

TNO APAC

Introduction

TNO Mobility & Built Environment

Asia Pacific

TNO innovation
for life



Contents

Chapter 1	3	Chapter 3	14
1. Introduction to TNO		3. Introduction TNO APAC	
1.1 – TNO strategy & organisation		3.1 – TNO as international knowledge partner	
1.2 – Types of research & funding		3.2 – Key areas of interest in APAC	
1.3 – TNO Research Units		3.3 – Vision	
Chapter 2	10	Chapter 4	18
2. Mobility & Built Environment		Liveable & resilient cities	
2.1 – A liveable future for all		Chapter 5	20
2.2 – Three preconditions, one vision		Safe & efficient mobility	
2.3 – Addressing the complexity		Chapter 6	22
2.4 – Unique expertise for a common goal		Sustainable Mobility	
2.5 – Propositions			

1. Introduction to TNO

The Netherlands Organisation for Applied Scientific Research (TNO) is the largest independent Research and Technology Organisation (RTO) in The Netherlands. TNO was established by law in 1932 to conduct technical, natural and social scientific research in the public interest, and to make this knowledge applicable for governments and companies. Our mission is to create impactful innovations for the sustainable wellbeing and prosperity of society.

1.1 – TNO strategy & organisation

Innovation is vital for shaping a secure, sustainable, healthy, and digital society in the 21st century. TNO, a trusted independent applied science and technology organisation, collaborates closely with governments, universities, and the private sector to drive technological breakthroughs and inform policymaking and effective governance. Therefore, a keen understanding of customer needs, international supply chains, and the broader landscape of national, European, and global market trends is vital. Global investments in research and development (R&D) surge, and value chains span multiple borders. This means leveraging our unique strengths in specific fields – those that hold the most promise – to secure sustainable competitive advantages and establish strategic footholds (control points) within global value chains.

Mission

TNO's mission is to create impactful innovations for the sustainable wellbeing and prosperity of society.



As a leading research organisation in the Netherlands, TNO has a longstanding tradition of partnering with international organisations to drive technological advancements and address societal challenges.

The evolving geopolitical and economic landscape highlights the need to reduce strategic dependencies on value chains associated with less cooperative regimes to maintain technological leadership. Simultaneously, there is a growing focus on strengthening collaborations with

allies who have similar political and social values and adopt a comparable high-tech approach to societal challenges.

In the APAC region, we find allies with shared interests in key enabling technologies, and therefore I wholeheartedly endorse our international partnerships in this region.

Tjark Tjin-A-Tsoi
CEO and Chairman of the Board
of Directors of TNO

TNO as leading innovator

TNO, as a trusted, independent, and pioneering applied science and technology organisation, plays a multifaceted role. We innovate, investigate, and orchestrate, collaborating closely with governments, universities and the private sector. We inform governments on policies and empower evidence-based decision-making through rigorous investigations, cutting-edge scientific insights, and reliable measurements. By building national and international consortia and ecosystems, we drive technological and methodological breakthroughs that help to realise a secure, sustainable, healthy, and digital society, and strengthen the earning power of the Dutch economy.

Innovation is crucial in realising a secure, sustainable, healthy and digital society, with TNO as leading innovator

To maximise our innovative impact, we focus on areas where we excel and lead in innovation, ensuring our efforts have significant impact. We base our decisions in this regard on a thorough grasp of societal and market needs, a realistic assessment of emerging value chains and industrial hubs in the Netherlands, as well as the international competitive landscape. These factors co-determine the success or failure of an innovative effort. We remain committed until technical and social inventions evolve into successful innovations. Together, we aim to cultivate a more focused and agile organisation that thrives on collaboration, empowers employees, and creates impactful innovations that contribute to sustainable wellbeing and prosperity.



