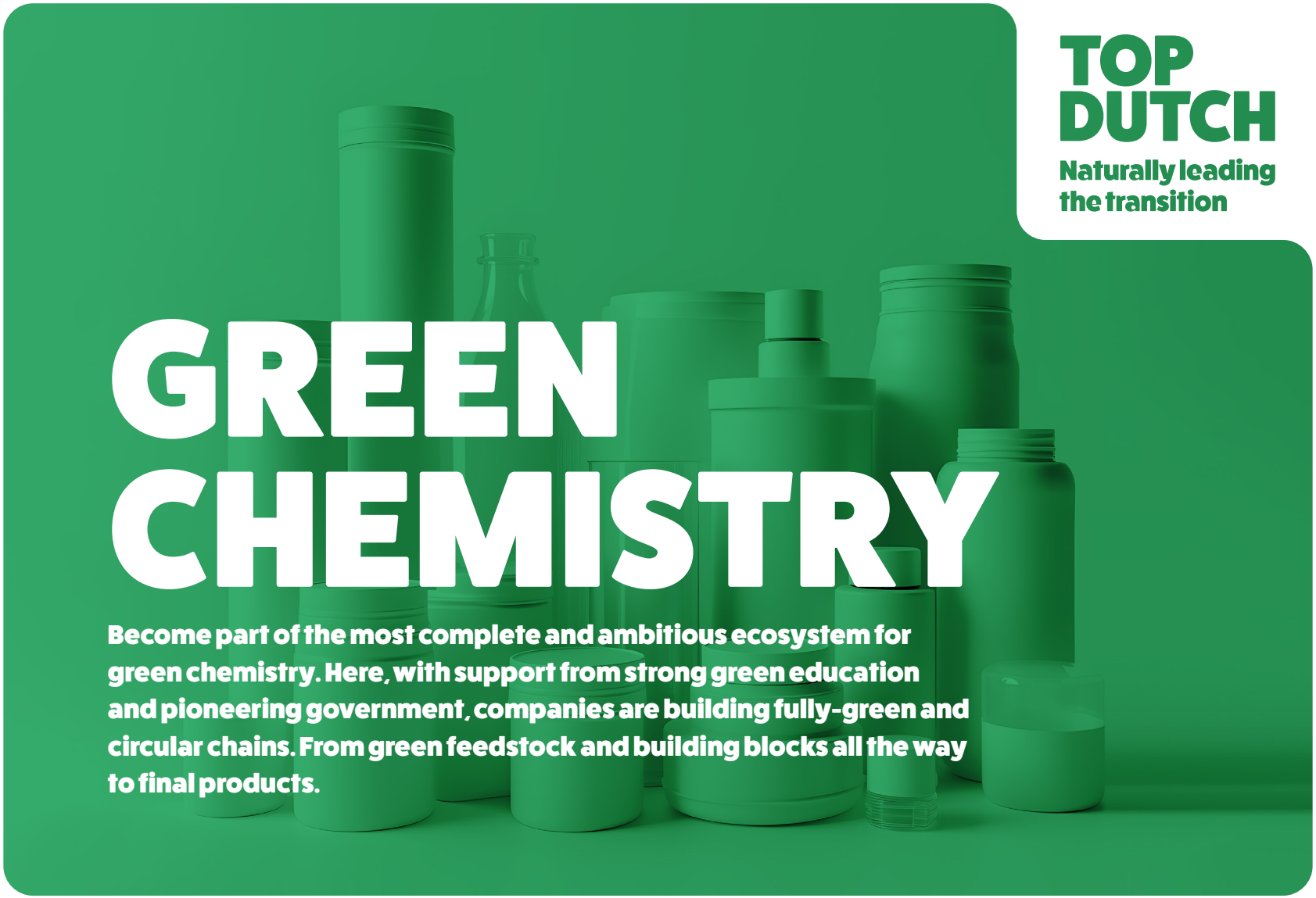


TOP DUTCH

Naturally leading the transition

GREEN CHEMISTRY

Become part of the most complete and ambitious ecosystem for green chemistry. Here, with support from strong green education and pioneering government, companies are building fully-green and circular chains. From green feedstock and building blocks all the way to final products.

In 1959, TopDutch discovered Europe's largest natural gas field right under their feet. Together with naturally large reserves of sodium and natrium chloride and a flourishing agricultural hinterland, it didn't take long before the TopDutch developed a mature chemical industry. Today's focus is fully on becoming the greenest chemical cluster in the world: fossil-free, CO2 negative, fuelled with green building blocks and closing the loop. United in Chemport Europe, the entire chemical ecosystem collaborates towards their shared vision and goals. Here, we change the nature of chemistry.

