



# The Netherlands: Electric Mobility proposition

Perfect ecosystem for your European EV activities



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# 1. Management Summary



## SOME FACTS

# The Netherlands

- EU #1 in **Charging Stations** for electric vehicles; 29.4% of all charging points are concentrated in The Netherlands;
- EU #1 European **Head Quarter Region** for Non European EV Companies;
- EU #2 in usage of **electric personal transport busses**, 25% being electric (Lux being #1);
- 6 percent of the total fleet of passenger cars is electric;
- **Target of 40 emission free city zones** in 2 years;
- Companies in NL being frontrunner in **charging infrastructure investments** for their company vehicles (on site and at employees homes - Vattenfall Research);
- **The Dutch market is OEM-neutral** in contrast to other big automotive markets in Europe where buyer power is very high. This allows every type of business to make an impact.
- Interesting link: [EU Regional Competitiveness Index 2.0](#); [Invest in Holland](#)



Proximity to European markets:  
**170 million consumers within 500 km & 244 million consumers within 1,000 km**



**No VAT payment at import**  
World class and competitive business environment



**3 mainports:** Air, Sea and Brainport Eindhoven

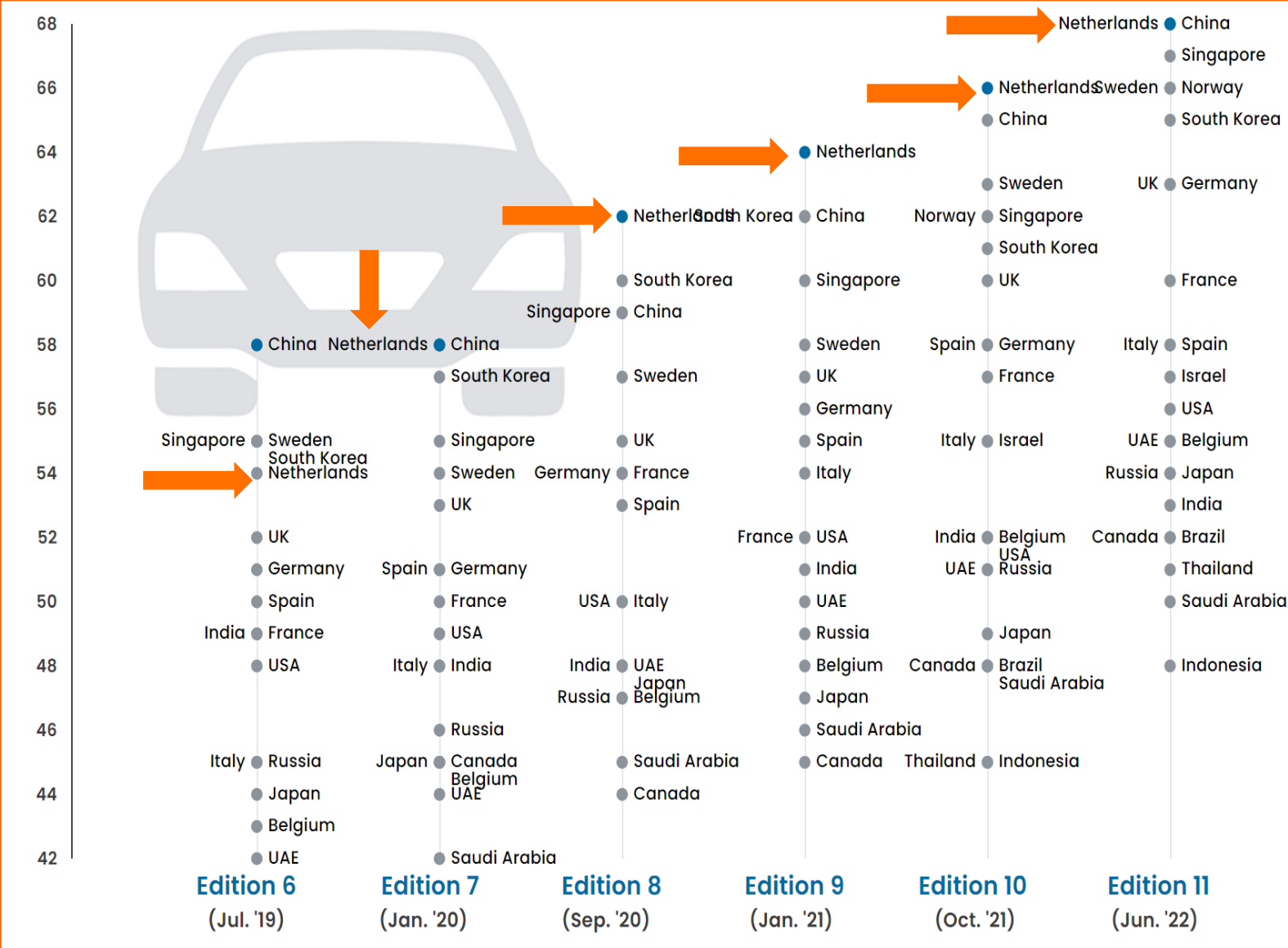


# 'The Netherlands, front leader in e-mobility'

## Small but mighty

The performance of smaller markets was particularly impressive – **The Netherlands recorded the highest score ever**, while China was the only automotive “superpower: to make the top 5.

Results from the survey component of the report (which account for a third of the total score) were a key driver here, with customers in countries that have little or no automotive industry more enthusiastic about new mobility concepts.



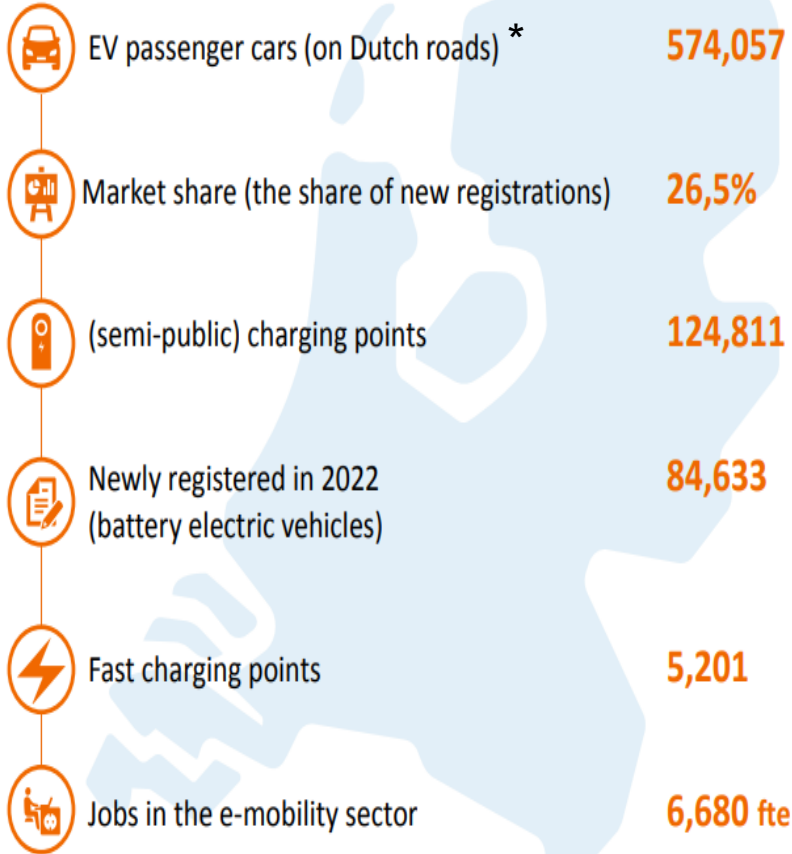
- **26 indicators from 22 countries**
- **In-depth analysis and survey results from 23,000+ participants**

The Automotive Disruption Radar is a biannual analysis of market trends related to disruption in the global automotive industry.





# E-mobility in the Netherlands



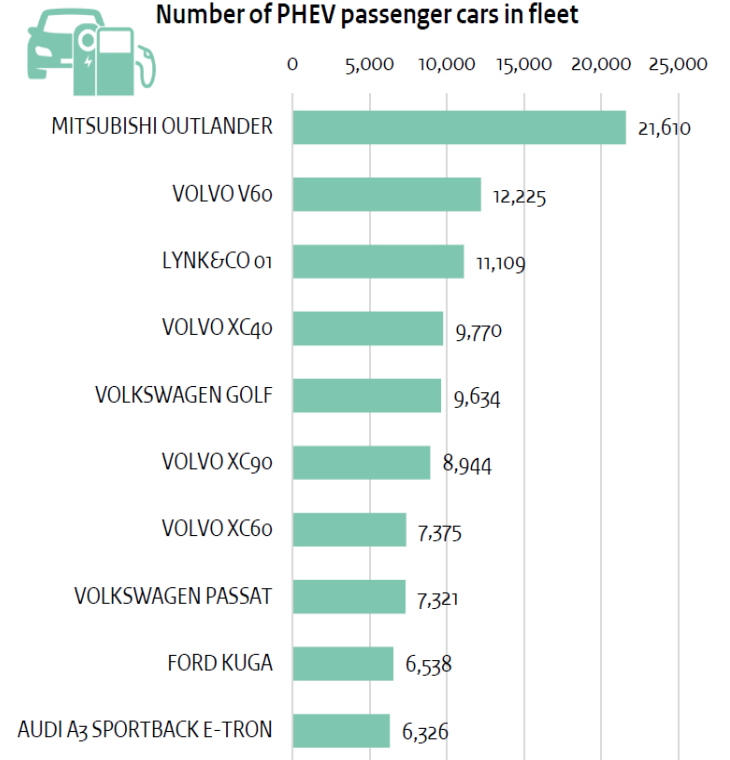
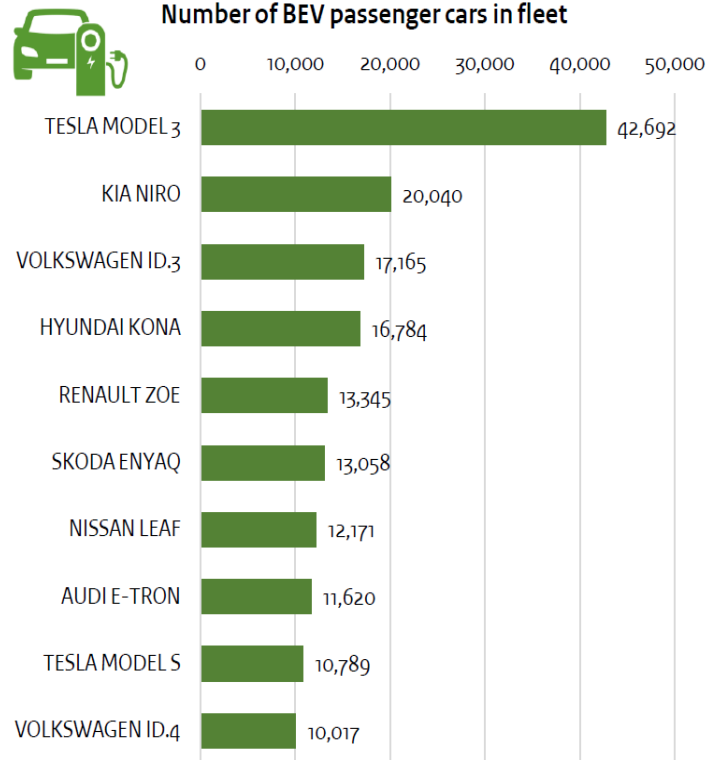
\*6% of the total passenger car fleet

Source : ACEA 2023

## Top 10 BEV and PHEV passenger car models

The graphs below visualize the top 10 most common registered EV passenger cars (M1) in the Netherlands as of **28 February 2023**.

**BEV** = Battery Electric Vehicle, **PHEV** = Plug-in Hybrid Electric Vehicle



Source: Dutch Road Authority (RDW), edited by Netherlands Enterprise Agency (RVO.nl). The numbers represent the **vehicle fleet**, the cumulative registrations on balance. Stock-in-trade cars included. The increase is due to new registrations, used import and transfers from stock-in-trade to car owners. Decrease is due to export, demolition, theft, et cetera. PHEV excludes hybrid electric vehicles (HEV). The statistics per 1-1-2022 december differ from earlier publications due to data improvements.

