

CAMPUS  
GRONINGEN

showcase

# Renewable Energy

Discovering hydrogen in  
the Northern Netherlands

Concept, April 2023

Concept document on the occasion of  
the opening of Plus Ultra Groningen.  
This document is work in progress,  
feel free to let us know if you have any  
suggestions.

## Preface

**It all starts here at Campus Groningen. This is where we build the world of tomorrow together. Where ideas emerge and travel across the region and beyond. Campus Groningen is the innovative capital of the Northern Netherlands. For startups, for innovative companies, for talent, for high-tech industries, for research and development in Healthy Ageing, Sustainability and the Energy Transition.**

Campus Groningen facilitates and accelerates collaborations between educational institutions and innovative companies. Connections are made between research, education and businesses every day. Campus Groningen is where intended and unintended encounters lead to the discovery, (re)combination and sharing of knowledge. This then leads to inventions, new companies and innovations. In less than six years, Campus Groningen has grown from a blooming young campus to one of the largest and most developed campuses of national importance that hosts **250 companies, three knowledge institutions** and more than **50.000 students**.

Campus Groningen approaches the region's core sectors (chemistry, agri-food, health, energy & digitalisation) from multiple angles. On Campus Groningen, we consider the needs of the world and go beyond our areas of expertise to work together. Our university prides itself on offering an exceptionally wide range of subjects and providing an internationally renowned science and engineering program. The university of applied sciences boasts a top-ranking on global charts in entrepreneurship. Our University Medical Center is accomplished in research and healthcare. With an abundance of vigour and innovation we have a representation throughout the whole chain; from research to industry to access to the clinic. The greatest strength of our Campus lies in the willingness and desire of all the involved parties - companies, educational institutions, local authorities - to truly work together.

When it comes to energy and the energy transition, the Northern Netherlands offers enormous opportunities and possibilities for the companies, talent, the new generation and authorities to make a difference. **The transition to sustainable energy is one of the greatest challenges of our time.** It can only become a reality if we work together. That is why the Campus is embedded in regional, national and international networks, and we join forces of entrepreneurs, researchers, students, policy makers and citizens. The Campus ecosystem moves forward by sharing knowledge, working together and strengthening each other. We invite firms of all sizes and backgrounds to explore the opportunities for collaboration and investment that we offer, and join us in building a more sustainable and prosperous future. In this document you can find an overview of how we work together in regard to energy(transition).