1. **Cohesive ecosystem for Green Chemistry**

2. **Access to green feedstock & energy**

3. **First CO_2 negative, fossil-free & circular cluster**

4. **Hydrogen Capital of Europe**

5. **Reliable government & fast business development**

6. **World-class knowledge & access to talent**

1. COMPLETE AND COHESIVE ECOSYSTEM FOR GREEN CHEMISTRY

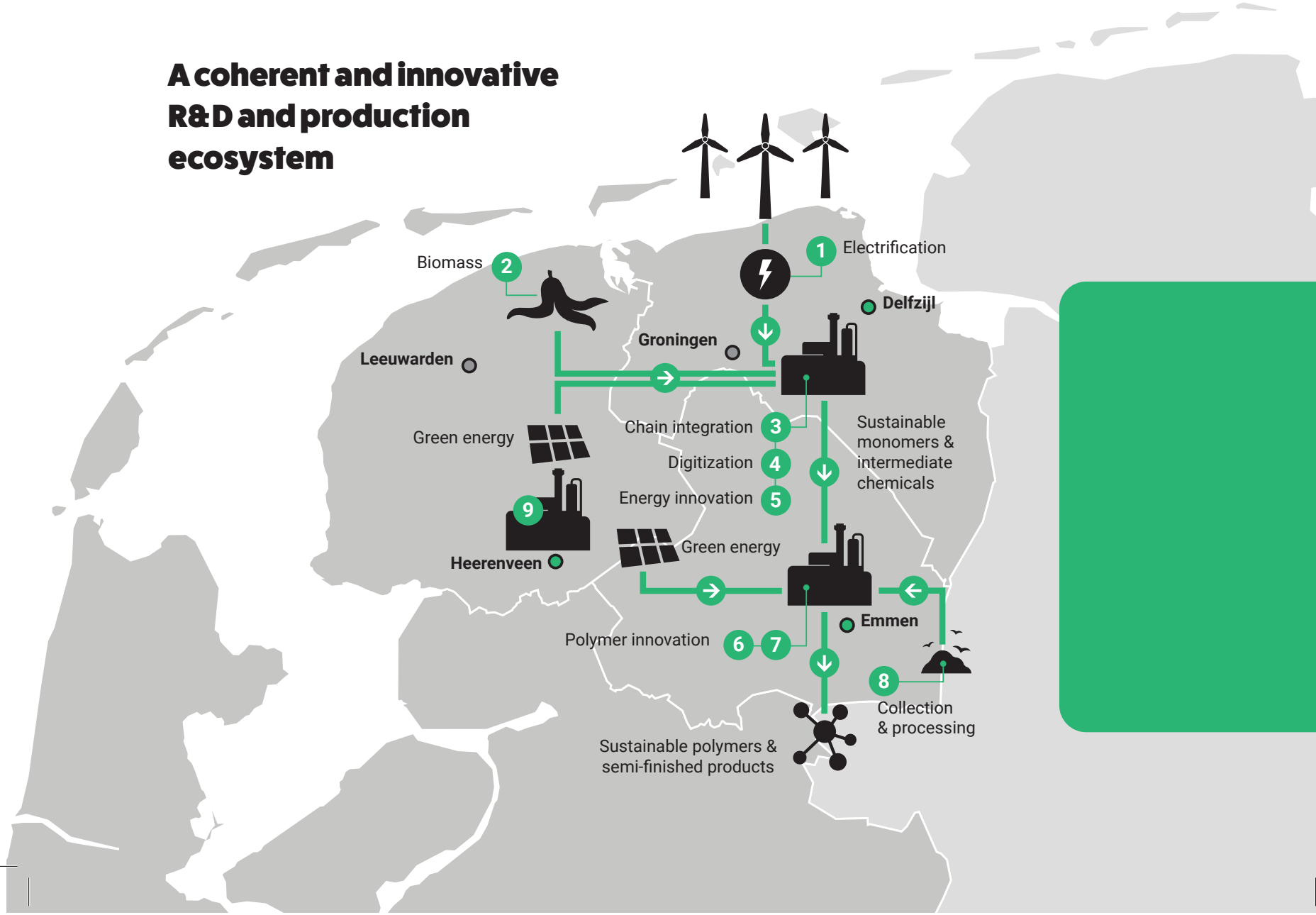
The Northern Netherlands offers a more complete and cohesive ecosystem for green chemistry than any other region in Europe.