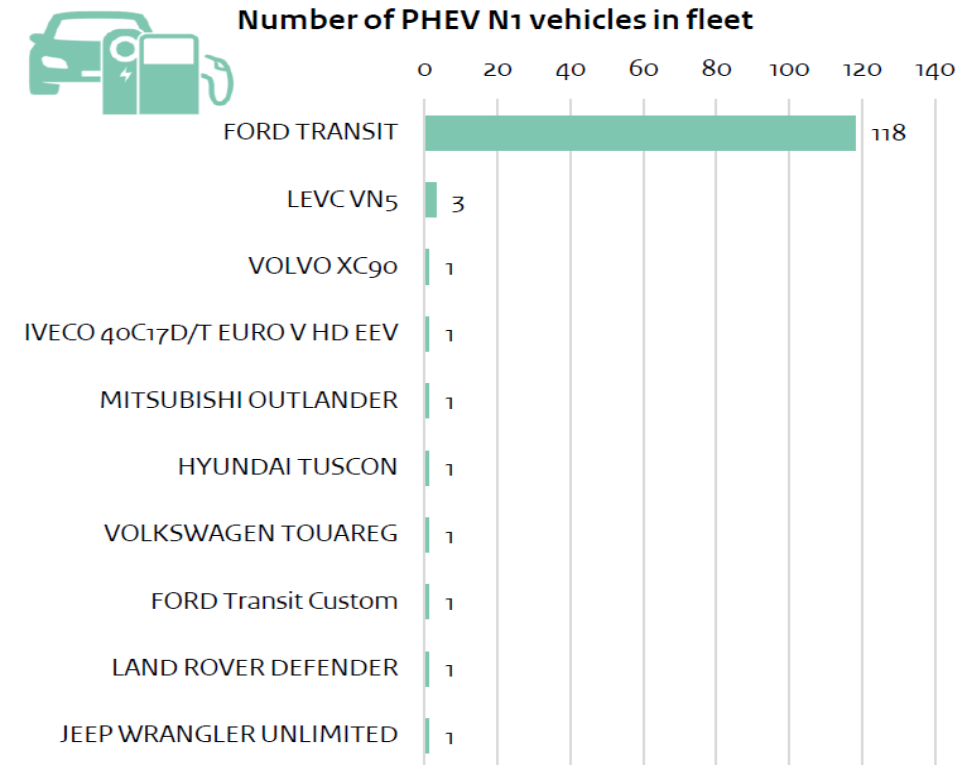
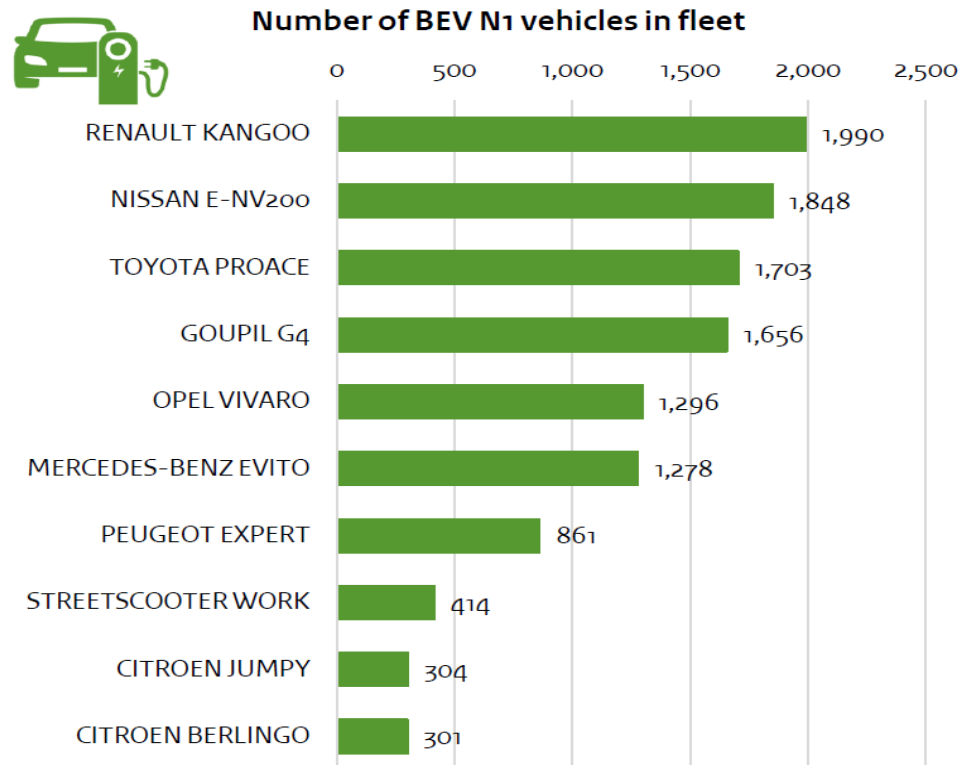


# E-mobility in the Netherlands

## Top 10 BEV and PHEV commercial vehicles ≤ 3.5 tons (N1)

The graphs below visualize the top 10 most common registered EV passenger cars (M1) in the Netherlands as of **28 February 2023**.

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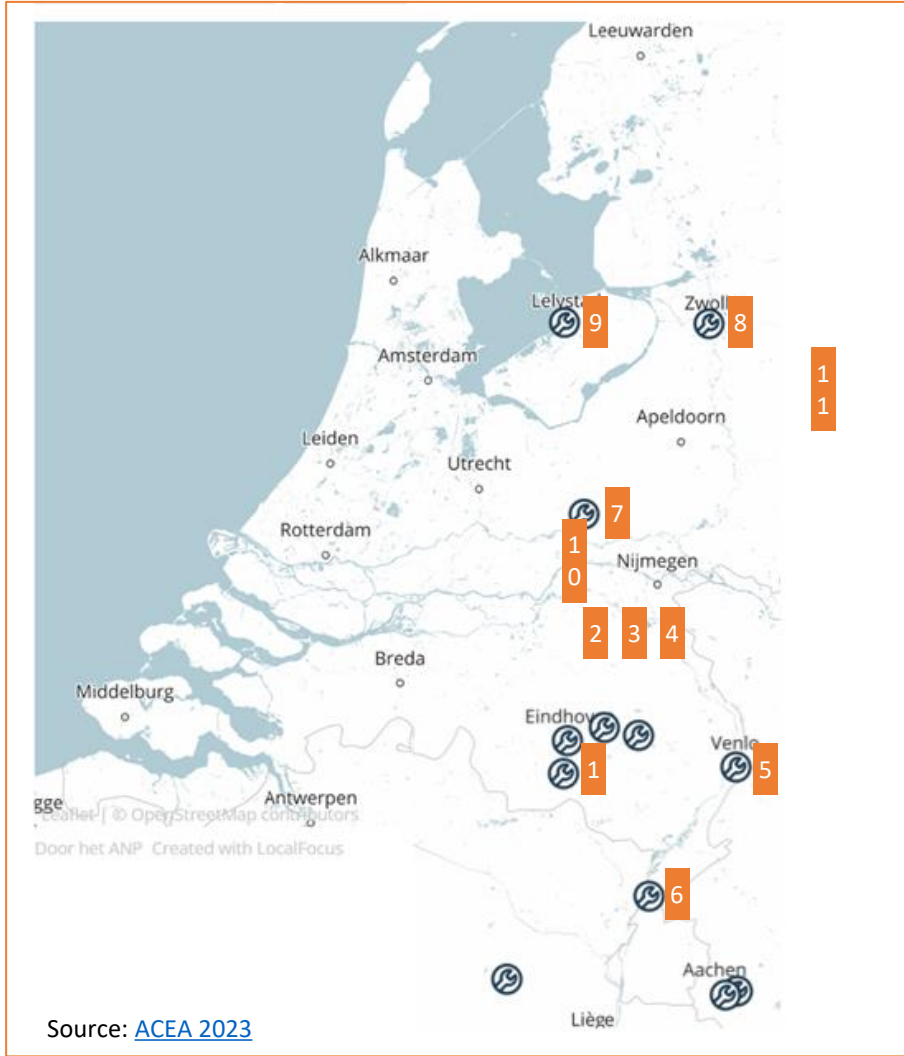
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# Heavy duty vehicles, Light commercial vehicles, batteries, passenger cars

## Dutch Automotive Production facilities

- 1 VDL Group: Busses (incl electrical)
- 2 DAF Trucks: Trucks (incl electrical)
- 3 Eleco technologies: Batteries
- 4 Ebusco: Electrical Busses
- 5 VDL Group: Electric Mini Busses
- 6 VDL Group: BMW and Mini
- 7 GINAF: Electric Heavy Duty vehicles
- 8 SCANIA: Heavy Duty Trucks
- 9 Donkervoort: Electric Sports cars
- 10 UMS: Heavy duty drive trains
- 11 AIH Group: EV factories & production







## THE EU VALLEY FOR SMART & GREEN MOBILITY

### 5 districts in one region within 2 hours

#### 1. Amsterdam Region

- EU City #1 EHQ per capita
- Headquarters
- Charging

#### 2. Utrecht Region

- LEV's
- Bi-directional charging

#### 3. Rotterdam/The Hague

- Charging
- Materials
- Maritime

#### 4. Arnhem Region

- Charging
- Battery
- Heavy Duty EV
- Advanced Materials

#### 5. Eindhoven Region

- #1 R&D smart mobility solutions
- Battery & testing
- Manufacturing, Logistics & Advanced materials



# EV Smart Mobility ecosystem within the Netherlands



LUCID



Delft

Amsterdam

Utrecht

Nijmegen/Arnhem

Rotterdam

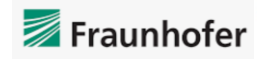
Eindhoven

Almere

Enschede



Great Wall



BOSCH



heliox



Great Wall



## 2. National ambition: Green & Smart mobility





## E-MOBILITY IN THE NETHERLANDS

### Some E-mobility targets the Netherlands

- 100% of new-sold passenger cars with zero-emission by 2030;
- Promotion EV by taxation measures and 1,7 million charging points by 2030;
- More renewable energy for transport (27 PJ) and related infrastructure (EV, H2, Sustainable biofuel);
- Modal shift from car to bicycle /public transport;
- Zero emission zones for logistics in the 30-40 biggest cities;
- 30% more efficient logistics;
- Zero emission construction, traffic and mobile vehicles;
- From 2030 legal norm for CO2 emission mobility for large employers



#### **Automotive Roadmap 2020-2030**

In The Netherlands we are continuously working hard on achieving zero emission, zero accidents and zero congestion. We contribute to these goals with a number of thematic programs based on the strength of the Dutch Automotive sector:


- Smart Mobility
- Green Mobility
- Manufacturing & Materials
- Human Capital
- Internationalization

Link: [HTSM Automotive Roadmap 2020-2030](#) for more details about these challenges.



## MONITORING OUR NATIONAL AMBITIONS

# 100% of new-sold passenger cars with zero-emission by 2030



## Dutch ambition and realization - electric passenger cars

The table below shows the ambitions of the Dutch government towards zero-emission mobility for passenger cars in terms of new sales of passenger cars. New sales only include the sale of brand-new vehicles, used imports are excluded, sales to stock-in-trade are included.

**BEV** = Battery Electric Vehicle, **FCEV** = Fuel Cell Electric Vehicle, **PHEV** = Plug-in Hybrid Electric Vehicle

Ambition					
2020	10% of all new passenger cars sold will have an electric powertrain and a plug <sup>1</sup> .				
2025	50% of all new passenger cars sold will have an electric powertrain and a plug. At least 30% of these vehicles (15% of the total) will be zero emission (BEV or FCEV) <sup>1</sup> .				
2030	100% of all new passenger cars sold will be zero emission <sup>2</sup> .				
Realization: EVs as percentage of new passenger car sales					
	All EVs (BEV, FCEV, PHEV)	Zero-emission (BEV, FCEV)	BEV	FCEV	PHEV
2017	2.2%	1.9%	2.0%	0.0%	0.3%
2018	6.3%	5.5%	5.5%	0.0%	0.8%
2019	14.9%	13.7%	13.7%	0.03%	1.2%
2020	24.8%	20.5%	20.5%	0.04%	4.3%
2021	29.8%	20.0%	20.0%	0.04%	9.7%
2022	34.9%	23.7%	23.6%	0.03%	11.2%
2023 (YtD: Feb)	33.6%	19,7%	19.7%	0.01%	13.9%

<sup>1</sup> Source: [Green Deal on Electric Transport 2016-2020](#)

<sup>2</sup> Source: [Coalition Agreement 2017-2021](#), p. 43

YtD: Year-to-Date - refers to the period beginning the first day of the current calendar year up to the most recent date of which data is provided in this document

Electric Vehicle Statistics in The Netherlands – data up to and including February 2023



## NATIONAL PARTNERS

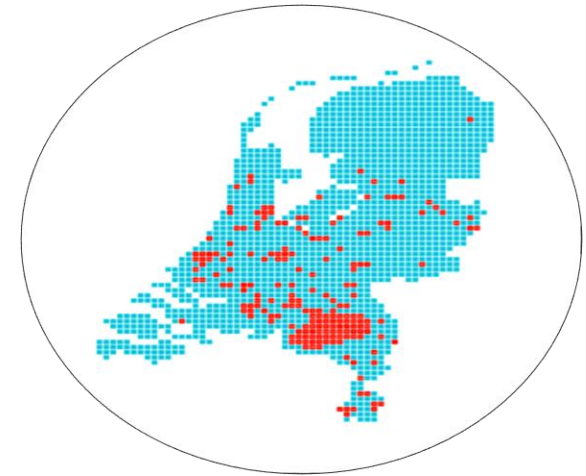
# RAI Automotive Industry NL

- RAI Automotive Industry NL is the **cluster organization of the Dutch automotive industry**, mobility sector and related knowledge and education centers with >200 members. It supports the innovative Dutch automotive sector by profiling and representing the sector, nationally and internationally.