**Edward van der Meer,**  
Director Campus Groningen

This bidbook is supported by

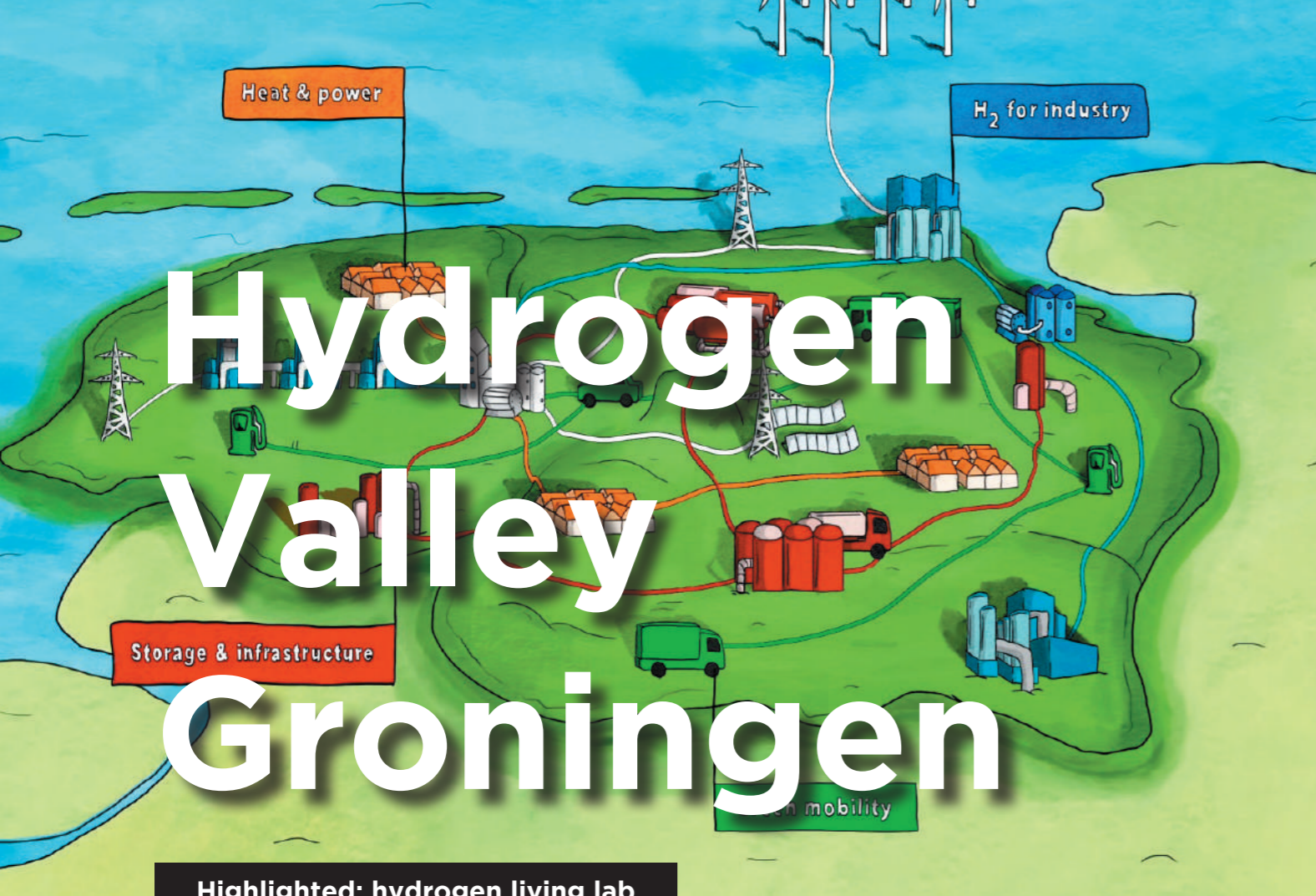


Image: Hydrogen Valley

**Green Hydrogen is now globally considered to become a key element in the energy system of the future. Early on, the Northern Netherlands region was identified as the perfect living lab for developing a fully functioning hydrogen chain due to the availability of major infrastructure (gas distribution network, deep sea port, industry clusters), together with embedded knowledge and know-how, political will power and sense of urgency.**

The Northern Netherlands Hydrogen Valley was born from HEAVENN, one of the showcase projects from the New Energy Coalition. It is a large-scale programme of demo projects bringing together production, distribution, storage and local end-use of hydrogen (H<sub>2</sub>) into a fully-integrated and functioning 'Hydrogen Valley', that can serve as a blueprint for replication across Europe and beyond. This Hydrogen Valley was the first of Europe's hydrogen valleys, now serving as an example for many international hydrogen valleys to follow. It was recently elected EU Hydrogen Valley of the year.

## Preface



**Being at the forefront of the energy transition is an exciting place to be. Yes, ultimately we are, all of us being lead by (geo)political agenda's, and it is a rocky road we are travelling. But it is up to us to always keep the eye on the ball, so to say. And that is exactly what is going on at Campus Groningen.**

The New Energy Coalition was founded based on Groningen's sense of urgency for a new energy future: as the Groningen natural gas fields are closing down we found a new perspective for the region putting the acquired knowledge, energy infrastructure and political will to use for the energy transition. With an increasing focus on hydrogen production, application and distribution. After all, we are the proud architects of the first EU acknowledged Hydrogen Valley.

Act local, think global: not a week goes by without us hosting visits by government officials, entrepreneurs and academia from around the globe who want to see the energy transition taking shape on campus and hear about our region's endeavours. We work closely with federal states in Germany, with the Nordic and other North Sea countries, and in European projects to acquire and exchange knowledge.

On campus, we are located in the Energy Academy Europe-building where, together with our partners we created a hub for energy research and education. Where we can operate as their linking pin to markets, daily practice and society. With the EnTranCe field lab facility a stone's throw away where innovations are being tested and developed, where the energy transition is actually taking place. With a flourishing community of entrepreneurs, developers, researchers, educators and thousands of students. An all-inspiring environment that is buzzing, filled with anticipation, working together on a carbon-free future.

It is with great pleasure that I present one of our highlight activities to you, and you are cordially invited to explore further online ([newenergycoalition.org](http://newenergycoalition.org)). Better still, I would advise you to visit Campus Groningen and experience the buzz yourself!



**Marieke Abbink,**  
CEO New Energy Coalition

### About us

New Energy Coalition is a continuously growing network of some 150+ partners and members: education and research institutes, industry and business partners, government bodies and ngo's working together to accelerate the energy transition for a sustainable future. In international projects we cooperate with up to 500 partners. We are rooted in the northern region of the Netherlands. This area has quite a history as the energy supply region for the Netherlands and beyond. With a track record in energy transitions - right here, 60 years of natural gas extraction, exploitation and distribution was developed and conducted. Groningen's deep sea port is the entry and distribution point of North Sea windpower. Here is where the energy is. As a result, a wealth of energy knowledge is embedded within the region and a strong energy infrastructure is part of the landscape. From that position we and our partners work on energy innovations, research and development and education. Focusing on the renewable and sustainable energy system of the future, this region is a living lab, with an (inter)national scope. This is reflected in the strong energy-related profile of Campus Groningen - it couldnot be anywhere else. **Together we are the drivers of change.**



### Access to a unique ecosystem

### An innovative location

Campus Groningen is the place for innovation, research and entrepreneurship. It is the fastest growing campus of the Netherlands with 250 companies, 3 knowledge institutes, 50.000 students and more than 23.500 jobs.

### Access to Real Estate

Space to start, to grow, and dream big



### Access to Talent & Human Capital

70.000 students in Groningen / 50.000 students on Campus Groningen

### Access to Research & Education

### Access to Funding

Access to funding is essential for growth. Campus Groningen and the Northern Netherlands have various options and facilities to this end.



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& more ..



