 000	30 000	35 000
Production Manager (up to 100 FTEs)	16 000	18 000	22 000
Shift Leader (Master) (50–100 FTEs)	9 000	12 000	15 000
Production Planner (3–5 years of experience)	9 000	10 000	12 000
Quality Manager (up to 100 FTEs)	12 000	14 000	18 000
Quality Process Engineer (3–5 years of experience)	10 000	12 000	15 000
Supplier Quality Assurance Engineer (3–5 years of experience)	10 000	12 000	15 000
Supplier Quality Development Engineer (3–5 years of experience)	10 000	12 000	15 000
Customer Quality Engineer (3–5 years of experience)	10 000	12 000	15 000
Engineering Manager (up to 100 FTEs)	13 000	15 000	18 000
Production / Process Engineer (3–5 years of experience)	9 000	10 000	12 000
Project Manager	12 000	15 000	20 000
Project Engineer (3–5 years of experience)	10 000	14 000	16 000
Lean Manager	14 000	17 000	20 000
Black Belt (Six Sigma)	15 000	20 000	24 000
Lean Manufacturing Engineer (3–5 years of experience)	10 000	12 000	14 000
Maintenance Manager (up to 100 FTEs)	12 000	15 000	20 000
Maintenance Engineer (3–5 years of experience)	10 000	12 000	15 000
Tooling Engineer (3–5 years of experience)	9 000	10 000	12 000
R&D Manager (10–15 FTEs)	15 000	20 000	23 000
R&D Engineer (3–5 years of experience)	10 000	13 000	15 000
Product Engineer (3–5 years of experience)	10 000	12 000	16 000
Design Engineer (3–5 years of experience)	8 000	10 000	12 000
EHS Manager (up to 100 FTEs)	12 000	14 000	16 000
EHS Specialist (3–5 years of experience)	9 000	10 000	12 000
Purchasing Manager (up to 100 FTEs)	17 000	18 000	22 000
Purchasing Specialist (3–5 years of experience)	8 000	9 000	11 000
Commodity Buyer	10 000	13 000	16 000

Position	Min	Opt	Max
Project Buyer	10 000	12 000	14 000
Logistics Manager (up to 100 FTEs)	15 000	19 000	23 000
Logistics Specialist (3–5 years of experience)	8 000	9 000	10 000
Warehouse Manager (Manufacturing)	12 000	14 000	18 000
Transport Manager (Manufacturing)	11 000	13 000	16 000
Low-skilled blue-collar worker	4 700	5 000	5 500
Medium-skilled blue-collar worker	5 000	5 500	6 500
High-skilled blue-collar worker	6 000	7 000	8 000
An establishment employing from 100 to 500 people			
Plant Manager (100–500 FTEs)	30 000	40 000	50 000
Production Manager (100–500 FTEs)	16 000	20 000	25 000
Shift Leader (Master) (50–100 FTEs)	9 000	12 000	15 000
Production Planner (3–5 years of experience)	9 000	10 000	12 000
Quality Manager (100–500 FTEs)	14 000	16 000	20 000
Quality Process Engineer (3–5 years of experience)	10 000	12 000	15 000
Supplier Quality Assurance Engineer (3–5 years of experience)	10 000	12 000	15 000
Supplier Quality Development Engineer (3–5 years of experience)	10 000	12 000	15 000
Customer Quality Engineer (3–5 years of experience)	10 000	12 000	15 000
Engineering Manager (100–500 FTEs)	14 000	17 000	20 000
Production / Process Engineer (3–5 years of experience)	9 000	10 000	12 000
Project Manager	12 000	15 000	20 000
Project Engineer (3–5 years of experience)	10 000	14 000	16 000
Lean Manager	14 000	17 000	20 000
Black Belt (Six Sigma)	15 000	20 000	24 000
Lean Manufacturing Engineer (3–5 years of experience)	10 000	12 000	14 000
Maintenance Manager (100–500 FTEs)	14 000	16 000	20 000
Maintenance Engineer (3–5 years of experience)	10 000	12 000	15 000
Tooling Engineer (3–5 years of experience)	9 000	10 000	12 000
R&D Manager (10–15 FTEs)	15 000	20 000	23 000
R&D Engineer (3–5 years of experience)	10 000	13 000	15 000
Product Engineer (3–5 years of experience)	10 000	12 000	16 000
Design Engineer (3–5 years of experience)	8 000	10 000	12 000
EHS Manager (100–500 FTEs)	15 000	18 000	25 000
EHS Specialist (3–5 years of experience)	9 000	10 000	12 000
Purchasing Manager (100–500 FTEs)	19 000	22 000	25 000
Purchasing Specialist (3–5 years of experience)	8 000	10 000	11 000
Commodity Buyer	10 000	13 000	16 000
Project Buyer	10 000	12 000	14 000
Logistics Manager (100–500 FTEs)	17 000	22 000	26 000
Logistics Specialist (3–5 years of experience)	8 000	9 000	10 000
Warehouse Manager (Manufacturing)	12 000	14 000	18 000
Transport Manager (Manufacturing)	11 000	13 000	16 000