### The RAI association exists of mobility sections:

1. Bicycles
2. Motorbikes
3. Passenger cars and light commercial vehicles
4. RAI Aftermarket
5. RAI Automotive Industry NL
6. RAI CarrosserieNL (Body shop)
7. RAI Equipment
8. Scooters
9. Heavy commercial vehicles

Source: [www.raivereniging.nl/en/sections/rai-automotive-industry-nl/](http://www.raivereniging.nl/en/sections/rai-automotive-industry-nl/)



- In order to create an economically and socially friendly user environment in the Dutch transportation domain, their ambition is to work towards **zero emission, zero accidents and zero congestion**.
- Furthermore, RAI is Founder and co-owner of RAI Amsterdam, and shareholder of Autorecycling Nederland (ARN).

### Our purpose is to:

- **Connect** Internal- and external stakeholders
- **Represent** the Dutch Automotive Industry
- **Facilitate** new initiatives and joint interests
- **Inspire** & energize
- **Share** Best practices and intelligence
- **Stimulate** cooperation and innovation



## NATIONAL PARTNERS

### Green mobility network organizations

- [Doet](#): Dutch Organisation for Electric Transport
- [NL Electrisch](#) – Government site on Electric driving & Charging.
- [Elaad.nl/en/](#) ElaadNL researches and tests the smart and sustainable charging of electric vehicles
- [NKL](#): The starting point for charging infrastructure of electric transport with the mission to accelerate electric mobility by contributing to a more cost efficient and future-proof charging infrastructure in the Netherlands.
- [Dutch National Charging Infrastructure Agenda](#)



### 3. Dutch automotive value chain

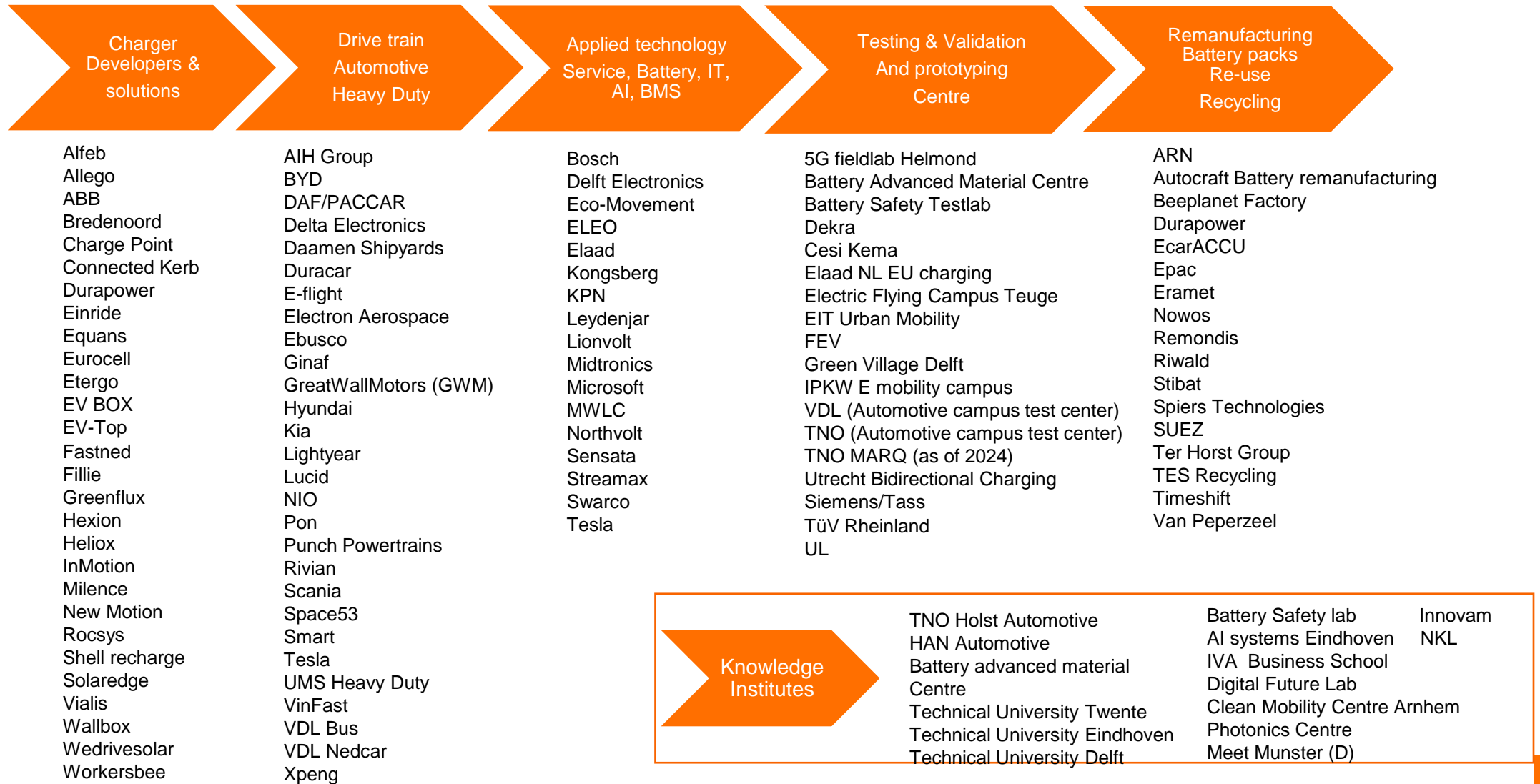






## DUTCH VALUE CHAIN FOR SMART AND GREEN MOBILITY

### Some key players





## 4. Green mobility : Charging





## E-Mobility: leading in number of charging points

### DISTRIBUTION OF ELECTRIC CAR CHARGING POINTS ACROSS THE EU

Some 50% of all charging points:  
Concentrated in just 2 EU countries

29.4% Netherlands

19.4% Germany

#### Top 5: Fewest charging points in 2021

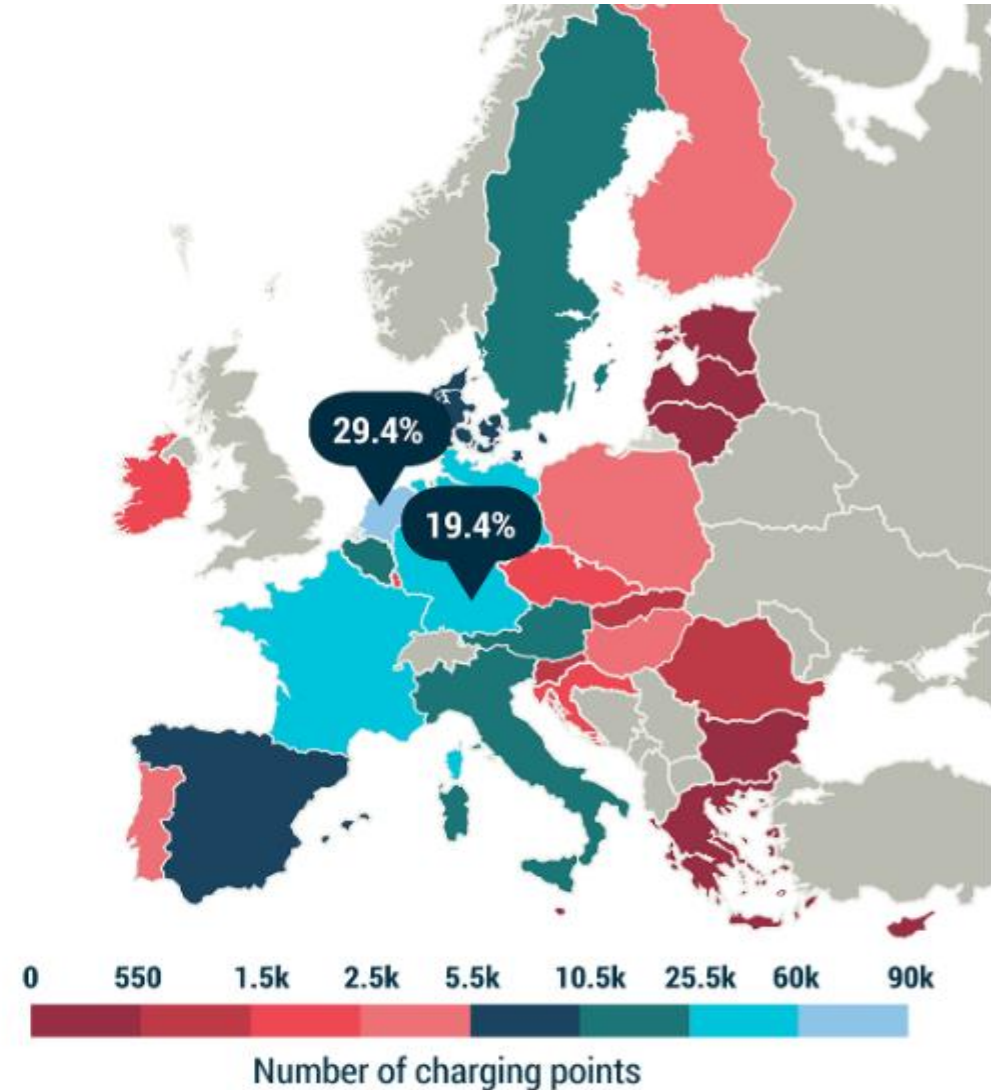
Cyprus  
57

Malta  
98

Lithuania  
207

Estonia  
385

Latvia  
420



Source: Acea June 2022



## E-Mobility: The Netherlands leading in charging infrastructure

- The Netherlands has strong players in developing and producing charging infrastructure. Both for regular electric vehicles and heavier carriers such as loading docks for public busses or trucks.
- The Netherlands produces world class smart energy management solutions that are tailored and scalable within a fast changing e-mobility landscape.

### National Charging Infrastructure Agenda

The Dutch Climate Agreement aspires all new passenger cars to be zero emission by 2030. By then, the Netherlands is expected to have 1.9 million electric passenger vehicles. On top of that there will be electric buses, vans, trucks, inland ships and light electric vehicles. **The Netherlands has one of the most dense charging networks in the world and is a European leader in electric driving.** The Netherlands is ambitiously aiming to maintain this position, and to extend it for all electric mobility. In order to provide electricity for a growing number of electric vehicles, the availability of charging locations must increase accordingly. [The Dutch National Charging Infrastructure Agenda is working to meet this demand.](#)

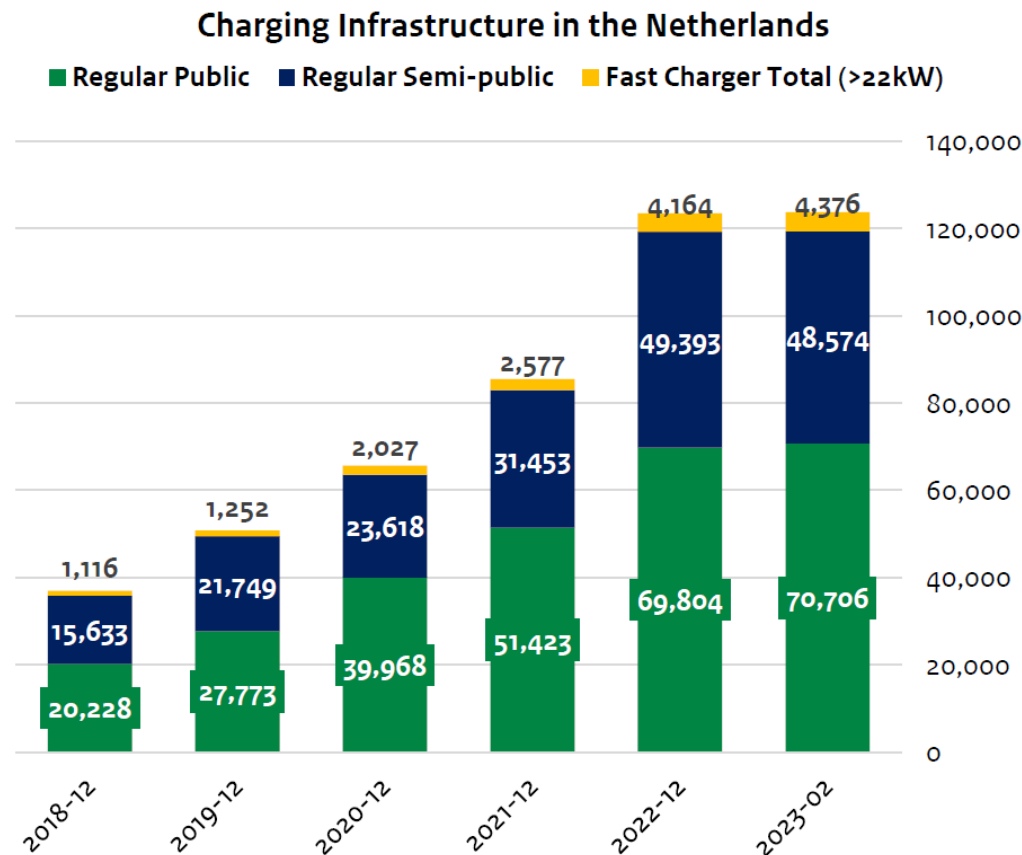




# E-Mobility: leading in number of charging points

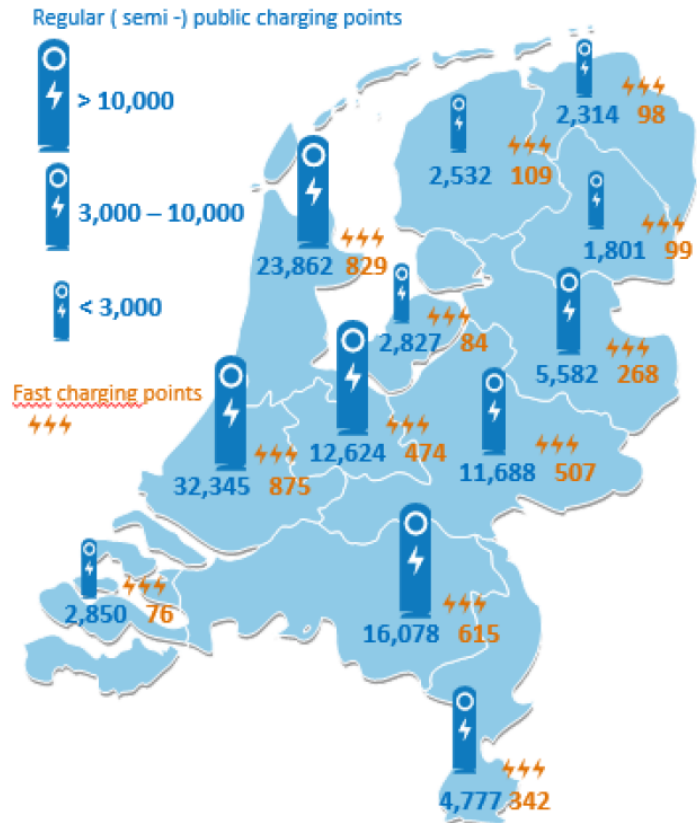
The graph below shows the total amount of charging points (EVSEs) for electric vehicles in the Netherlands. **Regular** charging points are  $\leq 22\text{kW}$  capacity, while **fast** charging points are  $>22\text{kW}$ .