## 1.1 Climate change & hydrogen

**The world is facing a pressing challenge: climate change. The increasing levels of greenhouse gases in the atmosphere, caused mainly by human activities such as burning fossil fuels, have resulted in rising temperatures, more frequent extreme weather events, and other negative impacts on the environment, economy, and society. In response, countries and regions around the world are committing to reduce their carbon footprint and transition to a low-carbon and sustainable future.**

One of the key solutions to this challenge is the transition to a renewable energy system, which harnesses natural resources such as sunlight, wind, and water to produce clean and reliable energy. A promising enabling technology is Hydrogen, which can be used as a clean fuel and energy storage medium. Hydrogen has the potential to transform various sectors, from transportation to industry to power generation, by replacing fossil fuels and reducing emissions. In this brochure, we will showcase the resources and capabilities that are present within the ecosystem of Campus Groningen, in the field of renewable energy and Hydrogen, and demonstrate how we can contribute to the global effort to combat climate change.

## 1.2 Regional motivations & actions

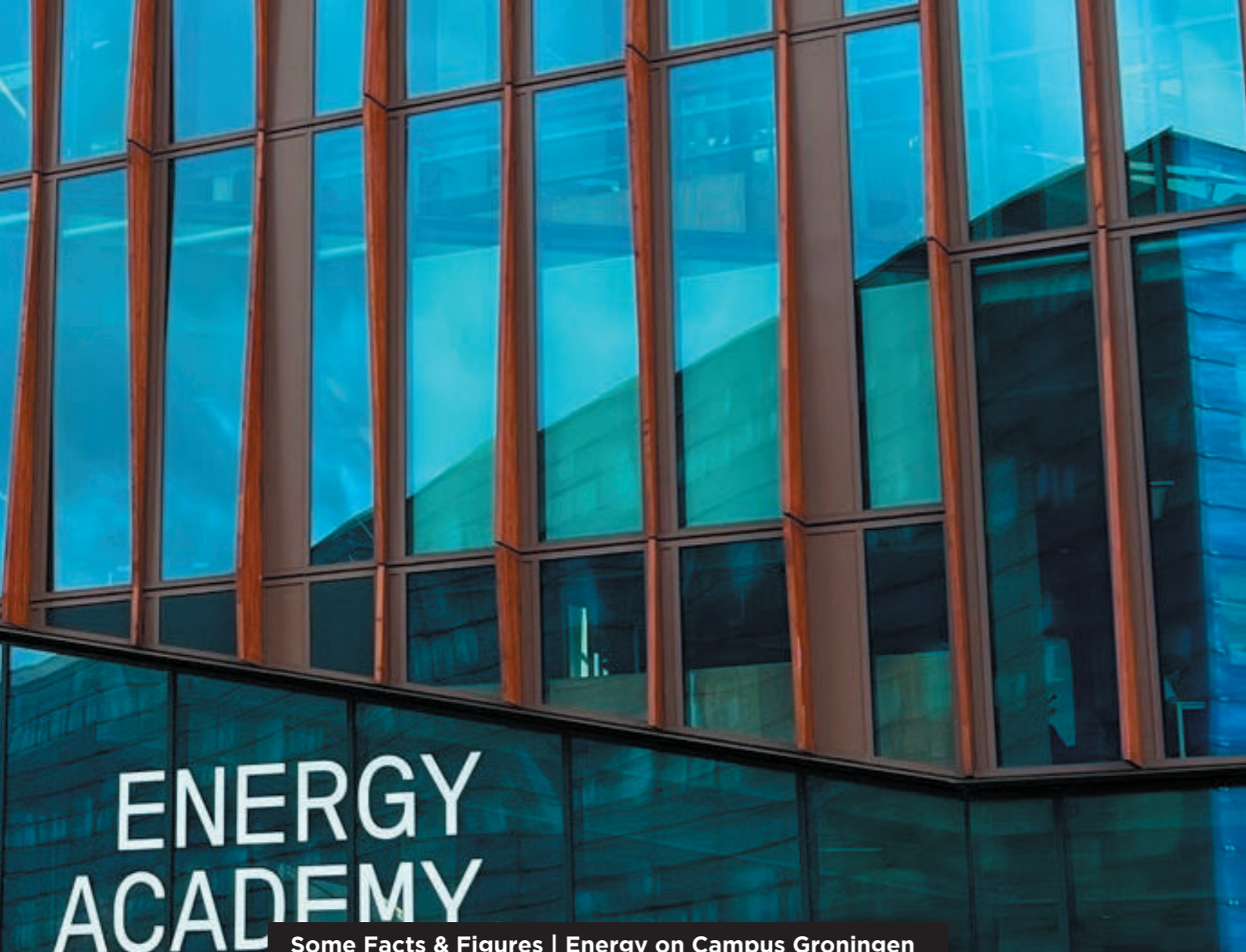
**The north of the Netherlands is a region that is highly motivated to become a leader in sustainable energy. The region has a strong legacy in energy, with a history of natural gas production that has provided prosperity to the region and the nation for many years. However, this legacy also brings a responsibility to transition to a more sustainable energy system that takes into account the risks and challenges of climate change. The region has recognized this challenge and is taking significant steps to move towards a low-carbon future.**

The region recently announced a major milestone in its efforts to become a global leader in renewable energy. The world's largest green hydrogen plant will be built in the North Sea above Groningen, with the capacity to produce up to -800,000 tonnes of green hydrogen per year. The project will involve the installation of offshore wind turbines to power the electrolyzers that will produce the hydrogen, and will be developed by a consortium of partners including Shell, Gasunie, and Groningen Seaports.



01.

Introduction



# ENERGY ACADEMY EUR

## Some Facts & Figures | Energy on Campus Groningen

**New Energy Academy** provides extracurricular courses and activities from a wide variety of perspectives: business, science, politics, law, society and spatial planning. Open for anyone with an interest in energy: students, (young) professionals, researchers, etc.