Position	Min	Opt	Max
Low-skilled blue-collar worker	4 700	5 000	5 500
Medium-skilled blue-collar worker	5 000	5 500	6 500
High-skilled blue-collar worker	6 000	7 000	8 000
An establishment employing over 500 people			
Plant Manager (over 500 FTEs)	40 000	50 000	65 000
Production Manager (over 500 FTEs)	18 000	25 000	35 000
Shift Leader (Master) (50–100 FTEs)	10 000	13 000	15 000
Production Planner (3–5 years of experience)	9 000	10 000	12 000
Quality Manager (over 500 FTEs)	14 000	18 000	24 000
Quality Process Engineer (3–5 years of experience)	10 000	12 000	14 000
Supplier Quality Assurance Engineer (3–5 years of experience)	10 000	12 000	15 000
Supplier Quality Development Engineer (3–5 years of experience)	10 000	12 000	15 000
Customer Quality Engineer (3–5 years of experience)	10 000	12 000	15 000
Engineering Manager (over 500 FTEs)	15 000	20 000	25 000
Production / Process Engineer (3–5 years of experience)	9 000	10 000	12 000
Project Manager	12 000	16 000	22 000
Project Engineer (3–5 years of experience)	10 000	14 000	16 000
Lean Manager	14 000	18 000	20 000
Black Belt (Six Sigma)	15 000	20 000	25 000
Lean Manufacturing Engineer (3–5 years of experience)	10 000	12 000	14 000
Maintenance Manager (over 500 FTEs)	16 000	20 000	25 000
Maintenance Engineer (3–5 years of experience)	10 000	12 000	15 000
Tooling Engineer (3–5 years of experience)	9 000	10 000	12 000
R&D Manager (10–15 FTEs)	17 000	23 000	25 000
R&D Engineer (3–5 years of experience)	10 000	12 000	15 000
Product Engineer (3–5 years of experience)	10 000	12 000	16 000
Design Engineer (3–5 years of experience)	8 000	11 000	14 000
EHS Manager (over 500 FTEs)	16 000	20 000	26 000
EHS Specialist (3–5 years of experience)	9 000	10 000	12 000
Purchasing Manager (over 500 FTEs)	21 000	25 000	30 000
Purchasing Specialist (3–5 years of experience)	8 000	9 000	11 000
Commodity Buyer	10 000	14 000	18 000
Project Buyer	10 000	12 000	14 000
Logistics Manager (over 500 FTEs)	22 000	25 000	30 000
Logistics Specialist (3–5 years of experience)	8 000	9 000	10 000
Warehouse Manager (Manufacturing)	12 000	15 000	18 000
Transport Manager (Manufacturing)	11 000	14 000	17 000
Low-skilled blue-collar worker	4 700	5 000	5 500
Medium-skilled blue-collar worker	5 000	5 500	6 500
High-skilled blue-collar worker	6 000	7 000	8 000