The [website of the National Agenda Laadinfrastructuur \(NAL\)](#) has more details, including statistics on provincial and municipality aggregation levels (in Dutch).



Source RVO.nl feb 2023

## Number of charging points



## 4. Green mobility : Batteries



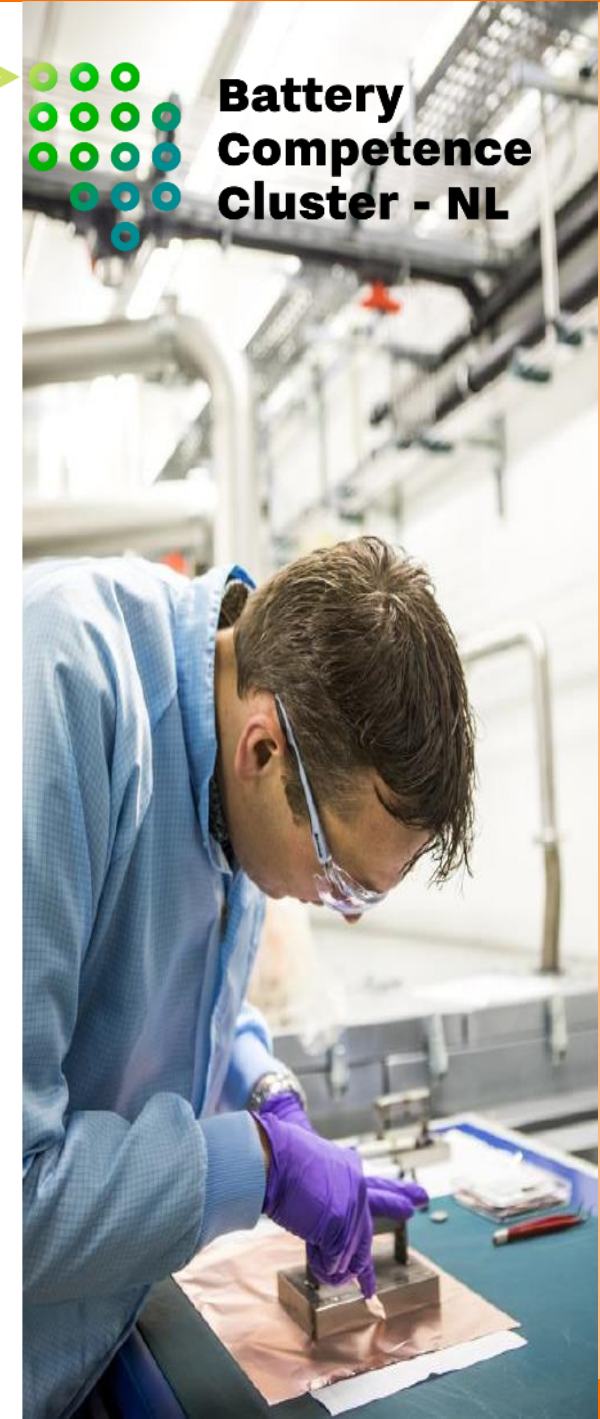
NATIONAL PROGRAM TO DEVELOP NEXT GENERATION BATTERIES

## The Battery Competence Cluster - NL

The innovation platform for companies, knowledge institutes and (public) organizations that want to work together to acquire knowledge and develop skills in the field of battery technology in the Netherlands. The Dutch high-tech, battery, transport and shipping industry join their forces in the Battery Competence Cluster - NL

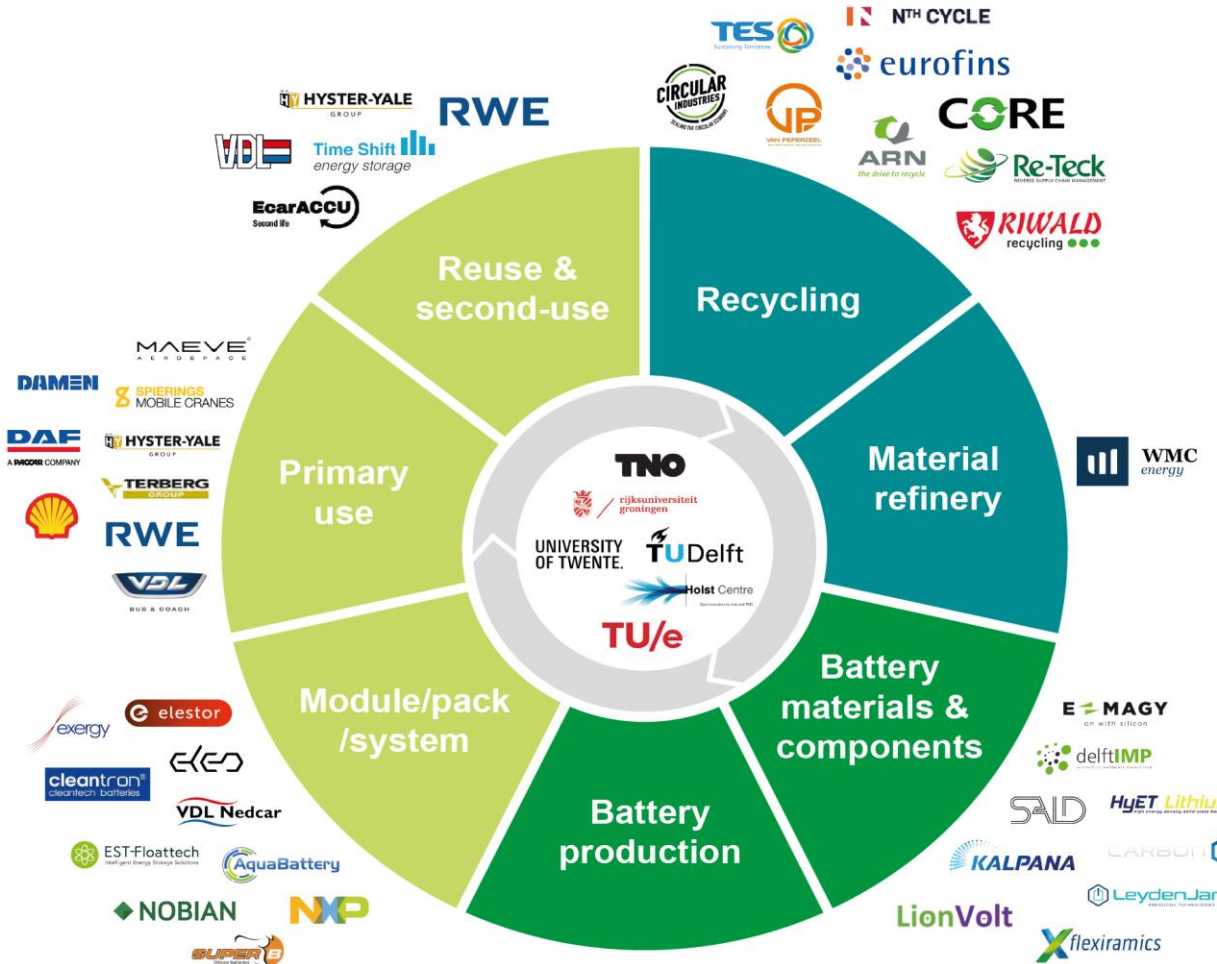
No Giga factories, but strong right to play:

- ❖ **Battery components:** BMS, Electronics
- ❖ **Battery Cells:** solid state batteries – 3D thin Film Structure
- ❖ **Battery Materials:** silicon anodes, lithium sulfur
- ❖ **Production equipment & processes :** sALD, PECVD, etc



THE NATIONAL GROWTH FUND WILL STRENGTHEN AND DEEPEN THE VALUE CHAIN

# The Dutch Battery Chain





# Utilizing regional strenghts in collaboration

## No Giga factories, but strong right to play

The Netherlands aims to be a big contributor to the European battery industry by acting as a major player in the supply chain of battery technology as well as in the re-use and recycling of battery components and the development of powertrains for automotive, heavy duty, marine and aerospace.

### 1 Zuid-Holland

**Sector:** Maritiem, High Tech Materials, Chemie  
**Technologie & competentie:** Logistiek, recycling / materialen, kathodes, vaste-stof batterijonderzoek  
**Key players:** LeydenJar, Damen Shipyards, DelftIMP, TU Delft

### 2 Oost-Nederland

**Sector:** Energie, High Tech Systems  
**Technologie & competentie:** Stationair, laadinfrastructuur, kathodes  
**Key players:** Elestor, Universiteit van Twente, Twente Safety Campus, Elaad, Hyster Yale, SuperB, Bredenoord

### 3 Brainport Eindhoven regio

**Sector:** Automotive, High Tech Systems & Materials  
**Technologie & competentie:** Dunne-film, interface engineering, plasma chemie, productietechnologie  
**Key players:** DAF Trucks, LeydenJar, TU/e, VDL Groep, ELEO, NXP, LionVolt, TNO/Holst Centre, Automotive Campus

### 4 Groningen

**Sector:** Energie, Chemie  
**Technologie & competentie:** Stationair, grootschalige productie, anodes, cathodes, elektrolyten, advanced characterisation  
**Key players:** RUG, DutchVolt, EuroCell, Hanze, Universiteit van het Noorden



Figuur 7: Overzicht van de voornaamste Nederlandse clusters waar veel kennis en bedrijvigheid samenkomt op batterijtechnologie



