



CIRCULAR PLASTICS NORTHERN NETHERLANDS

The world population is growing and this is affecting the environment. There is an increasing demand for raw materials, while supplies are decreasing. To ensure there is enough food, water and material for the products we use in our everyday life in 2050, we need to switch from a linear to a circular economy.

In a linear economy, raw materials are used to make a product and after it is used, any waste (e.g. packaging) is thrown away. In a circular economy, products are designed to be reused and/or recycled, which results in waste prevention and more efficient use of materials. In the Northern Netherlands, we feel the responsibility to pioneer and lead in this transition to a circular economy. We focus on specific sectors in which we can make a substantial impact and reach full circularity by 2050.

Plastics: the world nowadays produces more than 380 million tonnes of plastic every year, which often end up as pollutants, entering our natural environment and oceans. The large-scale use of plastics puts pressure on the environment not only after the plastic's life-cycle, as the production phase has a substantial footprint because of the use of raw materials and energy. The sustainable transition in plastic production can make a major contribution towards a circular economy, helping to achieve a more sustainable and resource-efficient future for all. In the Northern Netherlands, we aim to close the circular plastic loop in 2050 and we already have many initiatives contributing to this goal.

Textiles: the fashion industry is responsible for a stunning 10% of global carbon emissions. Apart from consumer behaviour (fast fashion), most of the adverse environmental impact in the textile chain comes from the production of raw materials; large quantities of water, pesticides, fertilisers (cotton) and non-renewable resources (synthetic materials) are used. In the Northern Netherlands, we are changing the textile chain by fully integrating the clothing production in our ecosystem and utilities network. Naturally, we focus on the recycling of textiles and on biobased degradable alternatives.

Building & construction: the construction sector consumes 42 billion tonnes of resources annually, making it the world's most material-intensive sector. The sector produces about one-third of all global waste. In a transition to a circular economy, it is imperative and a 'no-brainer' to focus on this sector. Circular Economy strategies have the potential to offer solutions: using renewable sources, sharing utilities and space, increasing repair, reuse and remanufacturing. In the Northern Netherlands, we are working hard on all these solutions. An example in relation to construction is wind blade recycling. Here we are able to integrate the world of construction, energy transition and the chemical industry.



"It is possible to grow an economy with less impact on the environment. With less impact on resources. And with lower costs. That's good news for shareholders. But most of all, it's good news for the next generations!"

Speech by Stientje van Veldhoven, State Secretary for Infrastructure and Water Management, at the GES session 'Financing new business models to boost resource efficiency and innovation', 5 June 2019.



Netherlands Enterprise Agency



NL Netherlands

Circular Economy and the SDG's

The Dutch government has drafted transition agendas for five economic sectors or value chains that can be front runners in the switch to a circular economy. This is captured in five transition agendas: 'Biomass and Food', 'Plastics', 'Manufacturing Industry', 'Circular Construction Economy' and 'Consumer Goods'. Naturally, the circular economy is relevant to all sectors of the economy. As a region, the Northern Netherlands contributes significantly to all these agendas and continuously works on new projects in all its economic markets to reach the goals of a fully circular economy by 2050. The transition to a circular economy contributes to the sustainable development goals as designed by the United Nations. With the transition to a circular economy, we strive towards a world with sufficient feedstock, which can be reused over and over again. The circular economy, an inspiring concept that is gaining traction worldwide, is concerned with the effective scaling of sustainable economic models within planetary boundaries. The principle of extending the life cycle for materials – to keep the value of products and materials in the loop as high as possible for as long as possible – is central to this vision, as is the transition to renewable energy, respect for biodiversity, societal balance and social inclusion. Working on the circular economy means working on the majority of SDGs, not as a cost item but as a business model. In some areas of the world, action takes place under the framework of the SDGs; in other countries, climate issues are the dominant driver for action. Some focus on measures that are creating sustainable and economically viable cities, while there are also regions, such as ours, which set out on the transition towards a circular economy.*

* Circular Economy & SDGs How circular economy practices help to achieve the Sustainable Development Goals – Holland Circular Hotspot, Netherlands Enterprise Agency, NL Netherlands.