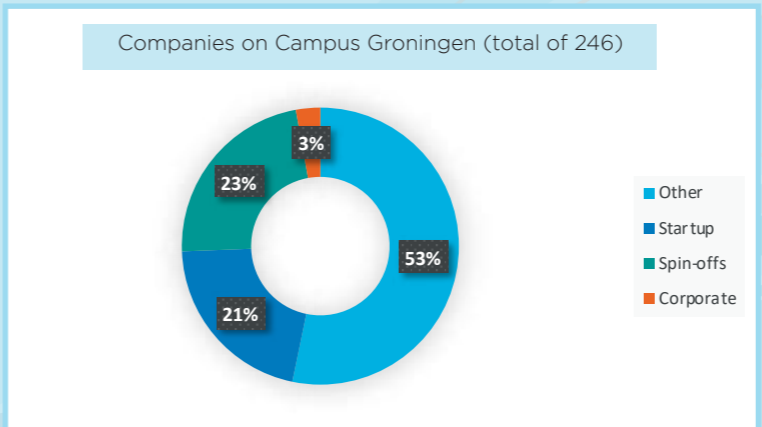
**2017.** The building Energy Academy Europe wins the international BREAAAM Award. Its smart design will keep its energy requirements low; the building will even be able to produce more energy than it uses. The Energy Academy Europe building is the most sustainable educational building in the Netherlands.

In the past years a growing energy curriculum is being developed at both Hanze University of Applied Sciences and University of Groningen (UG). There were **199 Hanze UAS** minor students and **60 UG minor students** at the New Energy Academy.

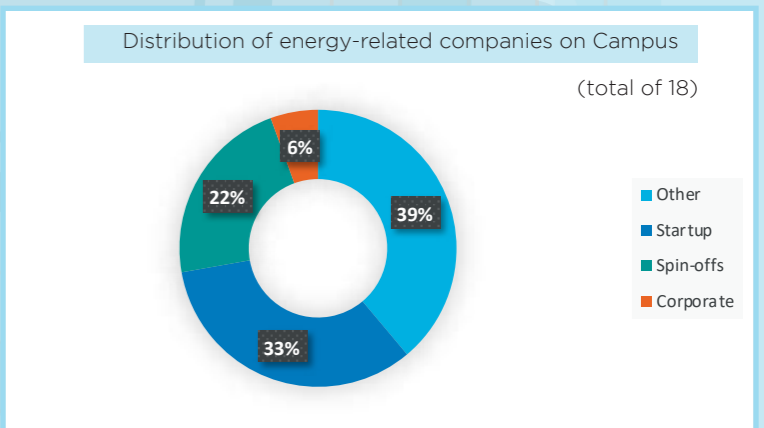
Moreover, ITM Power has collaborated with Gasunie to build a 1MW green hydrogen electrolyzer plant in the north of the Netherlands, which was opened by the king Willem-Alexander on 26 June 2019. The facility has the capacity to convert 1 MW of green electricity into green hydrogen, and will be used for industrial and transportation applications in the region.

This project represents a significant opportunity for the region to showcase its expertise in the field of hydrogen and attract more investment and collaborations from national and international firms. On Campus Groningen you can find influential organisations that play a critical role in driving the transition to renewable energy and hydrogen.

With its world-class knowledge institutions, innovative companies, and collaborative and supportive ecosystem, **Campus Groningen is uniquely positioned to offer expertise and resources that help new initiatives and companies of all kinds to succeed in the fast-evolving energy landscape.**



**31,391 sqm**  
Total number of m2 floor area for buildings with energy-related activities



**Amongst others, partners on Campus Groningen include DNV, TNO, Demcon, Avebe, VDL, Warmtestad, and EnTranCe. These collaborations highlight the unique set of capabilities and resources and contribute largely to the campus's innovative ecosystem.**

## 2.1 An innovative ecosystem

**Campus Groningen is proud to host world-renowned partners with organizations such as DNV, a multinational firm that has chosen to open their Technology Centre Groningen on Campus Groningen.**



**DNV** is a leading provider of renewable energy consultancy, pilot/demo and certification services and is committed to stimulate the energy transition. Their presence on the campus provides unique opportunities for collaboration and knowledge sharing between industry and academia.

At their location in the Plus Ultra Groningen building, DNV provides a range of services related to renewable energy, including feasibility studies, project development support, technical due diligence and technology qualification. This partnership demonstrates the high level of expertise and resources available on Campus Groningen for initiatives and companies looking to develop and implement renewable energy technologies.

DNV is an independent assurance and risk management provider, operating in more than 100 countries, with the purpose of safeguarding life, property, and the environment. As a trusted voice for many of the world's most successful organizations, the company helps seize opportunities and tackle the risks arising from global transformations. DNV uses their broad experience and deep expertise to advance safety and sustainable performance, set industry standards, and inspire and invent solutions. DNV has established its Technology Centre Groningen Campus Groningen, specifically in the Plus Ultra Groningen building.

The energy market today is a complex landscape to navigate. All players across the energy industry, including hard-to-abate sectors, need to create and implement safe and futureproof decarbonization pathways. However, significant challenges to progress remain – from social, investor and lender pressure to selection and qualification of technologies. How do you make the right choices with confidence as the energy transition accelerates?