## ENABLING COOPERATION

# Connectr Arnhem

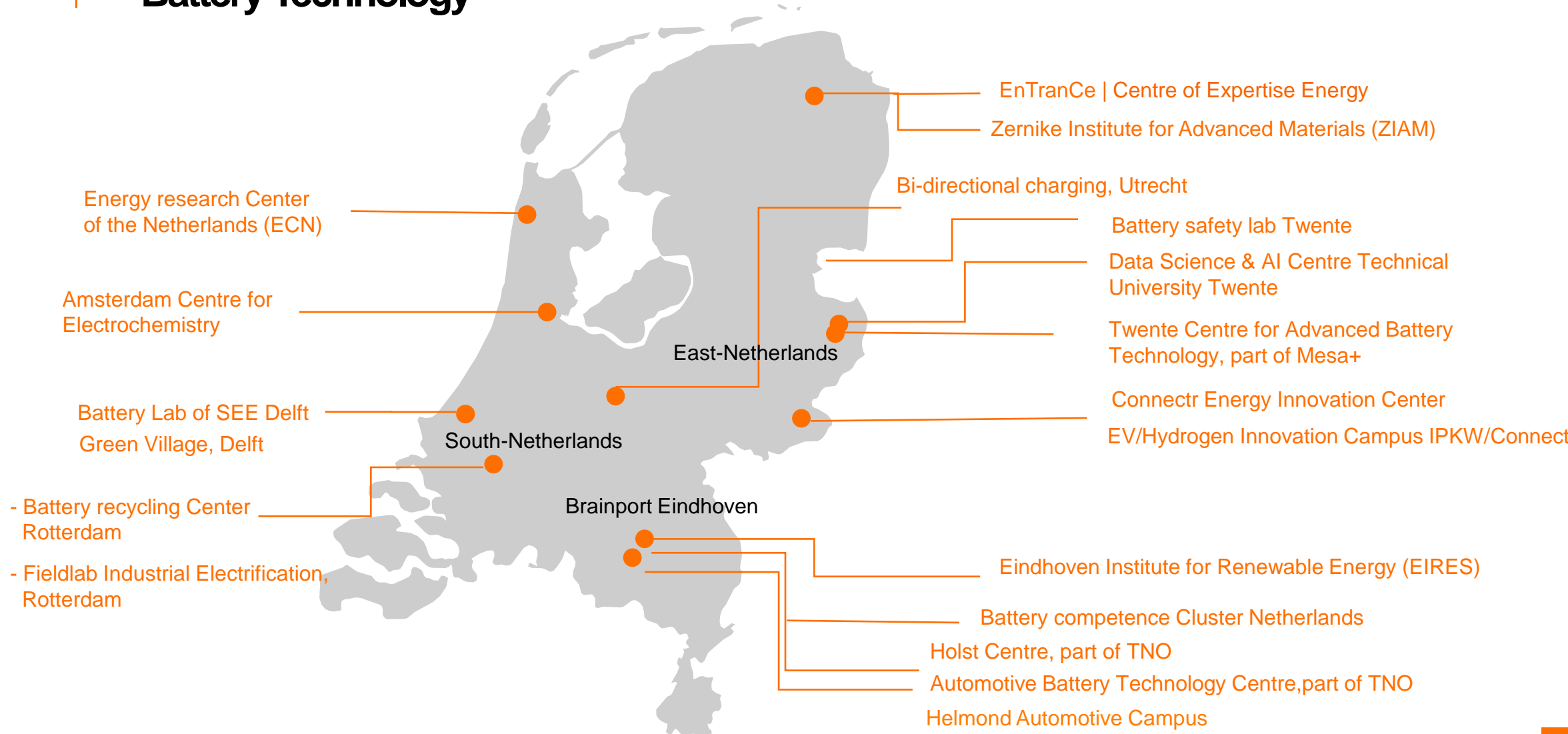
- Connectr is a triple helix (companies, Knowledge institutes and government) cooperation program, that focuses on three key technologies that are already developing strongly in the East and South of the Netherlands and that are **of excellent value at a global level**:
  - Electrical Power Engineering
  - Electrochemical Energy Storage
  - Sustainable Driveline System heavy duty and marine
- Connectr has development **a new energy innovation facility** of 17,000 m<sup>2</sup> and demofields in Arnhem available for tech EV companies.
- The facility will cover the value chain with R&D, education and shared test facilities, demofields, offices and meet & greet solutions to host energy-tech related companies and institutes and to support them in their plans.






## KNOWLEDGE INSTITUTES / OPEN ENERGY INNOVATION CENTERS / LIVING LABS

# Battery Technology





## 5. Smart Mobility : ecosystem & developments

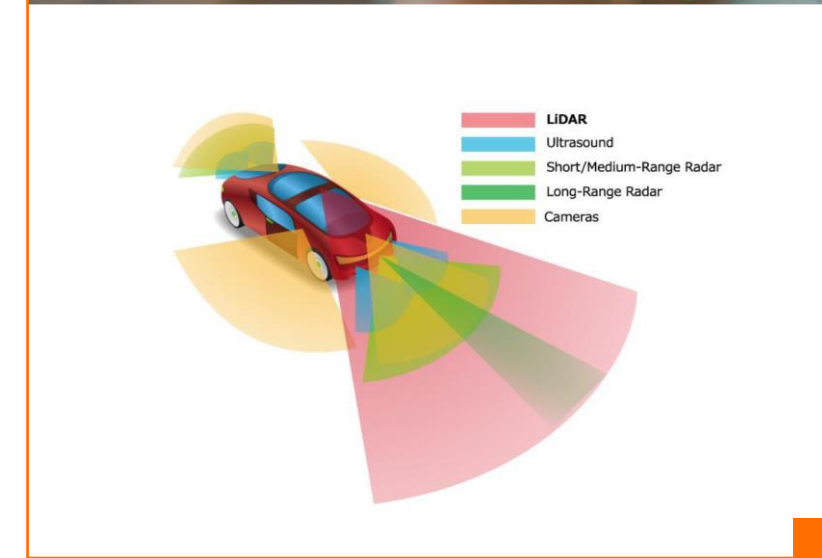
### Integrated Photonics



## NATIONAL RESEARCH PROGRAM

# Integrated photonics as enabler of smart mobility

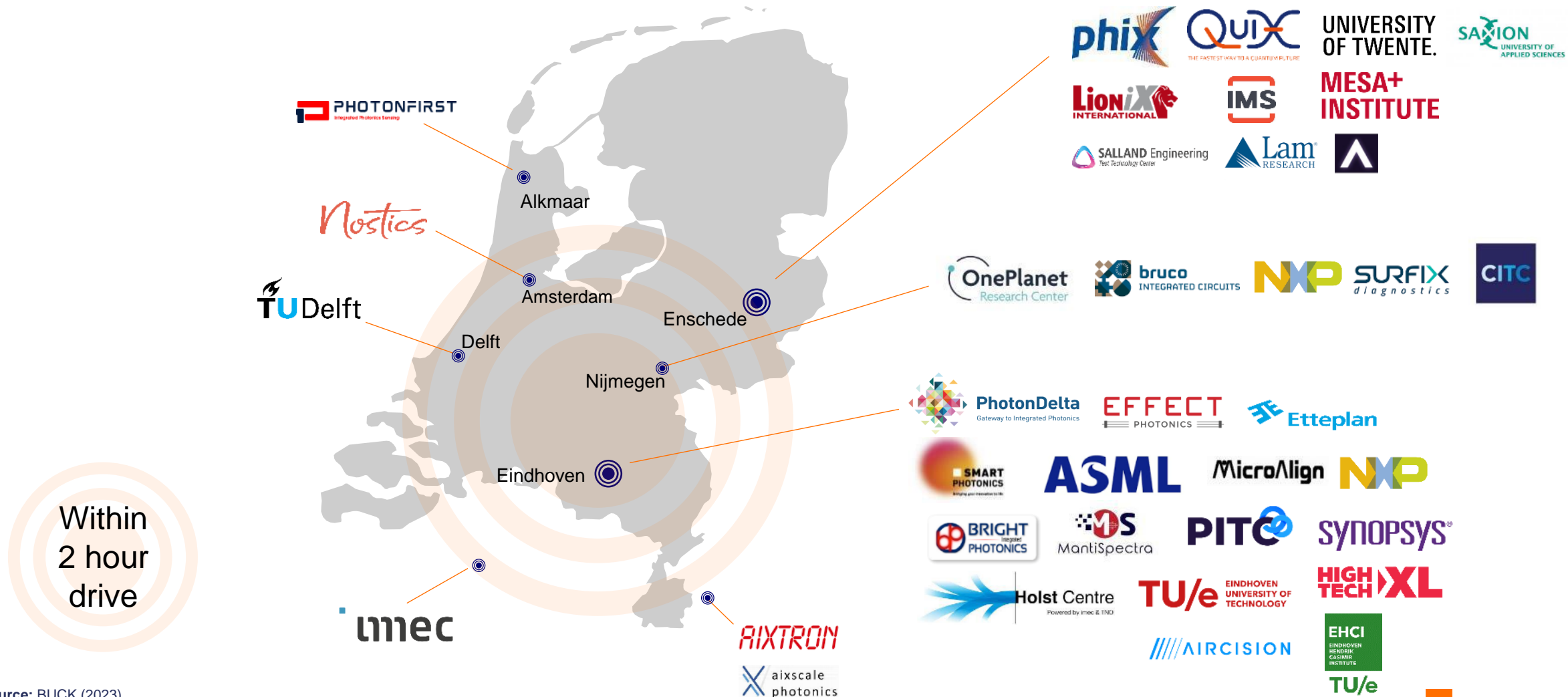
- PhotonDelta as organization runs national programs to further build and solidify the Dutch **ecosystem** for integrated photonics:
  - Bringing together industry and universities to promote photonics in new and emerging markets.
  - Investing in start-ups and scale-ups.
  - Supporting an '**end-to-end value chain** for photonic chips' from design to packaging, testing and applications.
  - Integrated photonics is driving various new **smart mobility solutions**;
    - ❖ Sensors ADAS and **autonomous driving**
    - ❖ Sensors for **powertrain** and **batteries**
    - ❖ In-cabin solutions for **driver comfort and safety**



The Netherlands is **#1** in EU ranking for Integrated Photonics publications on **Indium Phosphide & Silicon Nitride** and **#3** in the world

ENABLING AUTONOMOUS DRIVING AND NEXT GENERATION LIDAR AND SENSING

# Integrated Photonics ecosystem companies within the Netherlands



Source: BUCK (2023)



**5. Smart Mobility : ecosystem & developments**  
Artificial Intelligence & Software





## Autonomous driving & connectivity

### Ai & IT

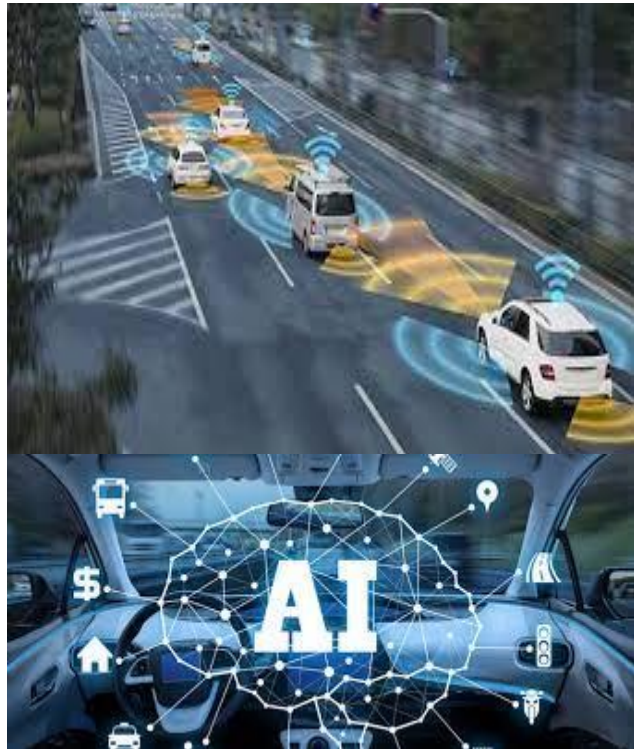


1. **AI Innovation Center Eindhoven [Website](#)**: Is an initiative by High Tech Campus Eindhoven and co-founded by Philips, Signify, NXP and ASML. It's mission is to industrialize AI in the Brainport Eindhoven region. Recently Microsoft and Amazon Web Services became a partner as well.
1. **EASI Eindhoven [Website](#)** brings together all AI activities of the Technial Uiversity Eindhoven (TU/e). Top researchers from various departments and research groups work together to create new and exciting AI applications with a direct impact on the real world. All this in close collaboration with our students and representatives from industry. The AI community now consists of nearly nine hundred researchers, including PhD students, postdocs and EngD students. Research focus is mainly in three domains: data and algorithms, engineering systems and humans and ethics. Application areas are health, mobility and industry. An example is that TU/e employees are building radar chips in collaboration with chip developer NXP that can estimate traffic situations. **Carlo van de Weijer, General Manager EASI: “*Amsterdam is very active around AI, but focuses mainly on the financial world and language interpretation. We are located in the region of machine builders. When machines are involved, you have completely different data and situations and therefore also different AI.*”**
2. **Jheronimus Academy of Data Science and Ai Den Bosch [Website](#)**. Offers various data science programs. From bachelor and master programs, to EngD (formerly PDEng) education and professional education. Besides, They help organizations shape their data driven future. At JADS, researchers and students work closely with the business community. In addition to education and research, JADS also offers space for innovative, data-driven entrepreneurship and public-private partnerships.





## Autonomous driving & connectivity **Ai & IT**



1. **Netherlands eScience Center Amsterdam** [website](#): the Netherlands eScience Center is the national centre to create innovative software solutions in academic research.
2. **CWI** [Website](#), the national research institute for mathematics and computer science. Conducting research in mathematics and computer science and transfers new knowledge to society and business. We focus on four areas of fundamental research: Algorithms, Data & Intelligent systems, Cryptography & Security, and Quantum Computing.
3. **Amsterdam Center for Artificial Intelligence** [Website](#) ICAI helps to organise and manage industry labs, strategic collaborations that run for at least 5 years and focus on technology and talent development. Research labs are made up of at least five PhD students and a scientific manager, who oversees the lab's daily business.
4. **Lab42/University of Amsterdam** [Website](#) Hub for the development of talent in the field of Digital Innovation and Artificial Intelligence (AI), facilitating partnerships between students, researchers and businesses.
5. **Data Science & AI Centre Technical University Twente.** [website](#) Various groups at the University of Twente conduct research on data science and artificial Intelligence, including work on fundamental understanding of machine learning, sensors, efficient realization of artificial intelligence in hardware, to development and application of artificial intelligence in fields such as health, safety and security, the geo-spatial domain, and manufacturing, to name a few. Central unifying themes are embedded and augmented intelligence.