- **Home to Chemport Europe.** Chemport Europe consists of three integrated chemical clusters. Chemport Delfzijl is focused on sustainable intermediate chemical production. Chemport Emmen is Europe's leading specialized fiber chemistry cluster, accelerating innovation in monomers, polymers and composites. And Chemport Heerenveen is dedicated to accelerating the circular economy with their recycling expertise. Entrepreneurs, government and knowledge institutions collaborate in Chemport Europe with one shared ambition: Changing the nature of chemistry.

- **Green processes via chain integration.** Companies collaborating in the Chemport Europe ecosystem join chains and exchange feedstocks with each other. In the near future, the chains will close, producing a circular economy. Infrastructure and a close-knit community encourage smart integration of production chains.

- **Closing the loop via recycling.** Besides a strong focus on using green building blocks for green intermediate chemicals, Chemport Europe is expanding its network with recycling companies to kick start the circular economy.

A coherent and innovative R&D and production ecosystem



Related Research & Development

1. 1 MW Hydrogen Test Centre
2. Zernike Advanced Processing (ZAP)
3. Chemport Industry Campus (CIC)
4. Smart Industry Hub
5. EnTranCe
6. Sustainable Polymer Innovation Cluster (SPIC)
7. Green PAC Polymer Application Centre
8. Kenniscentrum Recycling
9. National Test Center Circular Plastics

- **Closing the loop via recycling.** Besides a strong focus on using green building blocks for green intermediate chemicals, the TopDutch region is a hotbed for innovative plastic recycling. At locations across the region, we are working to recover polymers from household waste, and recycle them via thermal, mechanical and chemical recycling.

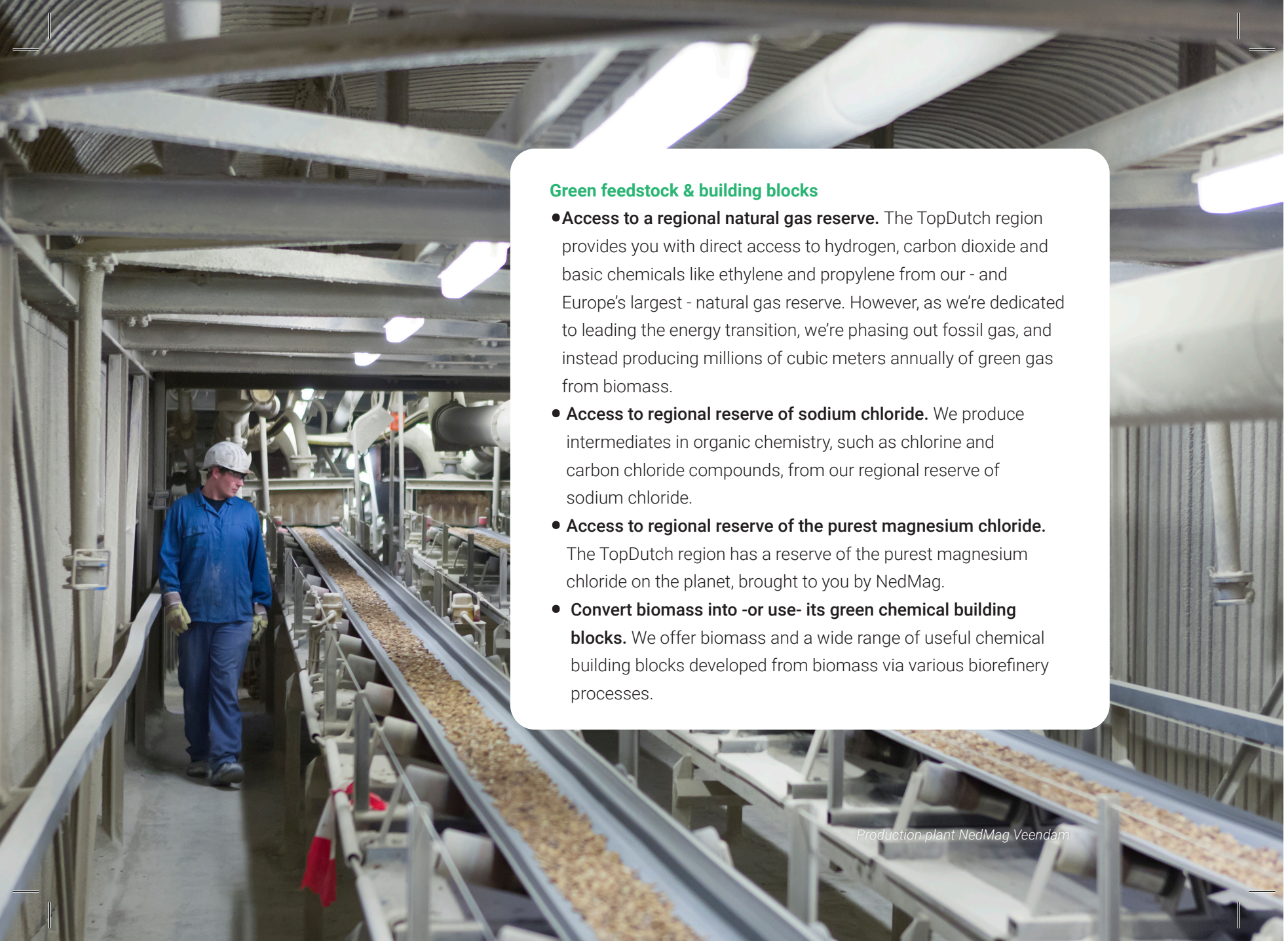
- **Developing breakthrough technologies.** Chemport Europe hosts many pilot facilities in which a substantial number of breakthrough technologies have been developed and are now in operation, being supported by the existing ecosystem dedicated to Green Chemistry. Examples of new technologies include: 2nd generation sugars, MEG, Bio-BTX, chemical recycling, acetate, etc.