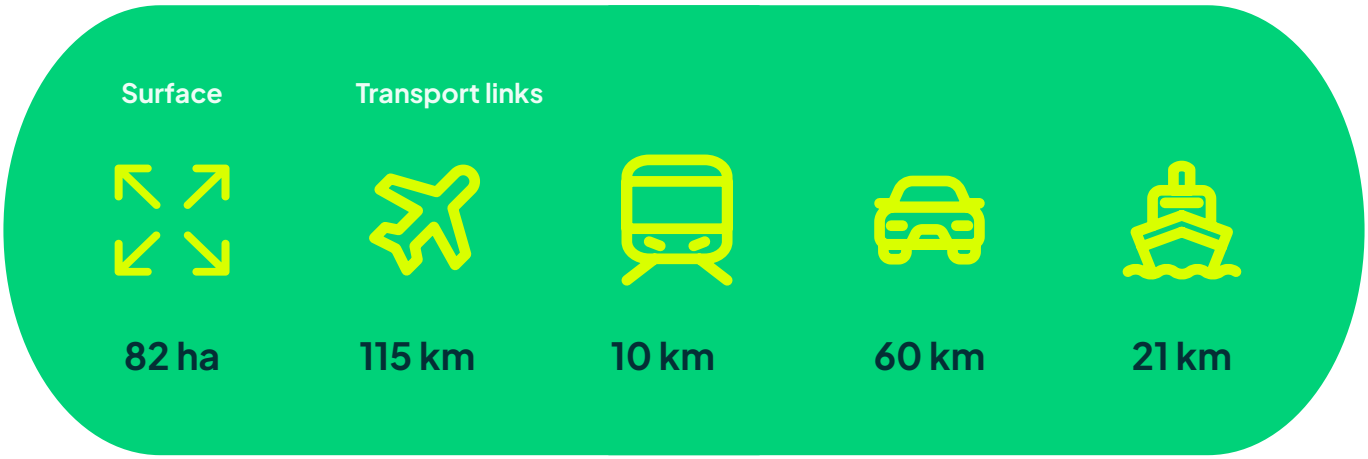
Investment areas

Redzikowo-Wieszyno Industrial Park

The Redzikowo-Wieszyno Industrial Park is a fully developed site with complete infrastructure and is strategically located along the S6 expressway (Szczecin–Gdańsk route). Ideal for manufacturing, production and logistics activities, it also benefits from its proximity to Poland's largest green energy region and offshore investment projects in the Baltic Sea.

The planned Redzikowo-Wieszyno Industrial Park

Owner:	State Treasury and Słupsk Special Economic Zone
Address:	ul. Przemysłowa, Redzikowo
Type:	Industrial and service facilities (production, manufacturing, logistics, data centres, energy storage, warehouses)
Parameters:	Height: 25–180 m, depending on the building Building class: A+ Number of storeys: 6–34, depending on the building Number of parking spaces: 220
Utilities:	All utilities have been routed to the site; 300 MW electricity supply can be provided
Preferred investment projects:	Low-carbon manufacturing, logistics, data centre, electromobility and energy storage projects



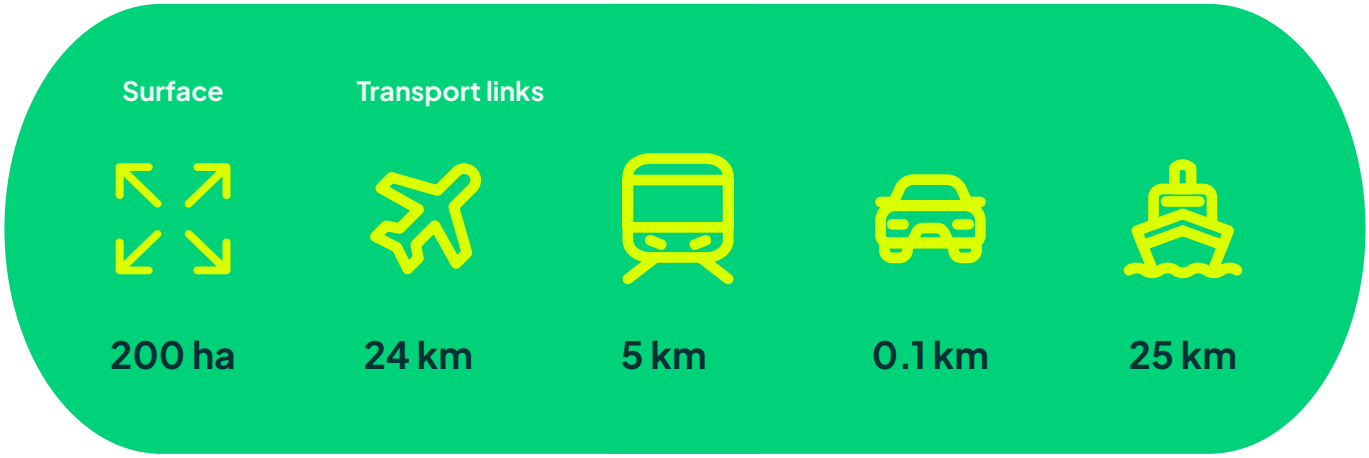
The site is adjacent to a 63-hectare industrial zone, which is home to domestic and international companies from the plastics, wood and furniture, automotive, metal, construction and service industries. The US Naval Support Facility Redzikowo is also located in the immediate vicinity.

Pomeranian Technology and Industrial Park in Wojanowo

The Pomeranian Technology and Industrial Park in Wojanów is a 550-hectare investment area in northern Poland, strategically located near the A1 motorway, within the Tricity Metropolitan Area. Designed for semiconductor manufacturing and the electromobility industry, it will provide a complete technical infrastructure capable of handling even the most technologically advanced projects. With planned zoning changes and potential tax incentives, it represents a unique opportunity for global investors.