As a global organization with in-depth knowledge of the energy industry and a strong local footprint and track record in Europe, DNV's Technology Centres help customers to understand and navigate the complexity of decarbonizing with trust. DNV provides assurance by qualifying and applying innovative technologies and new ways of working in a safe, cost-effective and sustainable way.

DNV's presence on Campus Groningen has allowed the company to establish a strong network of partnerships and collaborations with other organisations on the campus, as well as with the wider community in the region and DNV connects its international customer base to the knowledge intensive Groningen region.

# 02.

## An entrepreneurial ecosystem

# Tomorrow's energy

## Highlighted: Regional collaboration

Image: Plus Ultra Groningen

**One of DNV's main activities on Campus Groningen is focused on supporting the development of sustainable energy solutions. The company works closely with research institutes and startups in the region to develop and qualify innovative technologies and business models that help to reduce carbon emissions and increase the use of renewable energy sources. DNV also participates in a number of initiatives aimed at promoting entrepreneurship and innovation on Campus Groningen. The company has partnered with EnTranCe and other organizations on the campus to support the growth of startup companies and provide mentoring and guidance to entrepreneurs. Coordinated by New Energy Coalition, DNV partner of the Dutch hydrogen research consortium HyDelta.**

Through these partnerships, DNV has helped to foster a culture of innovation and entrepreneurship on Campus Groningen, which has attracted a diverse range of companies and organizations to the region. Johan Knijp (site manager DNV Groningen) says: "We help industries and governments to navigate the many complex, and interrelated transitions taking place globally and regionally, in the energy industry. We drive standardization and innovation by bringing industry players together in joint industry programs to develop new technologies, recommended practices, and standards. Many of our testing and research programs focus on the use of sustainable gases, such as biogas and hydrogen. We are working with local and international parties on the energy world of tomorrow. The Campus Groningen is a perfect place for us to work together with academia, start-up community and at the same time have a strong position in the international energy landscape.

The Northern Netherlands has been designated by Brussels as Europe's first 'Hydrogen Valley'. The region has everything it needs to become a leader in energy transition. DNV will make its contribution to this with investments in new and innovative test facilities and laboratories. Focus of the DNV Technology Centre Groningen is on decarbonizing the gas value chain, low carbon solutions and new energies. Hydrogen plays a prominent role in the current activities. New technology will be developed and tested together with customers. The company's focus on sustainability, innovation, and healthcare aligns well with the strengths of the region, making Campus Groningen an attractive location for companies looking to tap into these areas of expertise.

## TNO innovation for life

TNO is a Dutch research organisation that specialises in applied sciences and technical innovation. TNO has a strong presence on Campus Groningen, with a research facility dedicated to

sustainable energy and the circular economy. TNO's research on Campus Groningen focuses on a range of areas, including the development of sustainable energy solutions for buildings and transportation, circular materials and waste management, and the use of data and digital technologies to optimise energy systems. TNO's expertise in these areas makes it an ideal partner for companies looking to develop innovative solutions to sustainability challenges.

TNO has decided to also move into the new Plus Ultra Groningen building on Campus. Erik Peeters, Director of Operations TNO ICT unit: "The Zernike Campus has quickly developed into a centre for economic development at the intersection of research, education and entrepreneurship. The relocation of our facilities therefore offers us the opportunity to strengthen the collaboration with the University of Groningen (RUG), Hanze University Groningen and the ICT and energy parties located there. The move also brings the TNO office within walking distance of a number of initiatives in which TNO participates, such as the 5 Groningen living labs, BuildinG and the HESI lab."

## DEMCON

DEMCON is an engineering and innovation firm that specialises in high-tech systems and medical devices. Demcon has a presence

on Campus Groningen and is located in the Innovation Center Chemistry & Engineering on Campus Groningen. The transition towards sustainable energy systems requires advanced solutions that are both effective and environmentally friendly. At DEMCON, they utilise expertise in systems thinking to develop complete energy systems that cover the entire energy chain, from generation to consumption. One key trend in the energy transition is the decentralisation of energy generation and storage, which has resulted in the emergence of local and regional cooperatives focused on smart energy usage. DEMCON develops decentralised solutions that promote efficient and sustainable energy systems. This includes the development of electrolyzers that convert (green) power into hydrogen and advancements in battery technology to improve storage capacity.



Avebe is a Dutch cooperative that specialises in the production of potato starch and related products. Avebe has a presence on Campus Groningen through its innovation centre, which focuses on the development of sustainable materials and ingredients. Avebe's research on Campus Groningen focuses on the use of potato

starch and other plant-based materials to develop renewable and biodegradable alternatives to traditional plastics and other materials. Avebe's expertise in sustainable materials and agriculture makes it an ideal partner for companies looking to develop sustainable products. Next to this Avebe is extracting protein from potatoes which is being used in various plant based products. Plant-based food and protein sources are gaining popularity due to their potential to contribute to a cleaner environment. Animal agriculture, which is the primary source of protein for many people, is a major contributor to greenhouse gas emissions, water pollution, and deforestation. In contrast, plant-based proteins have a much lower environmental footprint. They require significantly less water, land, and energy to produce, and generate fewer greenhouse gas emissions compared to animal-based proteins.