- **A large knowledge cluster.** The TopDutch region offers a large knowledge cluster at its world-renowned University of Groningen with the largest chemistry faculty of the Netherlands, Zernike Campus and a complete research and development ecosystem related to chemistry.

- **No petrochemical industry.** Unique to these chemical clusters is that there is no petrochemical industry located, which makes the transition to fully green chemistry easier!

2. DIRECT ACCESS TO GREEN FEEDSTOCK AND GREEN ENERGY

The Northern Netherlands is rich in green resources with its agricultural hinterland and is located near and well-connected to Germany and Scandinavia.



Green feedstock & building blocks

- **Access to a regional natural gas reserve.** The TopDutch region provides you with direct access to hydrogen, carbon dioxide and basic chemicals like ethylene and propylene from our - and Europe's largest - natural gas reserve. However, as we're dedicated to leading the energy transition, we're phasing out fossil gas, and instead producing millions of cubic meters annually of green gas from biomass.
- **Access to regional reserve of sodium chloride.** We produce intermediates in organic chemistry, such as chlorine and carbon chloride compounds, from our regional reserve of sodium chloride.
- **Access to regional reserve of the purest magnesium chloride.** The TopDutch region has a reserve of the purest magnesium chloride on the planet, brought to you by NedMag.
- **Convert biomass into -or use- its green chemical building blocks.** We offer biomass and a wide range of useful chemical building blocks developed from biomass via various biorefinery processes.

Production plant NedMag Veendam

- **Use raw and biorefined agricultural feedstock.** Our rich agricultural hinterland provide us with valuable and waste feedstock, such as sugars and starches, from which we can produce chemical building blocks and energy. We have both 1st and 2nd generation saccharide (sugars) production facilities, with the 2030 goal of replacing 310 kton of fossil-based chemicals with saccharide-based chemicals produced in the TopDutch region.
- **Import additional feedstock or specialized chemical building blocks** via our regional seaports, which are close to the agricultural hinterlands of Germany and Scandinavia.

Access to green energy

- **Solar energy.** We have access to the sun, so also here many plants and private houses produce green energy through solar panels.
- **Wind energy.** TopDutch's rather flat, coastal regions are ideal for wind turbines. Even better are our offshore wind parks located north of the region in the North Sea.
- **Biomass energy.** We produce some green electricity by burning biomass.

- **Imported green energy.** Our chemical clusters are connected to the NorNed cable (to Norway) and COBRA cable (to Denmark) for direct access to (imported) green electricity.

Energy efficiency

- **Optimize energy efficiency.** We optimize the energy efficiency of our processes, by reusing heat and waste flows and investing clean technologies.
- **Exchange residual heat.** Via a pipeline network, we exchange residual heat and biosteam.