Figure 1

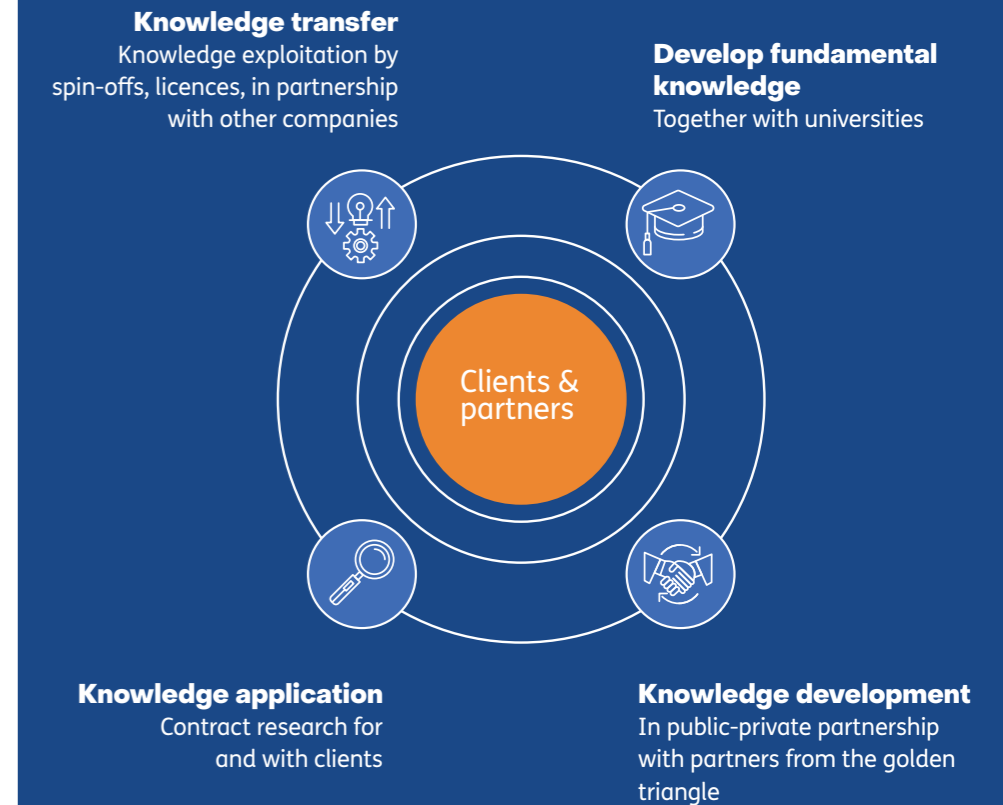
Core tasks

TNO has two core tasks:

- The first core task is to support the Dutch government in carrying out statutory government tasks in the public interest. Through research and advice, TNO works on the one hand to provide facts and science-based insights as input for policy processes.
- On the other hand, TNO supports the effective and efficient execution of government tasks through research, consultancy, testing, and innovation. This ranges from research for the Ministry of Defence to mapping the subsurface, and from policy advice for all ministries to supporting the energy transition.
- TNO's second core task is to strengthen the earning power of the Dutch economy and increase employment through applied research, valorisation, innovation, and collaboration. TNO innovates on behalf of both private and public organisations. In addition, we develop intellectual property, for which licences are granted. TNO also founds new companies (spin-offs) based on technological innovations, in addition to other forms of valorisation. In this way, we support the pursuit of a competitive, innovative, and dynamic knowledge economy that will ensure prosperity in the Netherlands well into the future and provide the financial and economic capacity necessary to finance solutions to major societal challenges.

We introduce innovations commissioned by businesses and civil-society organisations (Contract Research) and through public-private partnerships (PPPs), but also on our own initiative. Throughout the process, we raise issues, initiate movement, and connect industry and government so as to create greater social value together. TNO consists of six units and a centralised Services Organisation (see Figure 1). Each TNO unit has a Strategic Advisory Council made up of representatives from business and industry, the public sector, and knowledge institutions.

Smart solutions for clients & partners



TNO key figures

4.4

Client satisfaction

1,067

Public-private partnerships

62

Lecturers professors

937

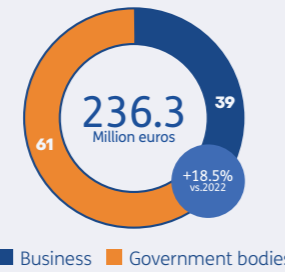
Patents

Financial indicators 2023

TNO organisation revenue (incl. state funding)



Revenue from national clients



Revenue from international clients

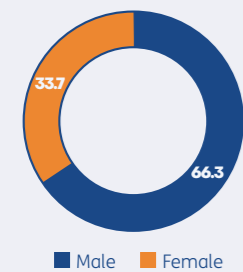


State funding and contracts from business and government

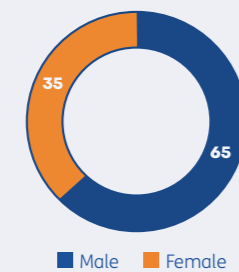


Key figures for employees 2023

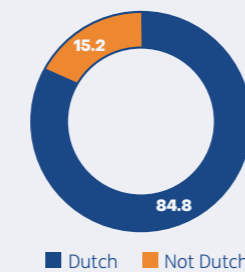
Male/female ratio. (total) in %



Male/female ratio top TNO in % (SB, EB and 1st echelon)