The area of the planned Pomeranian Technology and Industrial Park in Wojanowo

Owner:	POLHOZ (private company)
Address:	Wojanowo
Type:	Land zoned for commercial use. Available for sale or lease
Surface:	200 ha (for expansion to 550+ ha total)
Planning:	SUIKZP — land zoned for service, production and warehouse development; MPZP — being processed by the municipality, planned enactment in 2026
Utilities:	Suitable for even the most technologically advanced projects
Preferred investment projects:	Semiconductor and electromobility manufacturing companies



Visualisation of the area
Source: own elaboration by Invest in Pomerania

About Invest in Pomerania

Invest in Pomerania's regional support for investors

Invest in Pomerania is a regional initiative coordinated by the Pomerania Development Agency, whose main goal is to support foreign investors in the investment process and increase the investment attractiveness of the Pomeranian Voivodeship. The organisation acts as a central contact point, providing support at every stage of the investment process.

BEFORE THE PROJECT

Data analysis: We provide comprehensive information on the region's economy, key industries, real estate market, human resources and legal regulations.

Investment offer: We develop a full investment offer tailored to the needs of the project. Further, we consider factors such as workforce availability, employment costs, rental and sales costs for office space, warehousing and investment land, as well as the number of potential contractors.

Investment support: Complete information on the forms of investment support available at the time.

Networking: We assist in establishing contacts with local authorities and potential business partners.

Organising visits: We plan and organise local visits, including reference visits with strategic HR and real estate agencies, as well as visits to investment sites.

DURING THE PROJECT

Administrative support: We offer the support of the Investor Representative in the process of obtaining the necessary permits and carrying out other administrative activities. Moreover, we provide full support in all administrative matters such as residence and work permits.

Temporary office space: We provide temporary office space for the duration of the investment incubation period.

Promoting employer branding: We promote the investment project from an employer branding perspective.

Business development: We introduce investors to the local business community and organise joint marketing activities at conferences.

POST-PROJECT SUPPORT

What sets us apart is the extensive post-project support. We offer comprehensive project support, as well as support by the Investor Representative, including:

Media communication: We announce the project to the media through press releases or media events.

Attracting talent: We help attract talented employees.

Employer branding campaigns: We create individual campaigns as part of the „Live more. Pomerania" initiative, promoting the company as an attractive employer.

Integration into the local community: We help investors integrate into the local business community.

Reports and analyses: As part of the „*FOCUS ON*" series, we create analytical reports about the most innovative sectors of Pomerania's economy.

Contact

INDUSTRIAL & REAL ESTATE TEAM

Mikołaj Trunin
Deputy Director
mikolaj.trunin@investinpomerania.pl
+48 609 860 060

Radosław Bojarczuk
Head of Industrial Investment Projects Advisory Team
radoslaw.bojarczuk@investinpomerania.pl
+48 500 351 619

Michalina Kaczor
Real Estate Advisory Project Manager
michalina.kaczor@investinpomerania.pl
+48 885 660 652

Dawid Kwiatkowski
Senior Consultant – Strategic Sectors Development
dawid.kwiatkowski@investinpomerania.pl
+48 721 700 229

Maja Ziemianowicz
Senior Consultant - Real Estate Advisory
maja.ziemianowicz@investinpomerania.pl
+48 501 365 563

Ewelina Zwierz
Senior Consultant – Investment Projects Advisory
ewelina.zwierz@investinpomerania.pl
+48 500 351 535

DATA & ANALYTICS TEAM

Tomasz Grabowski
Head of Data & Analytics Team
tomasz.grabowski@investinpomerania.pl
+48 573 161 556

Justyna Jagielska
Senior Data Analyst
justyna.jagielska@investinpomerania.pl
+48 721 440 611

Błażej Stelmarski
Senior Data Analyst
blazej.stelmarski@investinpomerania.pl
+48 885 936 388

INVEST IN POMERANIA

Learn more about mobility sector: mobility.investinpomerania.pl

List of sources

List of sources

Introduction

1 GDP per capita (current US$) – Poland, https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=PL
2 Unemployment, total (% of total labor force) (modeled ILO estimate) - Poland, https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?locations=PL
3 Why optimism remains in Europe as foreign direct investment declines, https://www.ey.com/en_gl/foreign-direct-investment-surveys/optimism-remains-in-europe-as-foreign-direct-investment-declines
4 EY Attractiveness Survey Report 2025, https://www.ey.com/content/dam/ey-unified-site/ey-com/en-gl/campaigns/foreign-direct-investment-surveys/documents/ey-gl-europe-attractiveness-survey-report-06-2025.pdf
5 GPW WIG Index, https://gpwbenchmark.pl/en-karta-indeksu?isin=PL9999999995
6 European Commission, SA_105494_400F9E86-0000-C7FC-A843-C9F727056647_37_1.pdf
7 Hourly labour costs, 2024 (€), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Hourly_labour_costs,_2024_(%E2%82%AC),_map_rev3.png
8 International Labour Organization. "Education and Mismatch Indicators database (EMI)" ILOSTAT. https://ilostat.ilo.org/data
9 fDi's European Cities of the Future 2025 Ranking, https://www.fdiintelligence.com/content/c3096814-65ba-51b2-b27a-f17334b43c19

What is new mobility and why is it key to local development?