Sustainable Development Goals - United Nations

The future of the circular economy starts in the Northern Netherlands

The Northern Netherlands is poised to become the decisive hub in the transition to a circular economy. The region has everything a circular economy needs. It stands out with its substantial amount of large-scale green energy initiatives. To give a couple of examples: in Eemshaven offshore wind is used to generate green electricity which is used to produce hydrogen, in Delfzijl green steam is used to power the green chemical cluster and in Emmen we have a highly efficient polymer and fibre production cluster. Moreover, there are multiple solar parks and green-gas initiatives in the Northern Netherlands. The region has it all. Key to a positive life cycle analysis is green energy, as it is vital for circular production. The availability of (green) hydrogen is also essential as a key input for many chemical recycling processes and biobased production processes. Large amounts of water are often needed in certain steps in the circular chain. Industrial and demineralised water is available in sufficient quantities. Wastewater treatment in the Netherlands is world-class. With its Water Campus, Leeuwarden is also an important water capital in Europe and a source of R&D in this field. Energy, water and other commodities are also available on the industrial sites as circular products. The Delfzijl and Emmen chemical parks have an extensive utility network with steam, water, compressed air, nitrogen and biogas pipes that companies can easily connect to. Added benefit in Delfzijl is the availability of (green) hydrogen. The residual product of one company is the raw material for another company, as it should be. The circular economy revolves around raw materials and that calls for excellent infrastructure. The Northern Netherlands has outstanding water, road, rail and air connections. Groningen Airport Eelde facilitates fast connections with important European hubs. The Northern seaports guarantee access to the European and world market, both for feedstock and finished products. Germany and Scandinavia are right around the corner and the connection with their seaports enhances cooperation. A vast highway network connects the Netherlands with all other European countries.



Getec Park - Emmen



WaterCampus - Leeuwarden

Industrial Symbiosis

The circular economy is crucial for sustainable industrialisation and an inclusive economy; in particular, industrial symbiosis, remanufacturing and closed-loop supply chains are relevant concepts that contribute to this SDG. Industrial symbiosis is the process by which waste or by-products of an industry or industrial process become the raw materials for another. The application of this concept allows materials to be used in a more sustainable way and contributes to the creation of a circular economy. Industrial symbiosis creates an interconnected network which strives to mimic the functioning of ecological systems, in which energy and materials continually circulate without waste. The World Business Council for Sustainable Development published a 'Chemical sector SDG roadmap' on July 23rd, 2018. This Roadmap offers a collective vision for the sector on what the key impact opportunities to contribute to the SDGs are. Eighteen impact opportunities are identified in relation to the SDGs. Demonstrating the benefits of industrial symbiosis is one of these opportunities.

Chemical hubs are a well-established concept in many regions and provide opportunities by helping to reduce raw material as well as waste disposal costs, earning new revenue from residues and by-products, supporting circular business models and developing new business opportunities. Best practice principles that enable industrial symbiosis in the chemical sector can be deployed at a far greater scale to help address feedstock availability issues and to improve resource management in a cost-effective manner (*Circular Economy & SDGs – Holland Circular Hotspot*).

With the transition towards a circular economy, the availability of industrial utilities and facilities, such as water, steam, green and standard electricity, technical gases, air, data and residual substances, is becoming increasingly important as a location factor. In Chemport we recognised this early on and partners have been investing in public utilities since 2005. As a result, companies in the Northern Netherlands can operate more sustainably and cheaply and are able to focus on their core business. Nowadays, we are a leading example in the development of industrial symbiosis. In our region, businesses, government bodies and knowledge institutions work together to establish an industrial ecosystem. We have an innovative circular ecosystem for chemicals and materials and the ambition to become the first cluster with zero CO₂ emissions and minimum environmental impact. The entire Chemport Europe industry cluster will only use renewable energy and feedstocks by 2050. In the chemical clusters of Delfzijl and Emmen, there are (partly underground) networks for the mutual exchange of energy sources such as steam, residual heat, residual water, compressed air, nitrogen and syngas. Added benefit in Delfzijl is the availability of hydrogen. Groningen Seaports, the port authority, keeps on pre-investing in and expanding this utility network, creating less pressure on companies' CAPEX and OPEX.