Nationality (63 nationalities) in %



Number of employees



1.2 – Types of research & funding

TNO develops knowledge by carrying out Early Research Programmes (ERPs) and Shared Research Programmes (SRPs). This precompetitive and public-private knowledge development, co-financed by state funding, focuses to a great extent on research areas identified in the Dutch government’s Mission-driven Top Sectors and Innovation Policy. The accumulated knowledge forms the basis for solutions to client queries. We find these solutions through Contract Research and Technology Transfer.

Contract Research is involved if questions from clients and partners concern specific, potentially competitive applications of TNO knowledge and where there is customisation. This can also take the form of recommendations or consultancy. This type of research is paid for entirely by the client. In this way, knowledge developed by TNO is brought to market through its clients’ products and services. In Technology Transfer, TNO brings knowledge to the market by setting up spin-offs and by leveraging its 900 or so active patent families in the form of licenses to existing companies.

Programming TNO’s knowledge (intellectual capital)

The agenda and programming of knowledge development at TNO are created through close coordination with partners and clients and are based on national and international (European) policy and on statutory tasks, such as the Geological Survey of the Netherlands. This forms the basis of our knowledge development.

Propositions

TNO manages the strategic programming of research through a portfolio of propositions distributed across the units. Propositions are logical combinations of offerings and capacities, with the unique promise of adding value for clients in the relevant market. The propositions set out the social and economic impact of the intended product/market combinations, the required investments in technologies and methodologies, the mix of funding sources, and the research facilities needed.

Early Research Programmes (ERPs)

With the Early Research Programme (ERP), TNO renews and maintains its knowledge, focusing on intensive collaboration with knowledge partners and stakeholders. The ERP focuses on urgent issues with high societal and economic potential and a value increase of the TNO position through contract research, licenses, and spin-offs.

For the purpose of developing, applying and disseminating knowledge, TNO obtains its funding from a number of sources.

- Institutional funding: funds made available by the Dutch government. The Early Research Programmes and Demand-Driven Programmes, among others, are funded this way. Total in 2023: €202 million.
- Programme funding: earmarked funds from various ministries, including the statutory public tasks for the Ministry of Infrastructure and Water Management and the Geological Survey of the Netherlands. Total in 2023: €138 million.
- Competitive funding: contributions from partners in collaborative projects, including EU projects and large-scale public-private partnerships (Shared Research). Total in 2023: €133 million.
- Contract funding: fully external public or private funding for Contract Research. Total in 2023: €215 million.
- Management and the Geological Survey of the Netherlands. Total in 2023: €138 million.

1.3 – TNO Research Units

Mobility & Built Environment

TNO Mobility & Built Environment is working on innovative solutions to a number of challenges at the heart of society:

- Sustainable buildings
- Safe and sustainable mobility and infrastructure
- Maritime & offshore
- Applications of digitalisation and AI in mobility and the built environment



Defence, Safety & Security

Together with our security experts, researchers, and collaboration partners, we deploy technological and behavioural innovations for a safe society. Our field of activity moves between land, sea, and air, and between cyber and space. In the Netherlands and abroad. With science and innovation at the forefront. We collaborate closely with partners such as the Ministry of Defence and the Ministry of Justice and Security, the police, the national and international defence and security industry.

ICT, Strategy & Policy

TNO ICT, Strategy & Policy (ISP) works on breakthroughs to help solve societal challenges. We do so in a multidisciplinary way by connecting stakeholders in ecosystems across and within a wide range of sectors.

We develop innovations, strategies, and policies for industry and society, to accelerate transitions and increase economic growth and wellbeing.



High Tech Industry

Dutch industry is among the world's leaders. It's essential to innovate to maintain this position and continue developing society.

Our task is to contribute to modernising industry. To this end, we use key technologies: important building blocks for achieving objectives relating to climate and digitalisation, for example.

Energy & Materials Transition

The energy and materials transitions are inextricably linked in efforts to achieve the 2050 climate goals.