10 Total net greenhouse gas emission trends and projections in Europe, https://www.eea.europa.eu/en/analysis/indicators/total-greenhouse-gas-emission-trends
11 Climate Policy Info Hub for Decision-Makers, https://climatepolicyinfohub.eu/node/38/pdf
12 https://arp.pl/pl/jak-dzialamy/transformacja-energetyczna-/doliny-wodorowe/
13 https://klasterwodorowy.pl/pomorska-dolina-wodorowa,53,pl
14 Doliny wodorowe napędzane energią OZE, www.gospodarka.pomorskie.eu/wp-content/uploads/2023/12/10_Bursztynowa-Dolina-Wodorowa_Pomorze_ORLEN_GrzegorzJozwiak.pdf
15 Tak powstaje pierwsza polska morska farma wiatrowa, https://green-news.pl/4330-baltic-power-ile-jest-turbin-na-morskiej-farmie-wiatrowej-zdjecia-postepy
16 Największa fabryka wież wiatrowych, https://www.gdansk.pl/wiadomosci/Fabryka-wiez-wiatrowych-najwieksza-w-Europie-adres-Gdansk-Baltic-Towers-Tusk,a,287892

Global economic outlook

17 Global EV Outlook 2025, https://iea.blob.core.windows.net/assets/0aa4762f-c1cb-4495-987a-25945d6de5e8/GlobalEVOutlook2025.pdf
18 https://www.china-briefing.com/news/china-considers-extending-its-ev-subsidies-to-2023/
19 T&E, Europe's Automotive Industry at a Crossroads, https://www.transportenvironment.org/articles/europes-automotive-industry-at-a-crossroads
20 Interactive Map. Automobile assembly and production plants in Europe, https://www.acea.auto/figure/interactive-map-automobile-assembly-and-production-plants-in-europe/
21 Anna Jelińska-Sabatowska, Michał Kolasiński (2025). The Future of Electromobility in Light of EU Regulations: What Direction is the Automotive Industry Heading in the EU?, https://www.traple.pl/en/electromobility-in-light-of-eu-regulations/
22 EPRS (2024). The future of European electric vehicles, Policy Foresight Unit, PE 762.873., https://www.europarl.europa.eu/RegData/etudes/IDAN/2024/762873/EPRS_IDA(2024)762873_EN.pdf
23 BCG (2024). Consumer Survey on EV Adoption in China, EU and US., https://www.bcg.com/publications/2025/ev-strategies-in-us-europe-china
24 European Alternative Fuels Observatory (EAFO); ACEA, https://alternative-fuels-observatory.ec.europa.eu/transport-mode/road/european-union-eu27
25 https://transport.ec.europa.eu/transport-themes/clean-transport/alternative-fuels-sustainable-mobility-europe/alternative-fuels-infrastructure_en
26 https://www.gov.pl/attachment/052744d9-f48c-405c-b125-d7d3cd85fb82
EUR-Lex – Battery Regulation 2023/1542, https://eur-lex.europa.eu/eli/reg/2023/1542/oj
27 Council of the EU – Fit for 55 Package, https://www.consilium.europa.eu/en/policies/fit-for-55/
European Commission – Energy Performance of Buildings Directive (EPBD), https://energy.ec.europa.eu/topics/energy-
28 efficiency/energy-performance-buildings/energy-performance-buildings-directive_en?
29 European Commission – Critical Raw Materials Act, https://single-market-economy.ec.europa.eu/sectors/raw-materials/
30 areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en?
31 Volvo Trucks – Eurovignette reform, https://www.volvotrucks.com/en-en/news-stories/insights/articles/2024/jan/how-the-eu-toll-reform-will-affect-your-truck-business.html?

32 European Commission – Data Act, https://digital-strategy.ec.europa.eu/en/factpages/data-act-explained?utm

33 European Commission (2024). EU Industrial R&D Investment Scoreboard, https://iri.jrc.ec.europa.eu/scoreboard/2024-eu-industrial-rd-investment-scoreboard oraz ACEA Pocket Guide 2025/2026, https://www.acea.auto/files/ACEA-Pocket-Guide-2025-2026.pdf

34 S&P Global Mobility; T&E (2025).

Regional economic outlook

35 https://biznes.interia.pl/gospodarka/news-z-lidera-rynku-staniemy-sie-sredniakiem-producenci-baterii-m,nld,6971172 Tygodnik Gospodarczy PIE (38) 19 września 2024 r. https://pie.net.pl/wp-content/uploads/2024/09/Tygodnik-PIE_38-2024.pdf