3. MOST AMBITIOUS ECOSYSTEM

We will be the first fossil-free, CO_2 negative and circular chemical cluster in the world Chemport Europe is changing the nature of chemistry, not by talking, but by working together towards their shared vision and goals.

Chemport Europe is determined to close the plastics loop.
The TopDutch region is Europe's leading expert ecosystem for circular plastics. With an ambition to become 100% circular with 100% green products, our businesses, science partners and government are cooperating across a complete circular value chain. All bases are covered at an industrial scale:

- Converting recycled plastics into quality feedstock.
- Making products from quality feedstock.
- designing plastic products that can (easily) be recycled
- Developing technologies and establishing systems to collect, recapture, filter and recycle all types of plastics.
- Reducing plastic waste and pollution.

Chemport Delfzijl will be the first CO2 negative and fossil-free chemical cluster in the Europe, and will succeed by:

- using only green building blocks and energy, therefore also becoming 100% fossil-free.
- optimizing all processes.
- reusing CO2.
- collaborating and investing together.

We host a fully-integrated innovation ecosystem, covering all aspects of circular design.

- Breakthrough polymer innovations are facilitated in our world-renowned polymer science knowledge cluster. Top-100 University of Groningen is leading in foundational polymer sciences and chemical engineering research. Applied science research and education for circular plastics and sustainable polymers is provided by NHL Stenden University of Applied Sciences. Corporate R&D services are provided by Senbis Polymer Innovations.
- Next generation manufacturing and plastic technologies are collaborated on in our shared smart factory Technologies Added, innovated in BASF's TopDutch base, and taught at Noorderpoort vocational college.
- Circular product design and development is accelerated by Pezy Group and Minerva School of Arts.
- Tomorrow's sorting and recycling processes are tested within the unique National Test Center for Circular Plastics' shared facilities.

4. HYDROGEN CAPITAL OF EUROPE

The TopDutch region is dedicated to producing 100 percent green hydrogen, one of the most used and basic chemicals in chemistry and as facilitator for chemical processes.

Our inherent natural resources, and existing energy infrastructure make us the natural business location for a new hydrogen economy.

- Born on Europe's largest natural gas reserve, we will be the first region to proactively conclude natural gas extraction, and are instead upgrading and expanding our extensive transportation network.
- By 2025, the TopDutch region will be home to 169km of hydrogen pipelines. These will connect to a further 6,800km of pipelines across the Netherlands, Germany, Belgium and France by 2030.
- We're at the heart of Europe's largest futureproof energy sourcing area. Over half of the Dutch energy supply and one third of the European energy supply will be coming from the North Sea in a matter of years, presenting large-scale hydrogen production and storage potential on TopDutch's extensive coastline. We will generate 12.2 TwH of on-shore wind and solar power by 2030. In addition, we have a 600 MW production capacity in wind parks off the TopDutch coast, with plans for another three parks totaling 4,700 MW.
- The Northern Netherlands also has access to natural hydrogen storage locations in salt caverns. The Netherlands has the 2nd largest salt cavern storage capacity in in Europe – up to 150 PJ – of which 72% is in the TopDutch region..

Leading the green hydrogen economy

- A large-scale program of demo-projects, the €90-100 million cross-chain cluster development plan 'HEAVENN' led us to being designated at Europe's first 'Hydrogen Valley'. Making up 13 individual projects across production, distribution, storage and end-use of hydrogen, it now serves as Europe's blueprint for a green hydrogen economy across the value chain.
- Still the only fully-integrated hydrogen cluster in the world, we will continue to the lead the transition. Major multinationals including Engie, RWE and Shell, local energy heavy-hitters such as Gasunie, and our ambitious state are collaborating on an ~$10 billion hydrogen production, storage and transportation and innovation joint investment agenda, allowing us to power Europe's future economy with 100PJ of hydrogen p.a. by 2030.

Chemport Europe is determined to increase the impact of the green hydrogen economy on the chemical industry at large, using it for industrial processes and as feedstock.

- From its location in the Hydrogen Backbone Delfzijl, our chemical companies produce bleach, green methanol, amongst others with feedstock from its on-site 20MW electrolyzer. Demand is growing rapidly, so this will soon scale-up to a 100MW electrolyzer.
- In its Emmen location, a 4MW electorlyzer and the GETEC 'green steam' gas turbine will directly connect to our chemical and heavy industry companies via a newly constructed pipeline.

The current gas pipelines, like these belonging to the Gasunie, will be converted en-masse to build a strong hydrogen transmission pipeline network.