TNO Energy & Materials Transition connects these transitions through applied research, knowledge, and expertise relating to technologies, circularity, business models, and legislation and regulations. This is how we come up with customised advice and solutions.



Healthy Living & Work

Together with governments, knowledge institutions, and companies, TNO Healthy Living & Work develops social and technological innovations that promote good health and availability for work in people.

With knowledge and expertise in the fields of youth, work, biomedical health, and lifestyle, we work on health, health technology, and personalised health interventions. This results in a healthy, fit, and productive population, as well as reducing national healthcare costs and boosting economic growth.

2. Mobility & Built Environment

2.1 – A liveable future for all

Our society is collective, regardless of demographics, income, address, or personal circumstances. Challenges like climate change, resource scarcity, and population growth affect everyone. As we work to enhance our living environment, we must consider how our actions impact society at large. Mobility and Built Environment (MBE) prioritises creating a liveable future for everyone while developing essential structures and functionalities.

The concept of a ‘living environment’ encompasses our homes, workplaces, transportation systems (including vehicles, trains, and ships), green spaces, biodiversity, and infrastructure like roads and bridges. MBE not only seeks to enhance our current living conditions, but also focuses on ensuring that today’s innovations contribute positively to future communities. This approach ensures our solutions are sustainable for the long term.

2.2 – Three preconditions, one vision

At MBE, we use our expertise to cultivate collaborations for a sustainable living environment. We provide advice to businesses and governments regarding both the big picture and the details that matter. So they can be as well-informed as possible as they make the crucial decisions that will impact our collective future.

Our approach emphasises safety, sustainability, and efficiency in all solutions. Through innovation and integration of knowledge, we create opportunities that align with societal goals, fostering a more balanced future. We enable solutions that contribute to a multitude of agreed objectives. And we provide the building blocks for a more balanced society. MBE will continue to work under the three preconditions, develop and validate the solutions society needs, and contribute to our ‘Three Zeros’ vision: Zero Calamities, Zero Emissions and Zero Loss* (of resources, time, opportunities, or people).

2.3 – Addressing the complexity

But how do you change a system from within? How do you improve a living environment we all share? And how do you address the intertwined interdependencies, interests, and insecurities of a variety of stakeholders? This complexity is precisely the reason why MBE’s contribution is so essential. As an independent, trusted organisation for applied scientific research, we are uniquely qualified to answer stakeholders’ tough questions. We can provide integral, fact-based answers like no one else can. So stakeholders can make optimal decisions. Decisions that not only meet our sustainability and efficiency objectives, but also ensure that no one is left behind.

2.4 – Unique expertise for a common goal

From sustainable building materials to predictive infrastructure maintenance to optimal logistics. From more efficient electric vehicle batteries to smart public transport systems that make cities more accessible. From ecology to economy. From prototypes to policies. MBE develops and integrates unique areas of expertise to find the optimal balance between safety, sustainability and efficiency in our living environment, so we can maximise our contribution to a liveable future for all.

2.5 – Propositions

Our work is guided by 7 propositions, which are driven by market needs and external developments – based on our distinctive expertise – and they often need a multidisciplinary approach at system level.

<p>Our propositions & their market segments</p>	<p>Safe & efficient mobility Automotive, logistics, government</p> 	<p>Sustainable mobility Automotive, non-road mobile machinery, government</p> 	<p>Liveable & resilient cities Asset owners, government</p> 
	<p>Safe and sustainable maritime & offshore Maritime, government</p> 	<p>Safe & resilient civil infrastructure Construction, asset owners, government</p> 	<p>Circular & industrial construction Construction & installation asset owners, government</p> 

TNO science in action



CEVAS Automated trailer mover



Innovation center for smart mobility - Mobility Applied Research Quarter (MARQ) Helmond, The Netherlands



TNO and Torc Robotics collaborate to use real-world data for autonomous truck validation