36 https://biznes.interia.pl/gospodarka/news-problemy-polskich-producentow-drastyczny-spadek-eksportu-bat,nld,7826784

37 https://about.bnef.com/insights/commodities/lithium-ion-battery-pack-prices-see-largest-drop-since-2017-falling-to-115-per-kilowatt-hour-bloombergnef/

38 https://www.iea.org/commentaries/the-battery-industry-has-entered-a-new-phase

39 https://www.carscoops.com/2024/08/ev-sales-drop-37-in-germany-in-july-with-more-buyers-choosing-ice/

40 https://www.welt.de/motor/news/article255059150/Schlechtes-Jahr-fuer-E-Autos-Pkw-Neuzulassungen-2024.html

41 https://www.reuters.com/sustainability/decarbonizing-industries/ev-sales-slip-can-auto-industry-navigate-bumps-road-net-zero-2024-06-12/

42 https://psnm.org/2025/informacja/pevo-index-bariera-100-tysiecy-pojazdow-elektrycznych-przekroczona/

43 https://www.busworldeurope.org/news/solaris-summarizes-2024-strong-sales-growth-market-expansion

44 Raport *Wskaźnik e-mobility 2022. Elektromobilność na terenie województwa dolnośląskiego, wielkopolskiego, lubuskiego*. PIRE - Polska Izba Rozwoju Elektromobilności, https://branden.biz/eektromobilnosc-w-polsce-raport-wskaznik-e-mobility-

45 2022-inwestycje-trendy-zatrudnienie-eksport

46 trade.gov.pl, https://www.trade.gov.pl/en/news/poland-recharges-its-batteries/

47 Raport *Europe runs on Polish lithium-ion batteries. The potential of the battery sector in Poland and the CEE Region* PSPA - Polskie Stowarzyszenie Paliw Alternatywnych oraz IEA Trends in electric vehicle batteries, https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-vehicle-batteries

48 Słowa prezesa Electromobility Poland, https://energetyka24.com/elektromobilnosc/wiadomosci/prezes-electromobility-poland-sektor-elektromobilnosci-moze-dac-nawet-5-proc-krajowego-pkb

49 https://pracodawcy.pracuj.pl/profile/lgenergysolutionwroclaw%2Ceacifa4%2Cpl

50 https://www.umicore.pl/pl/aktualnoci/ionway-first-production-plant-in-nysa

51 https://investmap.pl/w-polsce-trwa-budowa-wielkiej-fabryki-ionway-7-mld-zl-i-setki-miejsc-pracy-zdjecia.a314186

52 https://automotivesuppliers.pl/pl/polska/ruszyla-budowa-fabryki-sk-nexillis-poland

53 https://www.otomoto.pl/news/fabryka-mercedesa-w-jaworze-nowe-plany-oml

54 https://www.busworldeurope.org/news/solaris-summarizes-2024-strong-sales-growth-market-expansion

55 https://transinfo.pl/x/infobus/jaki-jest-elektryczny-autosan-sancity-12lfe-_more_118118/

56 https://www.rynek-kolejowy.pl/wiadomosci/pesa-podsumowuje-2024-r-stabilny-rozwoj-inwestycje-i-dobre-finanse-123362.html

57 https://inwestycje.pl/biznes/pkp-intercity-podpisalo-z-h-cegielski-fps-umowe-na-300-wagonow-z-opcja-na-150-kolejnych/

58 https://www.newag.pl/rekordowy-kontrakt-pkp-intercity-i-newag-s-a/

59 https://www.nakolei.pl/pomorskie-kupi-wiecej-pociagow/

60 https://inwestycje.pl/gielda/newag-mial-wst-1227-mln-zl-zysku-netto-2108-mln-zl-zysku-ebitda-w-2024/

61 https://www.pracuj.pl/praca/pracownica-pracownik-produkcji-gliwice-alberta-einsteina-9%2Coferta%2C1003726356

62 https://www.motofaktor.pl/capchem-poland-zainwestuje-miliony-w-walbrzyskiej-strefie/

63 https://motoryzacja.interia.pl/wiadomosci/news-polskie-auto-elektryczne-trafi-do-produkcji-juz-sa-chetni-na,nld,22162197

64 https://fleetlog.pl/aktualnosci/stellantis-rozwija-produkcje-elektrykow/

65 https://forsal.pl/artykuly/1393552,nowa-fabryka-baterii-mercedesa-w-jaworznie-za-200-mln-euro-bedzie-300-miejsc-pracy.html,komentarze-najstarsze,1