5. RELIABLE GOVERNMENT AND FASTEST BUSINESS DEVELOPMENT

The Netherlands has a stable regulatory framework and the Northern Netherlands offers one of the most attractive business establishment procedures for new companies in Europe.

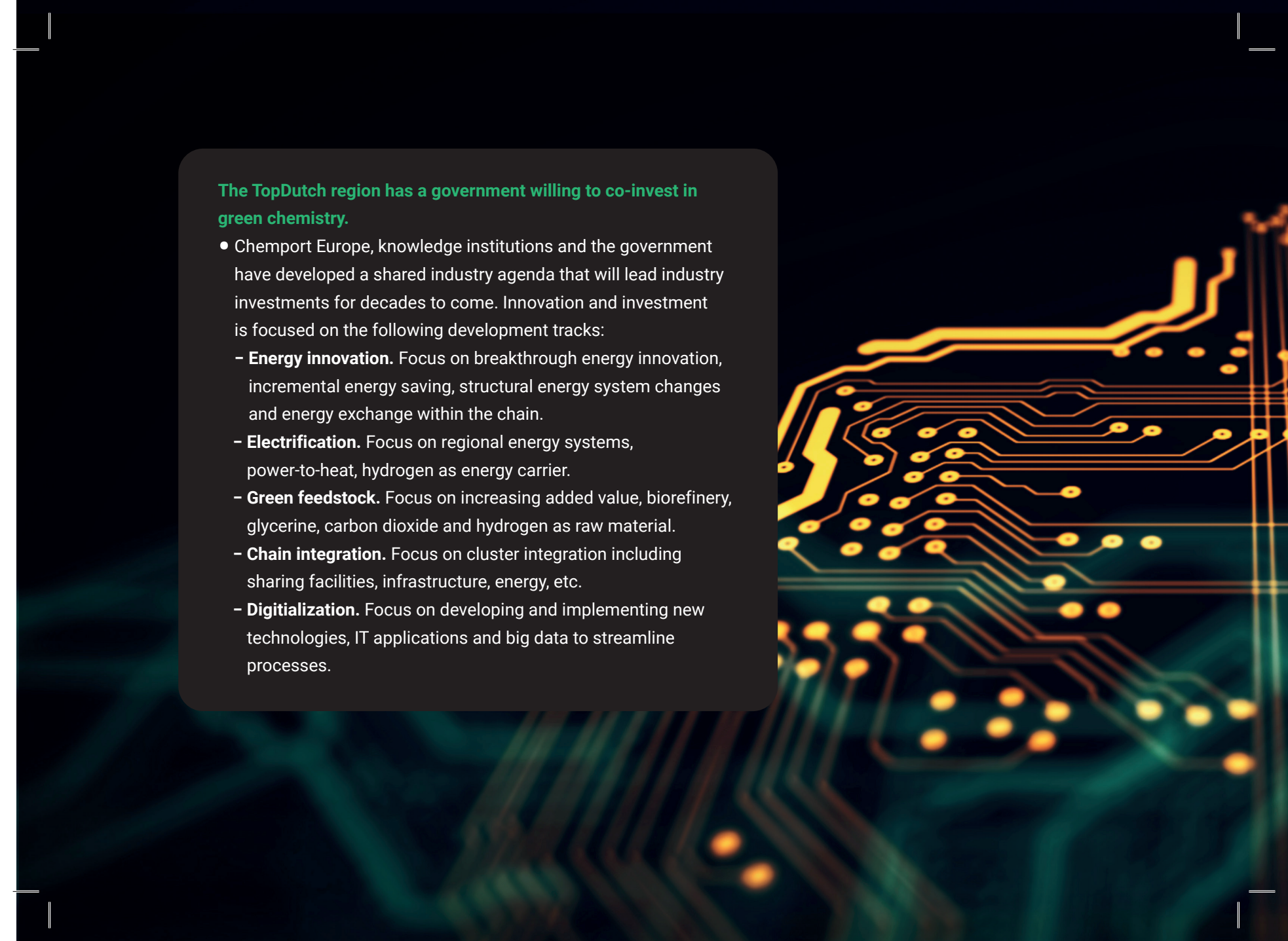
The Netherlands has a competitive economy and a stable regulatory framework.

- The Netherlands reguarly ranks among the top European countries on the World Economic Forum's Global Competitiveness Index. In particular, it is rated highly for macroeconomic stability, business dynamics, and institutional functionality.