Naturally, the region is home to an extensive data network with international fibre connections. Together with the power generation and cable landing of green electricity in the region, it is precisely this combination that makes the cluster promising for the development of effective solutions for a CO₂-neutral future. The circular business sector needs substantial amounts of water. In the Northern Netherlands, availability of industrial and demineralised water is not an issue. Wastewater treatment capabilities are world class. The chemical clusters of Delfzijl and Emmen both have extensive utility networks with a.o. water pipelines that directly connect to specialized waste water companies. Therefore, companies do not have to worry about wastewater treatment.

In the Netherlands we have a history with building projects related to dykes and waterworks. This focus has been steering our expertise towards innovative water projects. Over the years, we have expanded our expertise from building top-notch water infrastructural projects to keep ourselves safe, to developing the best water quality treatment technologies, serving households and industries across the globe. We are specialized in water related R&D projects, with the knowledge-intensive European water technology hub located in Leeuwarden as a highlight. Here they offer a complete chain of water related innovation.



National Test Centre Circular Plastics – Heerenveen

The different hubs of the Northern Netherlands

The Northern Netherlands also stands out in circular plastics. This comes as no surprise as a substantial amount of Dutch Post-Consumer Waste is processed in the region by companies such as Attero, OMRIN and EEW. This creates an ample and stable flow of secondary plastics. Bollegraaf, a world market leader in sorting recycling technology, is headquartered in the region.

At the Chemical cluster in Emmen, CuRe is pioneering chemical recycling of the more difficult polyester streams. After recycling, this material can be used in food applications, which make it a prime example of up-cycling. Another company operating in the plastic recycling market is Morrsinkhof, which produces various products from mechanically recycled polyester (rPET). At the chemical cluster Delfzijl, Avantium is developing methods to produce biobased monomers for a new class of polyesters. Working together with partners along the value chain from start to finish, full circularity is the end goal. With developments in all parts of the value chain, achieving full circularity has now come within reach.

The Northern seaports and industrial clusters are committed to have their waste disposed of within their provincial boundaries. As another example, together with Rijkswaterstaat and Impact Recycling, ships waste collector Bek&Verburg is working in Eemshaven and Delfzijl on recycling the national stream of fishnets, thus making a substantial contribution to the Green Deal on Fisheries. They focus on the decolourisation and recycling of polyolefins using the Boss technology developed by Impact.

With the National Test Centre for Circular Plastics (NTCP) in Heerenveen and startup companies such as BioBTX and Noria, the Northern Netherlands is putting itself on the R&D map. This is not surprising, given the many startup and scale-up companies and facilities in the Northern provinces, such as the Zernike Advanced Processing centre in Groningen. BioBTX recycles waste plastics and turns them into a drop-in chemical that is a precursor for polyester. Another company that is helping to tackle the plastic pollution problem is Noria, which is developing waterway innovations and is testing its plastic soup recovery system in the port of Delfzijl.

The circular economy will create a large number and variety of jobs: skilled people will be needed. In this dynamic environment, educational institutions are working together with the business community to match today's education with future jobs. In this partnership, they not only focus on the generation to come, but also on the current workforce. As well as the standard educational programmes, the triple helix makes use of many practical, learning and development centres to train and re-educate Northern Dutch citizens for jobs in the circular economy and the energy transition.

Our mission is to help develop future-proof business in the circular economy. The Northern Netherlands is Europe's circular hotspot which – as an economically sustainable region – helps achieve the Dutch circular goals of 2050.