66 https://investinpomerania.pl/en/news/new-scania-knowledge-center-in-gdansk

67 https://www.money.pl/gospodarka/wielkie-przejecie-w-gdansku-amerykanie-oglaszaja-natychmiast-wznowimy-produkcje-7173555708541856a.html

68 https://tek.info.pl/article/4140/ae_elemental_uruchomil_w_polsce_zaklad_recyklingu_baterii_litowo_jonowych

69 https://businessinsider.com.pl/wiadomosci/dwa-polskie-projekty-uznane-za-strategicznie-wazne-jest-decyzja-ke/8he4e51

70 https://eneris.pl/aktualnosci/eneris-otworzyl-zaklad-recyklingu-baterii-litowych-w-zarkach

71 https://www.gov.pl/web/klimat/projekt-ustawy-o-zmianie-ustawy-o-elektromobilnosci-i-paliwach-alternatywnych-ustawa

72 https://www.metropoliagdansk.pl/upload/files/23_1102_SUMP%20OMGGS_raport%20diagnostyczno-strategiczny.pdf

73 https://psnm.org/2025/informacja/licznik-elektromobilnosci-znaczny-wzrost-na-rynku-samochodow-elektrycznych-oraz-infrastruktury-ladowania/

74 https://psnm.org/2023/informacja/licznik-elektromobilnosci-miasta-napedzaja-rozwoj-infrastruktury-ladowania/
75 https://psnm.org/2025/informacja/licznik-elektromobilnosci-znaczny-wzrost-na-rynku-samochodow-elektrycznych-oraz-infrastruktury-ladowania/
76 https://www.portgdansk.pl/
77 https://zkmgdynia.pl/aktualnosci/17-nowych-pojazdow-zeroemisyjnych-dla-mieszkancow-gdyni-4269
78 https://www.eaton.com/us/en-us/company/news-insights/news-releases/2025/eaton-mobility-group-expands-testing-capabilities-with-state-of-the-art-european-testing-hub.html

Trends and innovations in the new mobility sector

79 BloombergNEF, Lithium-Ion battery pack prices see largest drop since 2017, falling to 115 per kilowatt-hour, https://about.bnef.com/insights/lithium-ion-battery-pack-prices-see-largest-drop-since-2017-falling-to-115-per-kilowatt-hour-bloombergnef/
80 IEA, Global EV Outlook 2025 – Batteries & supply, https://www.iea.org/reports/batteries-and-secure-energy-transitions/status-of-battery-demand-and-supply
81 NREL, Annual Technology Baseline 2024 – Energy Storage, https://atb.nrel.gov/electricity/2024/utility-scale_battery_storage
82 Reuters, Battery cell prices fall to record low in September 2024, https://www.reuters.com/markets/commodities/battery-cell-prices-fall-record-low-september-says-report-2024-10-30/
83 Renewables Now, Lithium-Ion battery prices drop to USD 115 per kWh (BNEF), https://renewablesnow.com/news/lithium-ion-battery-prices-drop-to-usd-115-per-kwh-in-2024-bnef-1267952/
84 https://cnevpost.com/2024/02/07/global-ev-battery-market-share-in-2023/
85 S&P Global, Where are EV battery prices headed in 2025 and beyond, https://www.spglobal.com/automotive-insights/en/blogs/2025/01/where-are-ev-battery-prices-headed-in-2025-and-beyond
86 Global Hydrogen Review 2024, https://iea.blob.core.windows.net/assets/89c1e382-dc59-46ca-aa47-9f7d41531ab5/GlobalHydrogenReview2024.pdf
87 https://afdc.energy.gov/vehicles/fuel-cell
88 https://stacjeneso.pl
89 https://rafineriagdanska.pl/1843/p,1941,n,5507/centrum_prasowe/w_rafinerii_gdanskiej_powstanie_elektrolizer_o_mocy_5_mw
90 Energy storage technology and its impact in electric vehicle: Current progress and future outlook, https://www.sciencedirect.com/science/article/pii/S2949821X24001078
91 IEA, Global EV Outlook 2025, https://www.iea.org/reports/global-ev-outlook-2025
92 Fraunhofer ISI, Development perspectives for lithium-ion battery cell formats, https://www.isi.fraunhofer.de/content/dam/isi/dokumente/cct/2022/Development_perspectives_for_lithium-ion_battery_cell_formats_Fraunhofer_2022.pdf
93 Transport & Environment, From waste to value – Battery recycling report (Dec 2024), https://www.transportenvironment.org/uploads/files/2024_12_Battery_recycling_report.pdf
94 https://wysokienapiecie.pl/101824-recykling-baterii-litowo-jonowych-polska-liderem-ue/#Zaklad_recyklingu_bedzie_niemal_niezalezny_energetycznie
95 https://www.umicore.com/en/media/newsroom/bmw-group-northvolt-and-umicore-join-forces-to-develop-sustainable-life-cycle-loop-for-batteries/
96 https://time.com/7306177/ev-battery-recycling/
97 https://www.reuters.com/business/autos-transportation/ascend-elements-elemental-strategic-metals-form-european-ev-battery-recycling-2024-04-09/
98 https://www.energetyka.plus/smart-grid-elementy-korzysci-i-funkcjonalnosci-dostepnych-rozwiazan/
99 https://mapaladowania.pl/blog/technologia-v2g-czym-jest/
100 https://evplus.com.pl/smart_charging/
101 https://selected.pl/jak-dziala-technologia-battery-swapping-wymiana-baterii-w-ev/
102 https://www.volvotrucks.pl/pl-pl/news/insights/articles/2020/jul/electric-roads-a-niche-solution-for-confined-areas.html
103 https://www.evcomecharger.com/pl/a-news-the-role-of-vehicle-to-everything-v2x-technology-in-electric-cars
104 Deloitte, Vehicle-as-a-Service: Subscription decoded (2022), https://www.deloitte.com/content/dam/assets-shared/en_gb/legacy/docs/perspectives/2022/gx-vehicle-as-a-service-subscription-decoded.pdf
105 Global EV Outlook 2025, https://iea.blob.core.windows.net/assets/7ea38b60-3033-42a6-9589-71134f4229f4/GlobalEVOutlook2025.pdf
106 Podsumowanie PSNM Rok 2024 w Nowej Mobilnosci Raport, https://psnm.org/wp-content/uploads/2024/12/PSNM_Rok_2024_w_Nowej_Mobilnosci_Raport_PL-2.pdf
107 Strona internetowa Volvo Trucks, https://volvotrucks.pl/pl-pl/trucks/electric.html?gad_source=1&gad_campaignid=22610752718&gbraid=0AAAAA_zJXKGVi58T1SVZWqjH4_55wVSuW&gclid=EAIaIQobChMI5Zjr-InJjwMVYcI5BB3QuwnXEAAYASAAEgILw_D_BwE
108 Strona internetowa Mercedes-Benz Trucks, https://mercedes-benz-trucks.com/pl/pl/trucks/eactros-600.html#title-e954e1c83f
109 Strona internetowa Scania, https://scania.com/pl/pl/home/products/trucks/battery-electric-truck.html