Parliament building in The Hague

The TopDutch region has a government willing to co-invest in green chemistry.

- Chemport Europe, knowledge institutions and the government have developed a shared industry agenda that will lead industry investments for decades to come. Innovation and investment is focused on the following development tracks:
  - **Energy innovation.** Focus on breakthrough energy innovation, incremental energy saving, structural energy system changes and energy exchange within the chain.
  - **Electrification.** Focus on regional energy systems, power-to-heat, hydrogen as energy carrier.
  - **Green feedstock.** Focus on increasing added value, biorefinery, glycerine, carbon dioxide and hydrogen as raw material.
  - **Chain integration.** Focus on cluster integration including sharing facilities, infrastructure, energy, etc.
  - **Digitialization.** Focus on developing and implementing new technologies, IT applications and big data to streamline processes.



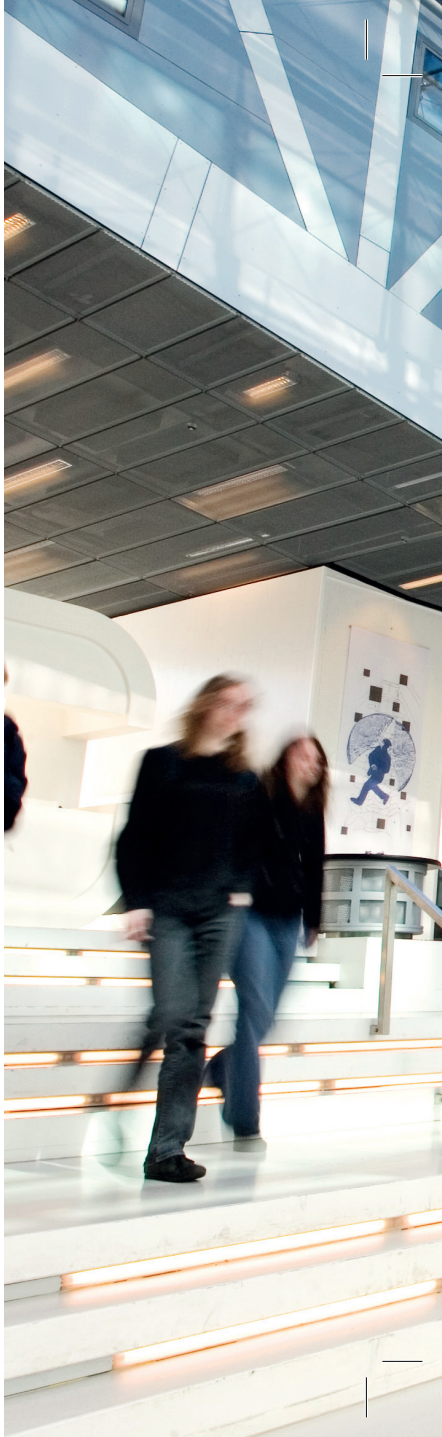
We have the fastest business development in Europe.