TNO innovation for life



Single cylinder research engine, Powertrains Test Center Helmond



MAGPIE: Automated ecosystem for container transshipment



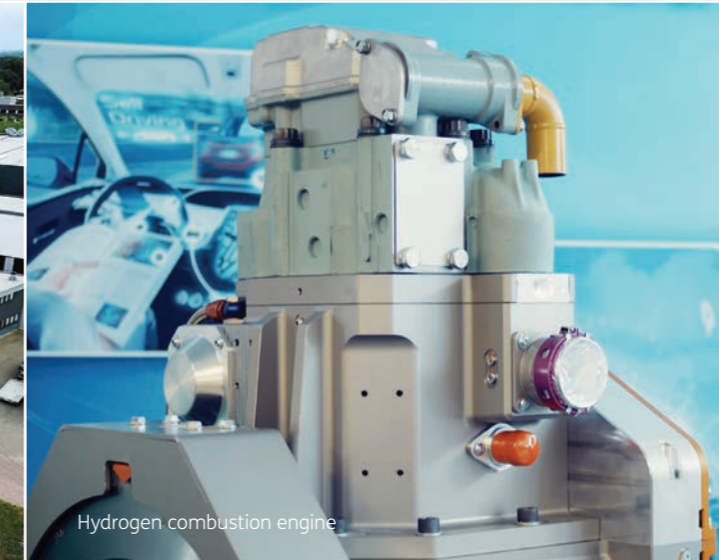
Goodyear-TNO enhance ABS with tyre information



TNO Autonomous driving



Powertrains Test Center Helmond



Hydrogen combustion engine



Digital city twin of San Diego, USA

3. Introduction TNO APAC

3.1 – TNO as international knowledge partner

Exponential population growth, intense urbanisation complexities and the intensified impact of climate change, combined with prosperous economic and dynamic geopolitical developments, makes innovation and technological advancement a necessity to future proof the Asian Pacific (APAC) region. This makes certain organisations in the region excellent knowledge partners for **TNO's vision towards the Three Zeros: Zero Calamities, Zero Emissions and Zero Loss**. In APAC, TNO recognises many topics of mutual interest, and similar if not higher urgency, to tackle the challenges of tomorrow.

As a leading research organisation in the Netherlands, TNO has a longstanding tradition of partnering with international organisations to drive technological advancements and address societal challenges. Our successful collaborations have spanned various domains, including healthcare, high-tech and energy. In the realm of Mobility and Built Environment, TNO aims to accelerate technological advancements and foster innovation in areas such as Automated Driving, E-Mobility, Sustainable Powertrains, Battery technology and Predictive Digital Twins for strategic urban planning & design.

TNO has dedicated its research efforts to understanding the impact on the wellbeing of society, by focusing on measures such as to enhancing safety, redistributing accessibility, improving affordability, and reducing exposure to environmental pollutants. In doing so, TNO and our international partners support cities, and thereby millions of people around the world, by making the complexity of urban transitions manageable. It's TNO's mission to combine our expertise with knowledge and propositions of our international partners into tailor-made, localised, comprehensive solutions.



Self-driving vehicles, electric buses, mobility as a service; how do we bring these disruptive technologies into our daily lives in a sustainable, efficient and safe manner?

TNO stands out for its dual role in propelling technological innovation in close collaboration with industry partners on one hand and guiding successful market deployment on the other, by advising policymakers on the required standards, legislation and infrastructure.

The Asia Pacific region provides a unique exposure and opportunities to accelerate disruptive technology that offers solutions for our urbanised society.

Through the creation of a 'knowledge bridge' between the Netherlands and the APAC region, TNO aims to cultivate reciprocal alliances grounded in mutual interest.

With over 10 years of experience in the APAC region, my mission is to initiate strategic collaborations among public, private, and academic organisations in Asia and the Netherlands. I am deeply passionate about cultivating impactful partnerships through technology and innovation. Let's work together on the sustainable wellbeing and prosperity of our nations and society.

Ronnie van Munster
Regional Director Asia Pacific



3.2 – Key areas of interest in APAC

TNO APAC organisation consists of 3 offices: Singapore, Tokyo (Japan) and Seoul (South Korea). In these countries we recognise the importance of enabling technologies and transitions that heavily impact the future sustainability, liveability and safety of our cities.

With our partners in the APAC region:

- TNO gains access and understanding of uniquely intense, urgent urbanisation challenges and potential scenarios and solutions to issues we will face more and more in the Netherlands in the years to come, such as ageing population, congestion, energy transition, impact of climate change and social equity. Through the joint-development and localisation of state-of-the-art predictive digital twins, successfully deployed in the Netherlands, we continue to future-proof our cities.
- We recognise the importance of innovative methodologies, such as a scenario-based safety assessment framework for automated vehicles, to develop new legislation to enable large-scale deployment of disruptive, new mobility technologies on the public road.
- We have access to a vast and innovative automotive industry in which the demand for expertise drives the acceleration of many key enabling technologies, such as Powertrains, Yard Automation, Connected Cooperative Driving, H2-ICE, Modular Energy Management, Battery Management, and Fuel Cell Technology.
- We see a pressing need to accelerate the development of sustainable powertrains, battery technology, and alternative energy sources. These advancements are essential for achieving international climate goals and directly impact the sustainability of the car fleet, not only in the Netherlands and the EU but also globally.