# Flying on green hydrogen

Highlighted: Regional collaboration

Image: project WAviatER

**The WAviatER project aims to boost the industrial hydrogen ecosystem in the Northern Netherlands by developing green hydrogen technology for the aviation sector and energy applications at a regional level. The project received a subsidy from the European Regional Development Fund (ERDF) granted by the North Netherlands Cooperation Agency. A consortium of companies from the Northern Netherlands, including Demcon, Douna Machinery Leeuwarden, JB Besturingstechniek, REDStack, Groningen Airport Eelde, New Energy Coalition, and the University of Groningen, will collaborate on the project, supported by external partners TNO and VONK.**

The first application will be developed at Groningen Airport Eelde, where an electrolyzer will be used to produce green hydrogen as an emission-free energy carrier for light aircraft, drones, and ground equipment. The goal of the consortium is to develop a scalable and sustainable electrolyzer for the airport that is cheaper to purchase, has higher efficiency, does not require scarce and valuable metals, and allows for automated series production.

Within the region, Groningen Airport Eelde is taking various initiatives to make airports and aviation more sustainable, including the existing 22 MW solar park and the Hydrogen Valley Airport project. The WAviatER project is now giving concrete shape to Hydrogen Valley Airport, and this initiative marks the first step towards an ecosystem of companies developing their own products for the green hydrogen economy. The WAviatER project is expected to provide a significant boost to the hydrogen economy in the Northern Netherlands and to position the region as a leader in the development of sustainable hydrogen technology. The partners of the consortium bring their expertise and experience in various fields to the project, and the collaboration is expected to lead to innovative and efficient solutions for the production of green hydrogen for aviation and energy applications.

# New laboratory for renewable gas

Highlighted: Energy innovation

Image: Marcel Koenis, Director Business Development (Hanze UAS). Photo by Luuk Stemers

**EnTranCe is building a laboratory on the Zernike Campus in 2023 for optimizing the production of bio- and synthetic sustainable gases. The new lab, with the provisional working name of 'EnTranCe Renewable Gas Lab', will be an experimental environment in which they develop new processes for the energy and raw materials transition. It is a wonderful collaboration between the Knowledge Center Bio Based Economy, which focuses on greening chemistry, and EnTranCe, which works on energy innovation. The University of Groningen is also a partner.**

By renewable gases we mean biogas as well as hydrogen and syngas. In the new lab, the researchers will focus on two process techniques that optimize the production of renewable gases: fermentation (also known as fermentation) and electrolysis.

Although the lab will not be ready until the end of 2023, work is already underway on a number of research projects that are being carried out in the lab. In the Fermolyse project with the Dairy Campus Leeuwarden and LTO Noord, research is being conducted into the fermentation and electrolysis of certain fertilizers and residual products from dairy production. In addition, the WAVEBE project has already been set up, a subsidy is being applied for at SIA. This project focuses on microbiological extraction of hydrogen from biomass via fermentation.

# Saving fuel costs and reduce emissions

Highlighted: start-up

Image: Clean Tech Aviation

**EnTranCe has an impressive track record in fostering innovation and entrepreneurship. EnTranCe has supported large amounts of start-ups, scale-ups, and established companies in the development of new sustainable energy solutions. An example of such a start-up is Clean Tech Aviation.**

Clean Tech Aviation (CTA) is a research and development organisation that specialises in aviation and maritime industries. CTA BV is located on Airport Teuge and has an engine duration test lab on the Energy Transition Centre (EnTranCe) Groningen. CTA's disruptive technical innovation aims to save fuel costs for the aviation and maritime industry and reduce CO<sub>2</sub>, NO<sub>x</sub>, and SO<sub>x</sub> emissions. The founder, Ben Cappelle, has built a consortium with the professional aviation industry and science institutes that has the skills and abilities to deliver a real solution to climate change while saving costs for the owners. The Clean Tech Aviation Consortium brings together an international network of partners, each sharing and profiting from the latest developments, building expertise, business models, and eco-manufacturers, leading to a cleaner and better aviation and maritime world. The focus is on retrofitting existing fossil aircraft engines and aircraft APU's, developing an LNG fuel tank for the use and storage of LNG, and designing and developing a hybrid APU engine that works on LNG for the maritime industry. CTA's collaboration with EnTranCe on Campus Groningen provides access to research and development facilities and incubation services for start-ups, which further supports the growth and development of innovative solutions in the energy transition sector.

**WarmteStad** **Warmtestad** is a Dutch energy company that specialises in district heating and cooling. Warmtestad has a presence on Campus Groningen through its subsidiary, EnergieBeheer Nederland. EnergieBeheer Nederland provides energy management services to companies and organisations on the campus, including the development of sustainable heating and cooling systems. Warmtestad's expertise in district heating and cooling makes it an ideal partner for companies looking to reduce their carbon footprint and energy costs. Warmtestad captures excessive heat from data server companies like Bytesnet. "At their data centre, the servers are arranged in aisles. They use electricity 24 hours a day and produce heat 24 hours a day. The heat generated from cooling the servers is removed through a heat exchanger and then upgraded to the desired temperature through an electric heat pump. The heat is then delivered to the northern neighbourhoods of Groningen via the district heating network." WarmteStad is also in the process of constructing a Warmtenet (Heat Network) in the northwest of Groningen, which will provide sustainable heat to more than 12,500 households, institutions, and businesses. The first part of the network has already been installed at the Zernike Campus and Paddepoel, and they are expanding it from Paddepoel to Selwerd and Vinkhuizen.