110 Strona internetowa MAN, https://man.eu/pl/pl/samochod-ciezarowy/elektryczne-samochody-ciezarowe/przeglad.html#tabs-3d0237be57-item-ff413fe7ee-tab
111 https://mckinsey.com/featured-insights/mckinsey-explainers/what-is-micromobility#/
112 Barometr Nowej Mobilności, https://psnm.org/wp-content/uploads/2025/01/PSNM_Barometr_Nowej_Mobilnosci_2025_Raport.pdf
113 https://gdansk.pl/wiadomosci/System-MEVO-rosnie-wiecej-rowerow-i-stacji,a,293124
114 Strona internetowa systemu MEVO, https://rowermevo.pl/aktualności
115 https://qucit.com/en/news/bike-sharing-in-poland
116 Elektromobilni.pl, Autonomizacja – kompendium wiedzy, https://narzedzia.elektromobilni.pl/elektromobilnosc/kompendium-wiedzy/autonomizacja?hideMenus=1
117 Center for Sustainable Systems, University of Michigan, Autonomous Vehicles: Factsheet, https://css.umich.edu/sites/default/files/2024-10/Autonomous%20Vehicles_CSS16-18.pdf
118 National Highway Traffic Safety Administration (NHTSA), Vehicle-to-Vehicle Communications: Readiness of V2V Technology for Application
119 Voronoi Automotive, Californians Have Been Riding With Waymo a Lot More Frequently, https://www.voronoiapp.com/automotive/Californians-Have-Been-Riding-With-Waymo-a-Lot-More-Frequently--5546
120 American Automobile Association (AAA), Annual Automated Vehicle Survey, https://newsroom.aaa.com/2025/02/aaa-fear-in-self-driving-vehicles-persists/

Education and labour market

121 ABSL 2025, Business Sector in Poland 2025, https://absl.pl/pl/raport/business-services-sector-poland-2025
122 https://www.gov.pl/web/edukacja/technik-elektromobilnosci--nowy-zawod-w-klasyfikacji-zawodow-szkolnictwa-branzowego

Invest
in Pomerania

investinpomerania.pl

mobility.investinpomerania.pl

Fundusze Europejskie
Dofinansowane przez Unię Europejską
URZĄD MARSZAŁKOWSKI WOJEWÓDZTWA POMORSKIEGO