3.3 – Vision

To develop a knowledge bridge that fulfils strategic collaboration between TNO and organisations in the APAC region, that enables key technological advancement and foster innovation to future-proof our knowledge position, thereby improving the competitiveness of our partners and realising a more sustainable, liveable and safe society.

Mission

It's TNO's mission to combine our expertise with knowledge and propositions of our international partners into tailor-made, localised, comprehensive solutions.





Liveable & resilient cities

How do aspirations for sustainable wellbeing and digitalisation impact urban mobility in the city and the metropolitan area? With integrated digital twin models and a state-of-the-art platform, TNO turns data of local partners into insights, making the complexity of choices in urban planning manageable.

With approximately 70% of the world's population residing in urban areas by 2050, the pressure on public space is increasing. Cities face the challenge of accommodating various activities such as housing, recreation, transportation, retail, and production while striving to meet societal goals. At the same time, urban mobility is undergoing rapid transformation due to digitalisation, electrification, and automation.

Unlocking local insights

TNO empowers cities, knowledge institutes (such as universities), and private stakeholders to construct interactive, comprehensive, and predictive digital twins of cities. Through this technology, TNO harnesses the knowledge of local partners to generate valuable insights for urban planning. These insights and models are integrated into the Urban Strategy platform, creating

a global network of urban planning expertise accessible to our partners.

Powerful platform for scenarios

TNO possesses unique expertise in connecting diverse data models to enable ultrafast interactions, surpassing state-of-the-art capabilities by a factor of 1000. This enables cities to gain real-time insights into the impacts of new urban developments, modifications in road infrastructure, and public transportation systems. Our partners conduct simulations and tests on aspects such as accessibility, air quality, noise levels, and overall liveability, among others.

Large-Scale Micro Simulations

The Urban Strategy platform is continuously evolving, incorporating new models such as those for urban heat and the integration

of electric buses. Moreover, the underlying technology itself is advancing. An exciting breakthrough that introduces a myriad of new urban planning applications is Large-Scale Micro Simulations (LSMS). TNO has successfully integrated the unique behaviour of thousands of individual vehicles into Digital Twin models, enabling much more precise and detailed decision-making. For instance, by focusing on specific road sections, it becomes feasible to enhance traffic flow through the optimisation of traffic light patterns. Another promising application domain of LSMS is the optimisation of V2X (Vehicle to X) communication, facilitating interaction between vehicles and the infrastructure.

Use-cases

Amsterdam

TNO entered into a strategic partnership with the municipality of Amsterdam for integrated mobility planning. The Digital Twins are used to quickly calculate the effects of traffic measures, for example in terms of noise, traffic flow and air quality. The platform is also used to consider shared mobility solutions, and for planning maintenance of bridges, quays and road tunnels in the city.

Delhi

With the combination of newly observed freight, fleet and trip characteristics, as well as socioeconomic and land use data, a four stage model was implemented using Urban Strategy. The model was applied to evaluate several transport policies, such as freight hubs and entry restrictions.

Singapore

To reduce emissions, Singapore will electrify half of the bus fleet by 2030 and achieve a 100% cleaner energy bus fleet by 2040. To optimise this transition, a Digital Twin of the (electric) bus system was developed using Urban Strategy, providing insight in the trade-offs between different solutions, technologies and operating strategies.



Safe & efficient mobility

TNO is recognised by OEMs and TIERS worldwide as a valuable knowledge partner with unique expertise, tools, and facilities to promote safe and efficient mobility. Our activities focus on improving the safety of vehicles, including the development and assessment of Advanced Driver Assistance Systems (ADAS) and Automated Driving Systems (ADS).

Globally, government and R&D agendas are increasingly focusing on the development of smart mobility ecosystems, prioritising digitisation and automation to achieve objectives such as ‘zero casualties’ and ‘zero loss.’ TNO occupies a unique position in this landscape, driving technological innovation while also guiding market implementation. TNO advises policymakers on the implementation and use of necessary harmonisation, (safety) standards, legislation, and infrastructure to support the advancement of smart mobility and automated driving solutions.