**EnTranCe** **EnTranCe** is an educational innovation centre from the Hanze University of Applied Sciences, that focuses on the development of sustainable energy solutions. EnTranCe has a presence on Campus Groningen and provides a range of services to companies and organisations, including access to research and development facilities, incubation services for startups, and collaboration opportunities with academic researchers. EnTranCe's expertise in sustainable energy innovation makes it an ideal partner for companies looking to develop and test new renewable energy technologies that are in their first four technology readiness levels.

**INNO LAB** **Innolab's Groningen** services are currently open to a wide range of industries currently being, chemistry, agrifood and engineering. With its location on Campus Groningen, Innolab is uniquely positioned to leverage the knowledge, talent, and expertise of the University of Groningen and Hanze University of Applied Sciences, further strengthening its ability to support the development of innovative technologies. **Innolab Renewable Energies** is currently under development on Campus Groningen, in collaboration with partners Kadans Science Partner and DNV. The goal is a shared facility for innovative startups, spinoffs and scale-ups in the field of renewable energy. This will be located in Kadans' Plus Ultra building, a breeding ground for renewable energy innovations. Innolab provides facilities and services to accelerate the development from a proof of concept (TRL 3) to a demonstrated prototype (TRL 6). With the help of our partner DNV, Innolab participants can develop a product ready for market introduction (TRL 8). The lab will offer a range of specialised equipment and infrastructure, including a fully-equipped workshop, laboratory space, and testing facilities. In addition to physical resources, InnoLab also provides access to a network of experts, entrepreneurs, and investors to help innovators navigate the development and commercialization process.

In summary, **Campus Groningen offers a unique set of possibilities** and resources that make it an attractive destination for companies and institutions focused on renewable energy, sustainability, and related fields. The partners showcased here offer a diverse range of expertise and contribute to the campus in various ways.



# How it started

## Highlighted: the Innolab Formula

Image: Nobelprize winner Prof. dr. Ben Feringa

**In 2014 there was an extensive need to work together in an open environment on Campus Groningen. With a pilot the Innolab initiators wanted to create the optimal environment for entrepreneurs to succeed in the Life Sciences field. The Innolab solution was to create, together with one of the leading companies in this field, an open innovation lab in the Chemistry field; Innolab Chemistry was born.**

An 'Innolab' that would be as easy to join; a place that gives entrepreneurs everything they needed to succeed when it comes to innovation and R&D. In short: Innolab was able to lower their costs, removed hurdles and provided support and access to a warm knowledge-intensive network of companies and institutes. This succesfull formula, with prof. dr. Ben Feringa as one of their founders, now excists of an Innolab Agrifood, Innolab Chemistry and Innolab Engineering on Campus Groningen.

Innolab stimulates and supports entrepreneurship, and facilitates innovative initiatives. Besides of offering laboratory facilities, business support is offered in the fields of business development, business strategy, intellectual property and patenting, legal aspects, budgeting, finance and risk analysis.



# Accelerating the hydrogen economy

## Highlighted: the Hydrohub

Image: Nobelprize winner Prof. dr. Ben Feringa

**Hydrohub is an initiative located at EnTranCe on Campus Groningen, established by the Institute for Sustainable Process Technology (ISPT) in collaboration with industry and knowledge partners. The initiative aims to accelerate the development of the hydrogen economy in the Northern Netherlands by creating a platform for innovation and collaboration.**

The Hydrohub provides a range of facilities and services to its partners. These facilities include the MegaWatt Test Center that can be used to perform such tests with water electrolysis at MW scale. This offers a range of test facilities and expertise for hydrogen-based technologies, and a green hydrogen production unit, which produces green hydrogen from renewable electricity and water using an electrolyzer.

Hydrohub is a test centre for the development and scaling up of hydrogen technology. The centre focuses on developing new technologies for the production, storage, transport, and application of hydrogen. The Hydrohub project includes research on the safety and efficiency of hydrogen production, transportation, and storage. The project also includes the development of fuel cell technology and the integration of hydrogen into existing energy systems.

By establishing Hydrohub, the ISPT and its partners are contributing to the development of a sustainable hydrogen economy in the Northern Netherlands. The initiative provides a platform for innovation, collaboration, and knowledge sharing, and offers access to state-of-the-art facilities and expertise for developing and testing hydrogen-based technologies. Through its programs and events, Hydrohub stimulates the development of sustainable hydrogen solutions and helps to position Campus Groningen as a leading hub for renewable energy innovation.

friendly  
Energy Storage



**The University of Groningen and Hanzehogeschool University of Applied Sciences are the driving forces behind Campus Groningen's commitment to showcasing renewable energy.**

Both institutions boast a long and impressive history of academic excellence, with the **University of Groningen** founded in 1614, making it one of the oldest universities in the Netherlands. Today, the University of Groningen is consistently ranked as one of the top 100 universities in the world, known for its research-driven approach to education. As of 2021, it has nearly 34.000 students, 20% of whom are international. In total, the University of Groningen offers 205 research-based study programs in Groningen.



**Hanzehogeschool University of Applied Sciences** is also a renowned institution, offering a diverse range of degree programs that prepare students for careers in fields such as technology, healthcare, and business. The university's focus on applied research and innovation is a perfect match for Campus Groningen. As of 2021, it has nearly 31.000 students, 8% of whom are international. In total, Hanzehogeschool University of Applied Sciences offers 127 study programs in Groningen that focus on applied research.