## 6. Green & Smart: Testing & valorization eco-systems





## TEST & VALIDATION FACILITIES

# Test & Validation facilities for Batteries and EV



[KEMA Labs S&ST Charging Stations Service - CESI](#)



[Innovation lab - Connectr](#)



[EV Battery Testing | DEKRA](#)



[Advanced battery technology Centre](#)



[Battery Lab - TU Delft | SEE](#)



[Automotive Battery Research | TNO Helmond](#)



[Holst Centre Eindhoven - Open-Innovation by imec and TNO](#)



[Battery safety test lab](#)



[KPN 5G Fieldlab Eindhoven](#)



[Test, analyse, and research - Automotive Campus Helmond](#)



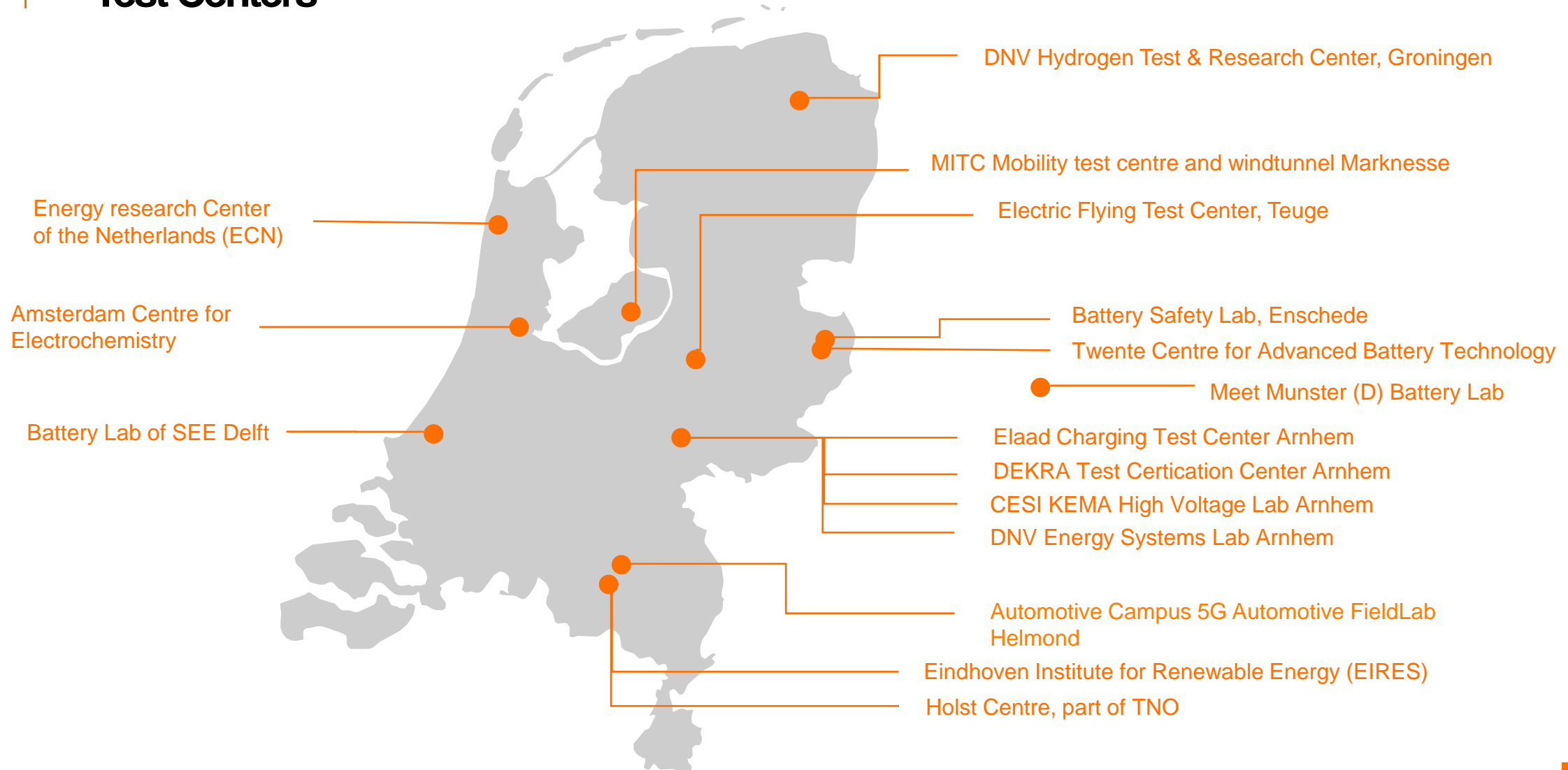
[MEET Battery Research Center](#)



[ELAAD NL Charging Testcentre](#)



## E-MOBILITY Test Centers





E-LAADNL ARNHEM

## International test centre charging infrastructure for heavy duty & automotive

- ElaadNL is testing the charging of all kinds of electric vehicles, from passenger cars to electric buses and trucks and the associated charging infrastructure.
- ElaadNL does this with six different tests: Interoperability, Power Quality, Smart Charging, Cybersecurity, Chain Tests and Network Operator Tests. **All free of charge.**



Photo: ElaadNL



## TNO AUTOMOTIVE BATTERY TECHNOLOGY CENTER **Applied knowledge on powertrains by TNO.**

In Helmond TNO develops control strategies for:

- CR dosing, flex-fuel engine, battery management systems and predictive energy management.
- TNO provides ultimate system validation. This is performed on in state-of-the-art experimental facilities:
- Unique Climatic Altitude Chamber for Engines vehicle testing at temperatures from  $-45$  to  $+55$  °C and up to an altitude of 4000m
- 4 transient engine test benches equipped with Extensive state-of-the art measurement equipment for emissions and GHG: NO<sub>x</sub>, NO, CO, THC, CO<sub>2</sub>, O<sub>2</sub> (CH<sub>4</sub>, EGR CO<sub>2</sub>)
- Portable Emission Measurement Systems (PEMS) for real world measurements
- Automated test benches for battery cell, module, pack and vehicle testing with thermal conditioning
- Extensive fuel infrastructure for liquid (diesel, petrol) and gaseous types (LPG,NG) as well as biofuels
- Fuel Cell test and validation facilities (under development)
- Fully configurable Truck- and Car-Labs (combustion, hybrid, fuel cell) for real-world on-road experiments



## 6. Green & Smart: Dutch Automotive Campus (Brainport/Helmond)





# Helmond Automotive Campus

## Collaborative innovation for smart & green mobility

### Innovation Program

#### Smart Mobility

Connected cars  
Autonomous driving  
Traffic Management

#### Digitalisation

Artificial intelligence  
Big Car data  
Cyber Security  
Data the new Fuel

#### Decarbonisation

Green Mobility  
Energy Carriers  
Hybrid powertrains  
Light constructions

Test facilities, 5G, Living Lab A270

People, Planet, Profit, Smart Charging

Community

Office &  
Lab  
Facilities

Education &  
Research

Business  
Support

Real Estate

Campus Enablers







# Automotive Campus Helmond

## The heart of Green & Smart Mobility

A national and international hotspot and potential business location for automotive companies, with access to partners, knowledge, talent, state-of-the-art technological (test) facilities and networks. It has real life, virtual, indoor and outdoor test facilities. Europe's largest rollerbank is located here. The campus also offers powertrain tests, virtual reality testing, 5G, A270 Test Highway, CO2 emission studies and the climate-control room studies where extreme weather conditions can be simulated.



### APPLICATION AREAS

Global hotspot in the areas of:

- Smart & Green mobility;
- Digitalization;
- Decarbonisation.

It also hosts the Netherlands Battery Competence Cluster.



### LEADING COMPANIES

- Multinationals such as Siemens-Tass international, Altran / Capgemini, Delta Electronics, VDL-ETS, Durapower, FEV
- Research institutes like TNO, Rijkswaterstaat innovatie Centrale
- Scale ups and startups like Eleo, DENS, Nimbus



### KEY FIGURES

- 70 companies & Organisations
- >25 nationalities
- 25 labs and test facilities
- 1250 Smart People and 500 Students
- Total 25,000 m2 of which half to be constructed
- 100 events / year
- 20.000 Visitors
- Incubator for start-ups



### OBJECTIVES

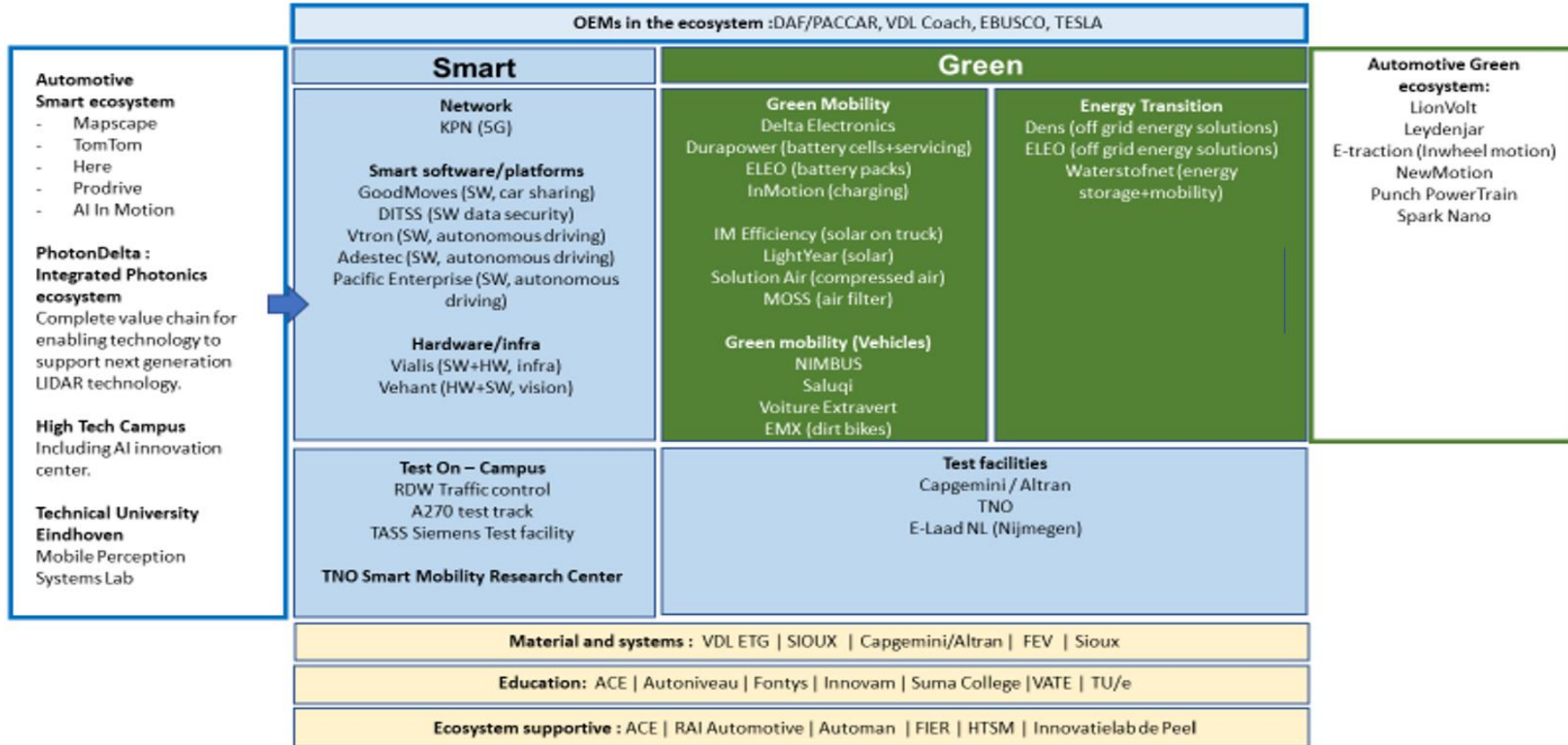
Each company at Automotive Campus shares a common goal: developing new technologies and applications that help solve social problems and challenges, and successfully bringing these to the market in the area of new mobility.





# Helmond Automotive Campus





## Collaborative innovation in a vibrant ecosystem









# Helmond Automotive Campus

## Embedded education and training in the heart of the campus

	Mobility in urban environments
	Automotive training center
	Higher education for vehicle design and testing
	Center for applied automotive research and education



	Secondary vocational education automotive engineering
	Student Team E-racing car
	Education and training for new automotive technologies
	Secondary vocational education automotive






## Helmond Automotive Campus

# Embedded testing and research in the heart of the campus

 5G field lab  
- N270


 **TNO** innovation  
for life Powertrain  
testing

 **MARQ**  
Opening  
2024


*Mobility Applied  
Research Quarter*

Vehicle labs  
HIL/SIL  
Dynamic driving  
Simulator  
Data&Control  
Center  
Mobile infra  
Digital Twin




 **VDL**

Rolling road  
test bench

 **Capgemini**

Engineering  
Prototyping  
Frequency test  
Climate test  
EV Battery  
testing

 **tass**  
A Siemens Business

Safety Center  
ADAS testing  
Automated  
driving validation  
International  
Mobility



## 6. Green & smart: Dutch High Tech Campus Infrastructures



## UNIQUE DUTCH HIGH TECH ECOSYSTEMS

# High Tech Campus Eindhoven

HIGH TECH CAMPUS  
EINDHOVEN

### HTC Eindhoven in Numbers

- 260 companies
- 12.500 employees
- Total 350.000 m
- **43% of all Dutch patent applications come from the Campus**
- 25.000 sqm R&D facilities
- 1 billion private R&D
- Global Top 7 incubator for start-ups



### Collaboration

High Tech Campus in Eindhoven, the **smartest km2 in Europe** is an ecosystem of 260 high tech companies. It's home to more than 12,500 innovators, researchers and engineers. Each company at High Tech Campus Eindhoven shares a common goal: developing new technologies and applications that help solve social problems and challenges, and successfully bringing these to the market. The combination of business and technology is central to many collaborations on the Campus shown by the **highest patent density**. From multinationals like NXP or Philips to small and medium-sized companies, research institutes, service companies and scale- and startups, collaboration is in our DNA.