Expertise areas:

- Connected mobility
- Automated yards
- Connected & cooperative
- StreetProof
- StreetWise
- Automated logistics
- Self-organising logistics
- Sustainable logistics

“Practical scenario-based safety assessment methods are essential for the safe deployment of Automated Driving on a large scale. The StreetWise method is generically applicable and serves a large variety of domains and use cases: from Automated Lane Keeping Systems in passenger cars and hub-to-hub autonomous trucks on highways, to automated tractors at the airside of airports”

Olaf Op den Camp,
Senior Consultant Vehicle Safety Assessment Methodologies, TNO

“We have 17 years of experience in safety systems for self-driving vehicles, and our technology is designed with safety in mind. We try to mimic the driving behaviour of the safest, most experienced drivers. We use TNO’s StreetWise methodology as the basis for our safety validation. TNO understands our needs and offers us support in implementing and scaling up this methodology”

Axel Gern,
Senior Vice President of Engineering & Managing Director, Torc Europe

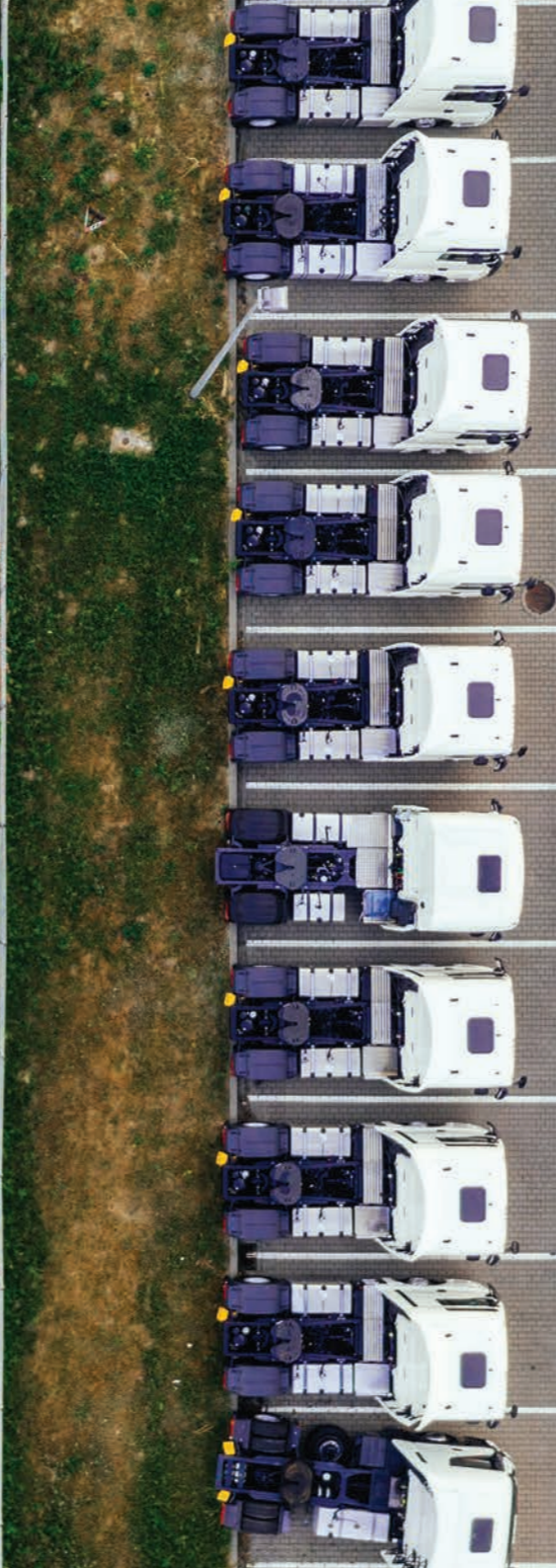


MARQ, open research centre for smart mobility

To develop advanced, integrated mobility solutions where connectivity, digitalisation, and automation play central roles, cooperation and innovation are essential. MARQ is TNO’s brand-new innovation and applied research centre for smart mobility, in collaboration with the Province of Noord-Brabant and the city of Helmond, in the Netherlands. MARQ provides partners with the opportunity to develop and test smart mobility solutions under optimally controlled ‘real-life’ conditions. With MARQ, TNO offers its collective knowledge, advanced test and research facilities, and simulation models in a user-friendly innovation and research centre. Its open nature fosters collaboration and the sharing of knowledge and resources among partners.