As of 2021, there are approximately 65.000 students in Groningen, nearly 32% of the city's population. Campus Groningen hosts a whopping 76% of all the students in Groningen or nearly 50.000, 14% of whom are international students. Aside from the two major educational institutions, a number of smaller schools offer a variety of study programs. Both institutions offer a number of degree programs that focus specifically on renewable energy. Students can pursue five different study programs focused on energy and sustainability, out of the total 22 available in the entire Netherlands. 252 students are enrolled in energy-related study programs in Groningen, nearly 10% of all the students enrolled in similar study programs in the Netherlands.

The University of Groningen offers a master's program in Sustainable Energy Systems, which provides students with a broad understanding of the technical, economic, and policy aspects of renewable energy. The university also offers a PhD program in Energy and Sustainability Research, which focuses on advancing knowledge in the field through original research. Hanzehogeschool University of Applied Sciences offers a bachelor's program in Electrical Engineering, which includes coursework on renewable energy sources such as wind and solar power. The university also offers a master's program in Energy for Society, which focuses on the social, economic, and environmental aspects of the transition to sustainable energy systems.

The University of Groningen's commitment to academic research on renewable energy cannot be overstated. The university's Energy Academy Europe is a leading research institute focused on sustainable energy and climate solutions. The institute brings together researchers, students, and industry professionals to work on innovative projects aimed at advancing knowledge in the field.

In conclusion, the University of Groningen and Hanzehogeschool University of Applied Sciences are crucial players on Campus Groningen to contribute to the energy of tomorrow. With a focus on academic research and innovative degree programs, these institutions are preparing the next generation of professionals to lead the transition to a sustainable energy future.

03.

Knowledge, talent  
and research



# 04.

## Funding

**The Northern Netherlands region offers several funding options to support students, researchers, and entrepreneurs with innovative ideas. The funding options available in the Northern Netherlands highlight the region's commitment to encouraging innovation, sustainable practices, and economic growth. A few of the funding possibilities are highlighted.**

**The Campus Community Fund** is a platform for financing and acts as a flywheel to convert the available knowledge and skills on Campus Groningen, and in the region even more effectively into important innovations. The strategy has been shaped by Campus Groningen and its stakeholders, Rabobank Stad en Midden Groningen and companies on the Campus. For the growth of innovations and economic activities, an investment strategy of approximately 500 million has been recorded in the Campus Community Fund.

**RUG Ventures** is an early-stage investment company that supports students and researchers with innovative ideas in creating successful companies that add value to society. In addition to RUG Ventures, there are several other funding options available in the region.

**Future Tech Ventures** provides funding for sustainable, innovative early-stage startups operating in the "RIS 3 strengths" and "Second Valley of Death"/proof of concept phase (TRL 3 to 6) with venture capital. The fund primarily invests in or for the benefit of the JTF region of Groningen-Emmen. Along with financial investment support, Future Tech Ventures also aims to assist with business development and investment expertise, mitigating the inherent risks associated with innovation.

The **NOM**, the Investment and Development Agency for the Northern Netherlands, covers the three northernmost provinces - Groningen, Friesland, and Drenthe - which together form the economic region TopDutch. The agency's main focus is to support economic development by providing funding and other forms of assistance to businesses and entrepreneurs in the region. The NOM's investment focus areas include renewable energy, circular economy, healthy ageing, and digitalization. Through its work, the NOM aims to encourage talent and support economic growth in the Northern Netherlands, while also helping to make the region a more sustainable and attractive place to live and work.

**Fonds Nieuwe Doen** is a self-sufficient foundation that provides loans to projects in the energy transition in the province of Groningen. Its management aims to help and encourage loan applicants and other initiatives and to connect them where possible. Fonds Nieuwe Doen Groningen is an initiative of the Province of Groningen.

**The Just Transition Fund (JTF)** is specifically aimed at supporting the energy transition with investments in sustainable products, processes, research, innovation, and education, as well as cooperation between education, businesses, and governments. With the cessation of gas extraction in Groningen and the reduction of CO2 emissions in the north, an estimated 20,000 jobs in the North Netherlands are affected. However, the transition also presents opportunities for new jobs and economic activities.

**The European Regional Development Fund (ERDF)** subsidy program focuses on developing the regional economy in the North with the provinces of Groningen, Drenthe, and Fryslân and Economic Board Noord-Nederland. Together, they aim to strengthen the entrepreneurial and innovative climate in the region.

# 05.

## Contact

Campus Groningen is a unique and vibrant community that is committed to sustainable energy and innovation. The Campus is a hub for knowledge institutions, research facilities, startups and established businesses, all working together towards a common goal of creating a sustainable future.

Collaboration is the key to success, and the Campus is always looking for new partners to the community. Whether you are a local business or an international corporation, a startup or an established player in your field, **Campus Groningen invites you to become part of the ecosystem.**

By joining Campus Groningen, you will have access to a wealth of resources and opportunities to help you grow and succeed. The facilities include cutting-edge research labs, state-of-the-art testing centres, and incubation spaces for startups. The campus community is made up of experts from a wide range of disciplines, including engineering, science, business, and more.

**Together, we can tackle the challenges of today and tomorrow and create a more sustainable future for all.** This document is work in progress, things are changing fast on the campus, feel free to let us know if you have any suggestions. You are invited to reach out to Campus Groningen to explore the possibilities. Let's build a better future together on Campus Groningen.

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