### Technical Facilities

- Philips Engineering
- Eurofins Material Science Netherlands: Material Analysis Lab
- Eurofins Material Science Netherlands: Reliability Lab
- Signify Electromagnetic Compatibility & Wireless Connectivity Lab
- AI Innovation Center

### Present (Integrated) Photonic Companies + Organisations

- PhotonDelta
- EFFECT Photonics
- Smart Photonics
- NXP
- PhotonFirst
- HighTechXL

### Leading Companies

- Multinationals such as ASML, NXP, Philips, Signify, Demcon, Etteplan, Intel, Shimano, Siemens, Symopsys, Thermofisher, TMC.

### Photonics Research Institutions

- Holst Centre
- Philips Research
- Innovation Lab
- 5G Hub Eindhoven



## UNIQUE DUTCH HIGH TECH ECOSYSTEMS

# Noviotech Campus

### Noviotech in Numbers

- 70+ companies
- 3400+ employees
- 250.000 m<sup>2</sup>
- 6 key sectors:
  - Semiconductors
  - Radio Frequency
  - Chip Integration
  - Bio Technology
  - Digital Health
  - Medical Technology

### Collaboration

The Noviotech Campus can be seen as the center of health and related high tech in the Netherlands. The Noviotech Campus community works from the research in medicine discovery to the developments in a new generation chips.

Community building and a flourishing ecosystem where (chip) companies work closely together is at the heart of the campus. All six key sectors cooperate to accelerate innovation.

While the collaboration between parties on the campus is strongly present, the Noviotech Campus is located in Nijmegen and has collaboration opportunities with other companies, knowledge institutions and academics in the rest of the region.

### Shared Facilities

Radboud Research Facilities is a collaboration between the Radboud University, RadboudUMC, Donders Institute for Brain, Cognition and Behaviour. Noviotech Campus members can use the equipment, facilities, knowledge and expertise of these organisations

### High Tech DNA

- 3 world-class chip companies (NXP, Ampleon and Nexperia)
- Strong focus on high tech and packaging
- Strong chip ecosystem and collaboration between integrated photonic and semicon partners

### Noviotech photonics and semicon companies

- NXP
- Nexperia
- Holland Semiconductors
- Photronics
- EPR
- ITEC Equipment
- Sumitomo Electric
- Sencio
- NTS
- CITC
- Nexperia
- Ampleon





UNIQUE DUTCH HIGH TECH ECOSYSTEMS

# Kennispark Twente



## Kennispark in Numbers

- 450+ companies
- 13,100 employees
- 350,000 m<sup>2</sup>
- Second largest campus in the Netherlands
- Presence of one of the largest nanotechnology institutes in the world: MESA+

## Collaboration

The innovation campus Kennispark Twente in Enschede is one of the top 3 of most important science parks of The Netherlands. It is a dynamic location where companies work on developments and innovations that make a difference.

Kennispark Twente aims to be a meeting point for top-class European knowledge, technology and innovative businesses. Through sharing expertise and cooperative innovation new possibilities, concepts and product can be developed. Innovating together means arriving at the intended result more quickly.

## Shared Facilities

Kennispark Twente has several open innovation centres and platforms to develop and share knowledge related to high-tech systems and materials. Several R&D facilities are available to both companies and universities, for example:

- High Tech Factory
- Design Lab
- Mesa+ Nanolab
- Battery Advanced Technology Centre

## Companies

- Demcon (HQ)
- Quix Quantum
- Phix Photonics Assembly
- Bosch | ItoM
- Eurofins | MASER
- Micronit
- Lionix International

## R&D Focus

- Focus on technological developments with a high social relevance: *High Tech – Human Touch*
  - Smart materials, software & security, medical technology, chip technology & advanced manufacturing







## 7. Talent , Technical Universities, Universities of applied sciences & Vocational education in the field of EV



## TALENT

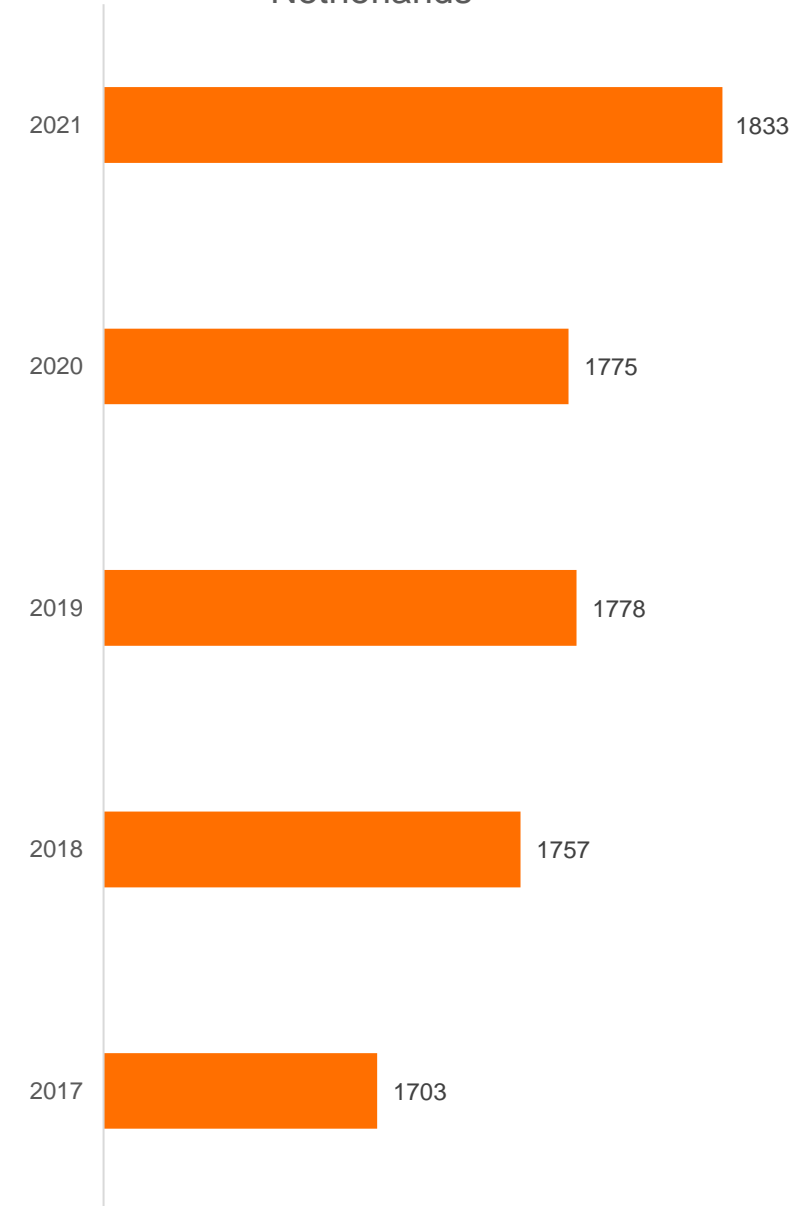
# Talent in the Automotive sector in the Netherlands

- The Dutch automotive industry is uniquely positioned for developing innovative and intelligent solutions to tackle global challenges. A **well-educated working workforce** is one of the most important drivers for this.
- Over the past five years, the intake of **automotive engineering students** has been increasing.

Although the automotive labor market is tight, like elsewhere:

- The Netherlands has a **flexible automotive labor market**  
11% of automotive professionals is actively searching for new employment
- RAI, through combined effort, invests heavily in education and training of **automotive engineering professionals**

Automotive Engineer students in the Netherlands





## TALENT AND EDUCATION

# Academic Universities with Electric Vehicles Related Studies

### University of Amsterdam / VU

- MSc Transport and Supply Chain Management

### Delft University of Technology (TU)

- BSc/MSc Electrical Engineering
- MSc Transport, Infrastructure and Logistics
- BSc/MSc Mechanical Engineering

### Erasmus University (Rotterdam)

- MSc Supply Chain Management

### Tilburg University

- MSc Supply Chain Management

### University of Groningen

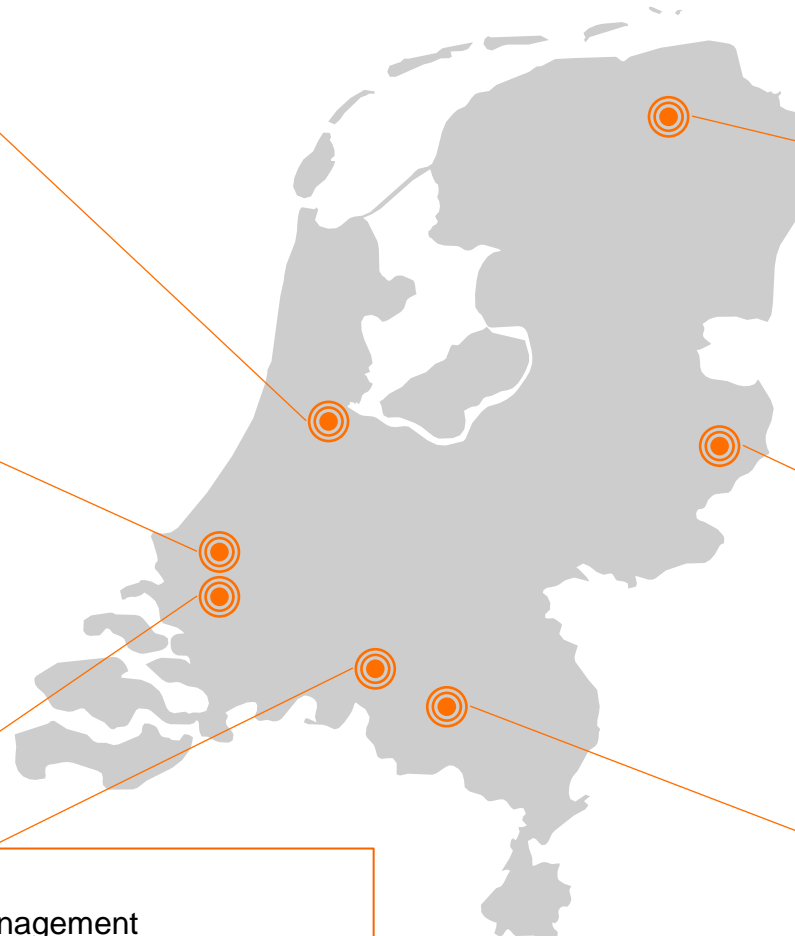
- MSc Supply Chain Management
- MSc Mechanical Engineering

### University of Twente

- BSs/MSs Electrical Engineering
- BSc/MSc Mechanical Engineering

### Eindhoven University of Technology

- MSC Automotive Technology
- BSc/MSc Electrical Engineering
- BSc/MSc Mechanical Engineering



# Universities of Applied Sciences with Electric Vehicles Related Studies



**Inholland UoAS\***

- Electrical Engineering
- Mechanical Engineering

**UoAS Utrecht (HU)**

- Electrical Engineering

**The Hague UoAS**

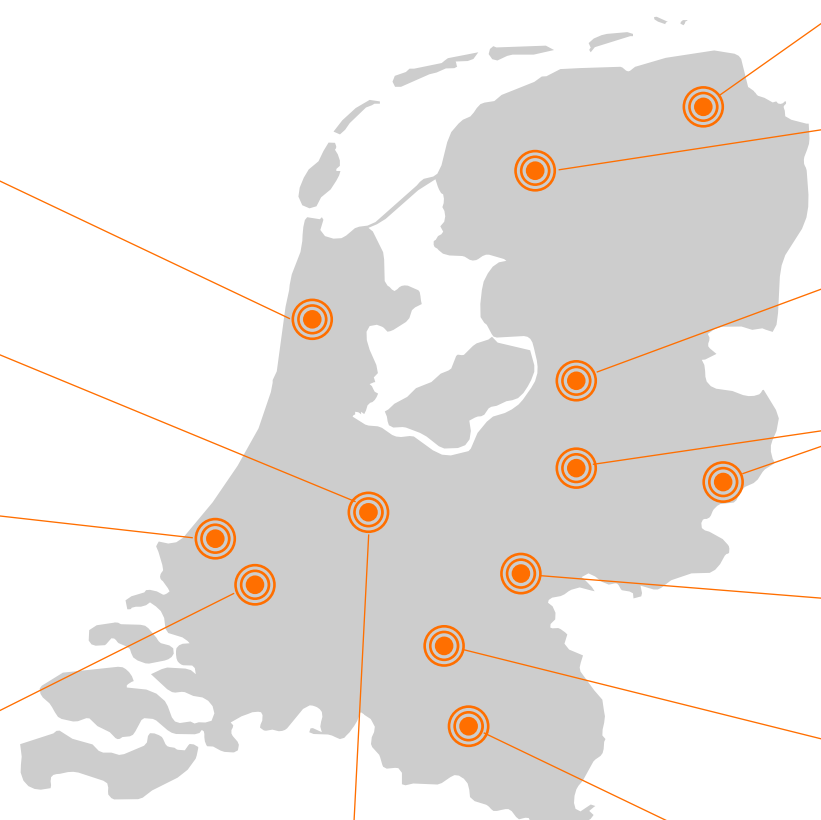
- Electrical Engineering

**Rotterdam UoAS / Inholland**

- Automotive Engineering
- Electrical Engineering
- Maintenance & Mechanics
- International Supply Chain Management

**IVA Automotive Business School**

- Private management business school specifically for automotive branch, combines knowledge in sales, management & techniques (950 students in 2021).