Sustainable mobility



At TNO, our mission is to advance towards a sustainable society by guiding governments and businesses in transitioning to a climate neutral mobility system. Leveraging our independent role, we assist industries in developing competitive low-emission technologies and support governments in crafting effective policies to promote the uptake of sustainable transportation solutions.

To meet global climate objectives, the mobility sector must adhere to increasingly stringent emission standards. TNO supports industry partners in transitioning towards future-proof, environmentally sustainable mobility solutions by refining powertrain technologies tailored for specific heavy-duty applications. From fuel cell trucks for emission-free logistics, to battery powered construction equipment, we assist industry partners, regardless of size, with R&D to devise feasible, sustainable solutions. Our development of an H2 Internal Combustion Engine, for instance, is a promising option to drastically and quickly reduce CO2 emissions of heavy-duty equipment, using trusted technology.

Unique dual role

TNO has a unique, neutral position when striving for a future with environmentally sustainable traffic and transport. For this goal we fulfil a dual role of on the one hand supporting governments with the

development of effective zero emission strategies and policies, and on the other hand aiding industry partners on how to interpret and meet future emission regulations.

Advanced innovation facilities

TNO's Innovation Centre for Sustainable Powertrains (ICSP) measures, assesses, and validates actual energy consumption and emissions of engines and powertrains. Our experts deliver fact-based information and monitor the effectiveness of emission legislation. At the same time we help the industry with the development of new cost-effective sustainable propulsion technologies and heavy-duty applications. For real-world validation of vehicles, TNO offers unique testing facilities such as the Altitude-Climate Chamber, capable of mimicking any driving condition on earth for any type of powertrain. Furthermore, the ICSP has a leading position in the development of H2-ICE and battery technology,

and is fully equipped to test hydrogen vehicles.

Real-world emission performance

Our Vehicle Emission Lab is focused on accurately measuring real-world vehicle emissions. Lab measurements are complemented by on-road emission tests using the Portable Emission Measurement System (PEMS) and Smart Emission Measurement System (SEMS). The acquisition and interpretation of recorded real-world data are essential for accelerating the energy transition.

“The mobility sector has the opportunity to demonstrate that powertrain innovations, combined with effective legislation, can truly make a difference in improving air quality and achieving climate-neutral mobility”

Merle Blok,
Proposition Manager Sustainable Mobility

Our expertise areas

Hydrogen Fuel Cell Solutions

Supporting the robust, efficient and reliable application of fuel cell powertrains.

OptiBatt

Aiding industry partners with improved lifetime of batteries and fuel cells and reduced development time and costs.

Modular Energy Management Strategy

Creating a software platform that enables industry partners to maximise powertrain efficiency of different vehicle configurations to reduce energy consumption.

Real-world emission

Measuring real world emissions, both tailpipe and non-tailpipe, including tyre and brake emissions.

Towards Zero CO2 Mobility

Policy advisor for realising a climate neutral mobility system in an effective way that is justifiable from a societal and environmental perspective.

H2 Internal Combustion Energy

Developing a cost-efficient hydrogen alternative to the diesel combustion engine and all other technologies.

Contact

Ronnie van Munster

Christianna Tsomidou

Regional Director APAC

APAC Coordinator

✉ ronnie.vanmunster@tno.nl

✉ christianna.tsomidou@tno.nl

in <https://www.linkedin.com/in/rvmunster/>

in <https://www.linkedin.com/in/christiannatsomidou/>

TNO aims to develop a knowledge bridge that fulfils strategic collaboration between TNO and organisations in the APAC region, that enables key technological advancement and foster innovation to future-proof our knowledge position, thereby improving the competitiveness of our partners and realising a more sustainable, liveable and safe society.

All rights reserved.

No part of this publication may be reproduced and/or published by print, photoprint, microfilm or any other means without the previous written consent of TNO. In case this report was drafted on instructions, the rights and obligations of contracting parties are subject to either the General Terms and Conditions for commissions to TNO, or the relevant agreement concluded between the contracting parties. Submitting the report for inspection to parties who have a direct interest is permitted.

© 2024 TNO

tno.nl