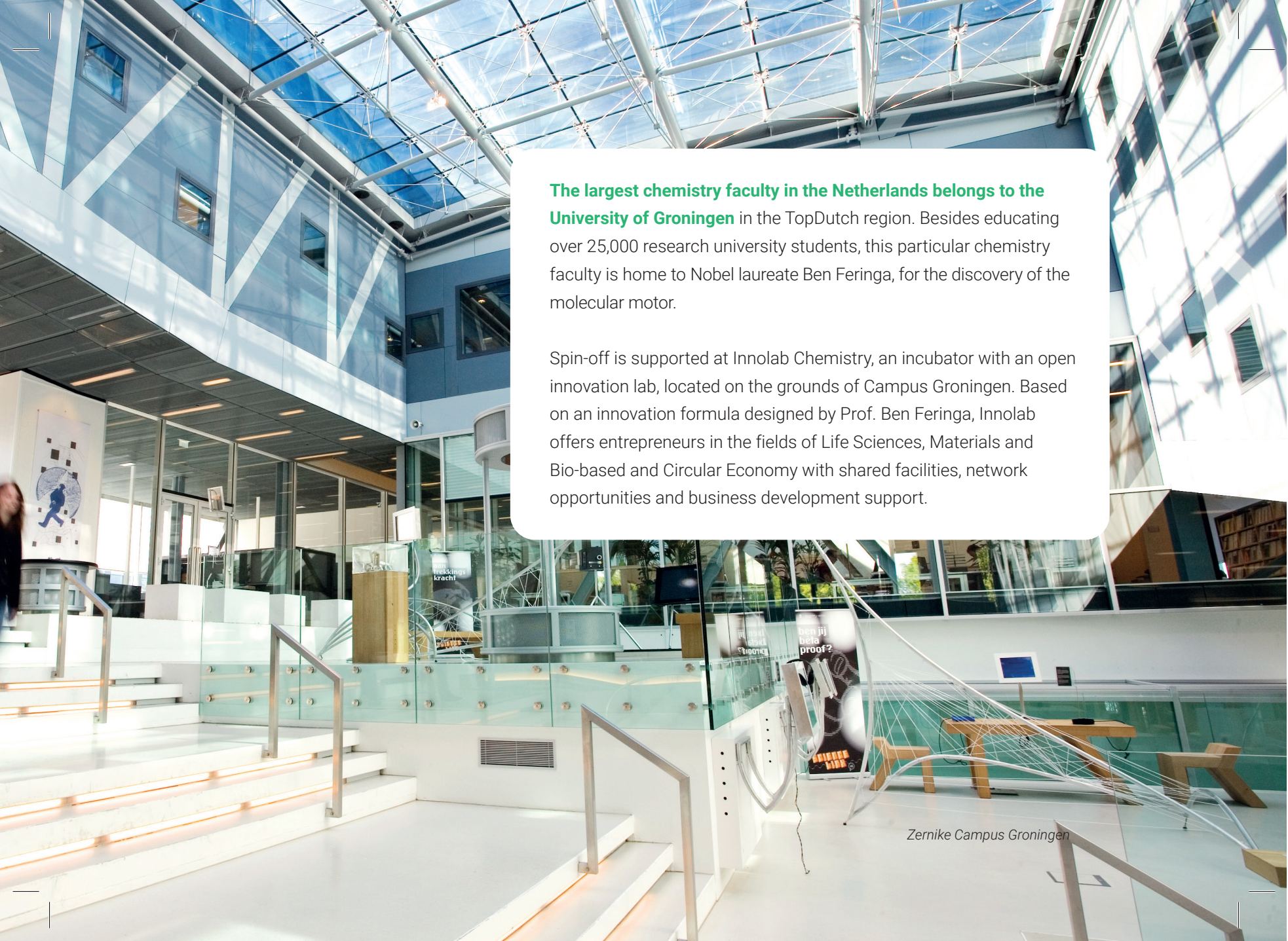
The Northern Netherlands offers some of the most attractive establishment procedures for new companies in Europe:

- Only 17 to 26 weeks from the application to the start of construction – a process that takes more than 25 weeks in Spain, 40 weeks in the Czech Republic and 30 weeks in Hungary.
- We provide a dedicated team to comprehensively guide the business foundation process. We have gained extensive experience in this from prior investments like Google's data center and other green chemistry companies that have recently landed in the region.

6. WORLD-CLASS KNOWLEDGE DEVELOPMENT AND ACCESS TO TALENT

We have a highly skilled and well-trained workforce that knows green chemistry and offer leading research and development facilities.





The largest chemistry faculty in the Netherlands belongs to the University of Groningen in the TopDutch region. Besides educating over 25,000 research university students, this particular chemistry faculty is home to Nobel laureate Ben Feringa, for the discovery of the molecular motor.

Spin-off is supported at Innolab Chemistry, an incubator with an open innovation lab, located on the grounds of Campus Groningen. Based on an innovation formula designed by Prof. Ben Feringa, Innolab offers entrepreneurs in the fields of Life Sciences, Materials and Bio-based and Circular Economy with shared facilities, network opportunities and business development support.

Zernike Campus Groningen

Research center at Campus Groningen

The TopDutch region is home to an extensive ecosystem of leading research and development facilities, stretching the innovation and applications of our knowledge far beyond the chemical industry

- Zernike Campus
- Zernike NanoLab
- Innolab Chemistry & AgriFood
- EnTranCe
- Hydrohub
- Northern Innovation Lab Circular Economy
- Zernike Advanced Processing
- Zernike Institute for Advanced Materials
- Water Application Center
- Food Application Technologies Center
- Green PAC
- BioBizzHub
- Pilot Center for Sustainable Chemicals and Processes
- SPIC Emmen
- EMMTEC services

Are you interested in exploring what your business possibilities could be? Connect with Sil Faber, our Green Chemistry expert.

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