**Hanze UoAS**

- Electrical Engineering
- Mechanical Engineering

**NHL Stenden UoAS**

- Electrical Engineering
- Mechanical Engineering

**Windesheim UoAS**

- Logistics Engineering
- Electrical & IT Engineering

**Saxion UoAS**

- Electrical Engineering
- Energy Transition Specialization
- Mechanical Engineering

**HAN UoAS**

- Automotive engineering
- Electric and mechanical engineering
- Energy transition technology

**Avans UoAS**

- Electrical Engineering
- Smart Energy Specialization

**Fontys UoAS**

- Automotive Engineering
- Electrical Engineering
- Sustainable & Smart Living Specialization
- Mechanical Engineering

\*UoAS = University of Applied Sciences



## TALENT AND EDUCATION

# Applied Sciences Studies related to Electric Vehicles

### ROC Amsterdam

- Automotive engineer
- Technical specialist passenger cars

### NexTechnician

- Education and training on new automotive technologies . Focus areas being cars, trucks, busses. Cooperation between Amsterdam based schools of applied sciences and 50 commercial partners like Mercedes Benz, Porsche, Volvo, Scania and Renault Trucks

### ROC Midden Nederland

- Automotive engineer
- Technical specialist passenger cars

### ROC Mondriaan

- Automotive engineer
- Technical specialist passenger cars

### Curio Etten-Leur

- Automotive engineer
- Electrical engineer
- Mechanic electrical systems

### ROC Midden Nederland

- Automotive technician
- Electro IT technician
- Mechanical construction



### Alfa-College

- Automotive engineer
- Technical specialist passenger cars

### Landstede & Deltion College

- Automotive technician
- Electro IT technician
- Mechanic construction

### ROC Twente

- Automotive engineer
- Electrical engineer
- Mechanic electrical systems

### Koning Willem I College

- Automotive engineer
- Technical specialist passenger cars

### Summa Automotive College

- Automotive engineer
- Technical specialist passenger cars
- Specialist mechanic electrical systems



## 8. Fiscal Climate and Incentives



## NATIONAL INCENTIVES

# Support to international business

- **Attract international talent**
  - Fast-track permit for highly skilled migrants
  - 30% ruling provides expatriates (income tax exemption of 30%)
- **Stimulate R&D**
  - WBSO (16-32% tax withholding deduction on R&D wage costs, equipment and expenses)
  - Innovation Box resulting in an effective tax rate of 9%
  - Incentives to stimulate public-private research (EU, national and regional)
  - Innovation Credit is a direct loan from the Netherlands Enterprise Agency that enables companies to finance part of the costs of innovative projects with high risks that banks and other investors will not invest in.

## Energy/sustainability incentives

- With the **Energy Investment Allowance (EIA)**, companies that invest in energy-saving installations, or that make use of sustainable energy can deduct 45.5% of the investment costs from the fiscal profits, on top of the usual depreciation.
- Through the **Environmental investment deduction (MIA) scheme** companies can deduct up to 45% of the investment costs for an environmentally friendly investment on top of the regular investment tax deductions.
- With the **Arbitrary depreciation of environmental investments (Vamil) scheme**, companies can decide when to write off 75% of their investment costs. This gives an advantage in liquidity and interest
- New electric cars will be subsidised with €2,950 in 2023 if the price is below €45,000. The state will continue to provide €2,000 for used electric cars. Also incentives for buying electric commercial vehicles.

# 9. South Korean projects in EV

Fontys

ULTRAN

NOVATIE  
NTRALE

automotiveNL

000  
ive

uperior  
etdiensten



LIGHTYEAR  
smart  
wayz.nl



BRAINPORT  
SMART DISTRICT  
BRANDEVOORT



GROENEWEGEN

ACE automotive center of expertise

TNO

tass international  
A Siemens Business

inno am



RDW



SUMMA College



Rijkswaterstaat

FEV

Connected  
strategische veranderingsprocessen

Driven™  
Helmond City of Smart Mobility

SPIKE



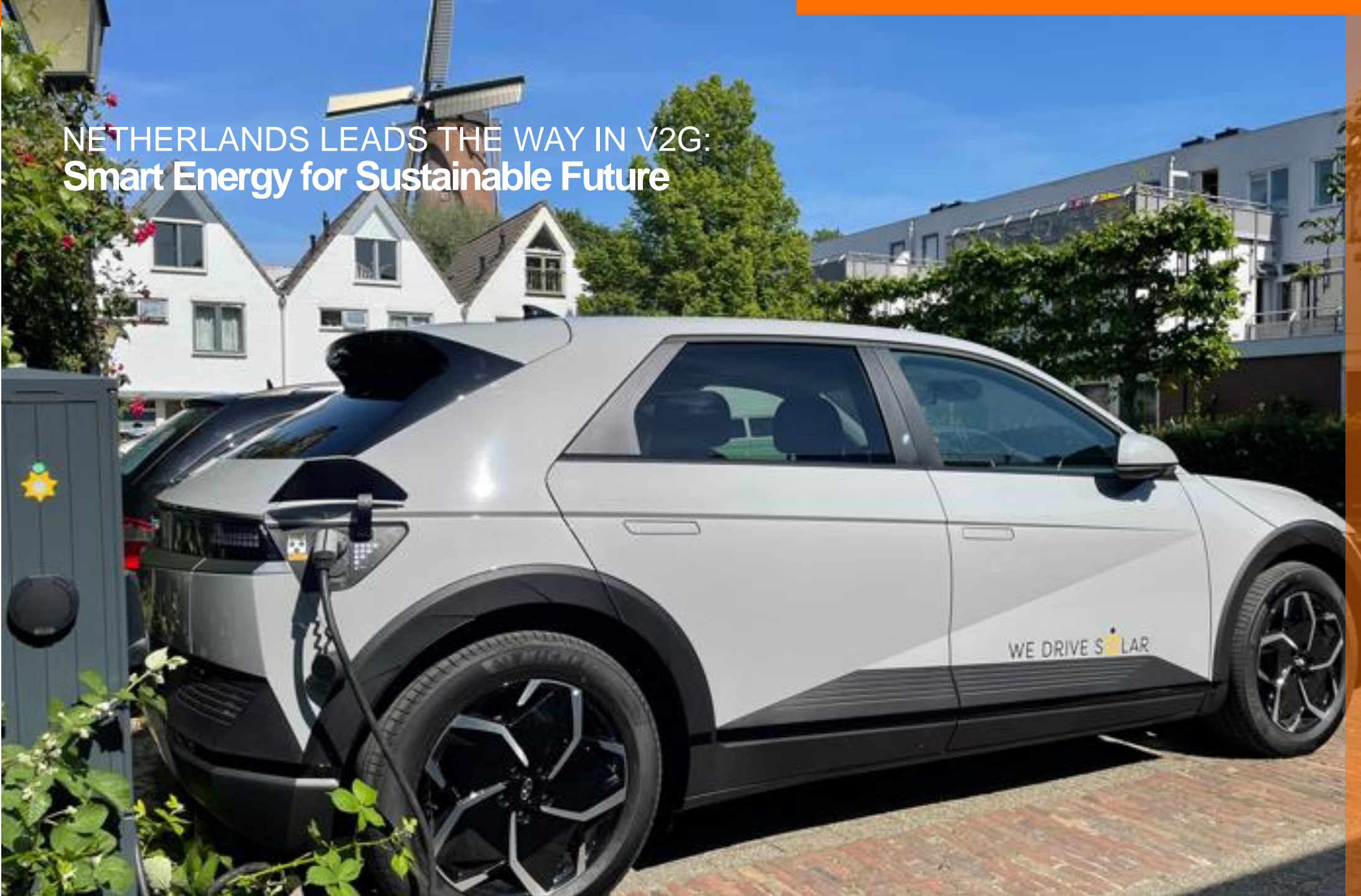
INNOVATIE  
HUIS DE PEEL

electric





## NETHERLANDS LEADS THE WAY IN V2G: Smart Energy for Sustainable Future





## FIRST BIDIRECTIONAL PILOT IN THE WORLD

# We Drive Solar with Hyundai

- We Drive Solar, Hyundai, ElaadNL, the City of Utrecht and other partners are collaborating to make Utrecht the first bidirectional region in the world and to scale up to Europe. This will involve deploying a network of bidirectional charging stations and using electric vehicles to store and supply energy back to the grid.
- Their shared electric cars can be charged at bidirectional charging stations (AC type 2). In time, these charging stations will also make it possible to discharge cars (V2G), effectively turning these cars into batteries on wheels that store energy to later feed back into the local power grid. This allows more efficient use of renewable solar and wind energy.
- The Netherlands, with Utrecht at the forefront, is spearheading bidirectional charging with 800 stations installed and 1,700 more on the way. The world-first ISO15118 protocol paves the way for smart energy grids in NL and Europe.





## FIRST BIDIRECTIONAL PILOT IN THE WORLD **Hyundai IONIQ 5**

- On 21 April 2022 Hyundai and project partner We Drive Solar launched the first Hyundai IONIQ 5 in Utrecht that can charge and discharge.
- They will expand bidirectional charging with 150 more IONIQ 5 vehicles and more to come
- The next three years, the innovation translates into bidirectional city regions in projects FLEET and ROBUST and into European proportions in project SCALE to eventually be rolled out worldwide.

Source: press release Smart Solar Charging in pictures: Gamechanger of the Energy Transition





E-LAADNL COOPERATION WITH HYUNDAI AND KIA

## International test centre charging infrastructure for heavy duty & automotive

ElaadNL is testing the charging infrastructure for the models for Hyundai Kia they support with different tests: Interoperability, Power Quality, Smart Charging, Cybersecurity, Chain Tests and Network Operator Tests. **All free of charge.**



Photo: ElaadNL

## KIA PIONEERS SMART ENERGY SOLUTIONS IN NETHERLANDS

### **Kia Charge: smart charging & green energy**

- Kia Netherlands is pioneering the development of innovative smart energy solutions for electric vehicle (EV) owners. The company has selected the Netherlands as a pilot market to test and refine its new Kia Charge services, which include V2H and V2G smart charging, as well as a partnership with a Dutch energy provider to offer solar panels to EV customers.
- V2H and V2G smart charging: EV owners can use their vehicles to store energy during off-peak hours and discharge it back into the grid during peak hours, helping to reduce energy costs and improve grid stability.
- Leveraging Dutch national infrastructure and strategic partnerships with Vattenfall and Jedlix, Kia Netherlands enriches Kia Charge with solar panels, green energy, and smart charging to enhance electric mobility.



OEM-S

## Remanufacturing in the Netherlands (Arnhem)

- Advanced EV Battery repair processes informed by decades of automotive experiences
- The patented ARIA (Augmented Reality Interactive Assembly) approach combines the power of technology and human capability using cameras, projectors, and wireless tools. Benefits include:
  - The testcentre pinpoint the root cause of failures at a cellular level.
  - Digital twins predict where future faults are likely to occur.





## Testimonials



**Hyosung (South Korea)  
Opens R&D Innovation  
Centre in Arnhem the  
Netherlands (2024)**



**New building Delta  
Electronics (Taiwan) at  
Automotive Campus  
Helmond (2023)**



**Autocraft (UK) opens battery  
remanufacturing plant in  
Arnhem (2023)**



**ADASTEC (USA) Expands at  
Automotive Campus  
Helmond the Netherlands  
(2022)**



**International Automotive  
AIH Group (South Africa)  
sets up HQ in World Trade  
Center Twente. (2023)**



## 10. NFIA network and support





INVEST IN HOLLAND NETWORK

## We roll out the orange carpet



**Invest in Holland** is the national network of the Netherlands Foreign Investment Agency (NFIA), an operational unit of the *Dutch Ministry of Economic Affairs and Climate Policy*, and our regional and local partners. Together we support foreign companies to set up and expand their business in the Netherlands.



### **We connect you**

with local networks, regulators, clusters and consultants.



### **We inform you**

about incentives, business locations, regulations and procedures.



### **We organize**

custom-made fact finding trips for your investment project.



### **We provide**

confidential and free support.



## EV FOCUSTEAM INVEST IN HOLLAND NETWORK FOR EVS

# We welcome you!



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