Chemical Park - Delfzijl



National Test Centre Circular Plastics – Heerenveen



Getec Park - Emmen

Northern Netherlands as circular hotspot

A circular economy will not become reality without partnerships. We are well aware of this. We have united companies and institutions in the Northern Netherlands and have named our circular industrial ecosystem 'Chemport Europe'. Within Chemport Europe, businesses, government bodies and knowledge institutions work together to establish a fully circular industrial ecosystem. Together, we formulate strategic agendas with strong focal points and long term goals. We want to fully supply our region with green energy, we are working on becoming a chemical cluster fully based on renewable carbon and hydrogen and strive for a full circular economy while matching the education of today with the jobs of the future. Our combined in-depth technical knowledge is always the fundament of our strategic agendas. We are, however, not just talking about long term goals, we are actively achieving them. Every day.





Benefits of the Northern Netherlands:

- Partners available along the circular value chain
- A shared focus between stakeholders
- European funding
- Regional governmental support
- Cooperation with nearby knowledge institutes
- Large start- and scale-up network



“ The Northern Netherlands is small enough to create an ecosystem that’s quick on its feet, but big enough to make impact ”

1.

Joint focus and ambition

2.

Partners along the value chain

3.

Cohesive ecosystem for sustainable chemistry and manufacturing

4.

Access to green feedstock and energy

5.

European ‘hydrogen valley’

6.

World Class knowledge and access to talent

7.

Excellent Infrastructure

8.

European exposure and funding opportunities

9.

Reliable and ambitious government

10.

Extensive Startup & Scale-up and R&D ecosystem

1.

Joint focus and ambition

Northern Netherlands as circular hotspot

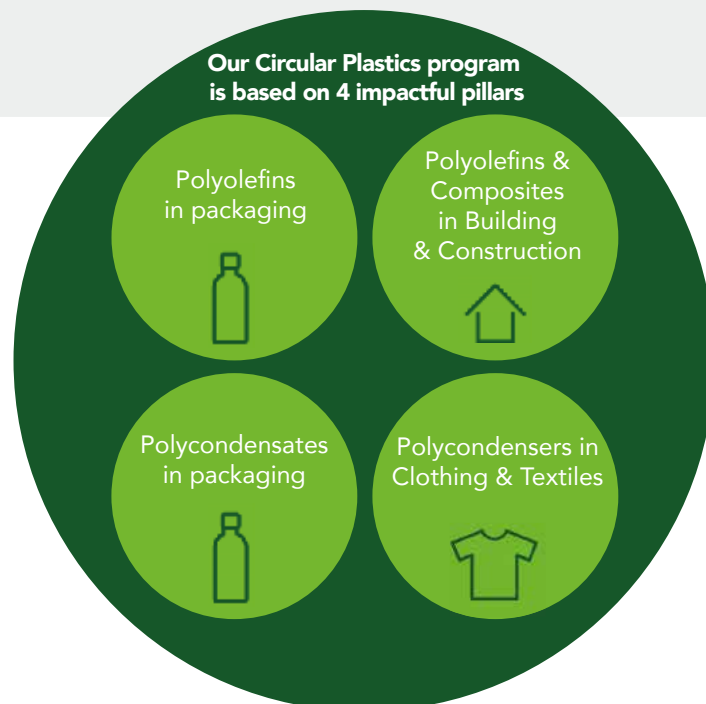
A circular economy can not be achieved without partnerships. We know this very well. We unite ourselves as the Northern Netherlands, and have called our circular industrial ecosystem 'Chemport Europe'.

Within Chemport Europe, businesses, government bodies and knowledge institutions work together to establish a fully circular industrial ecosystem. Together, we formulate strategic agenda's with strong focal points and long term goals. We want to fully supply our region with green energy, we are striving to a biobased chemical cluster, a full circular economy and we're matching the education of today with the jobs of the future.

Our in-depth technical knowledge is always the fundament of our strategic agenda's. But we're not only talking about long term goals, we're actively achieving them. Every day.

THREE MAIN FOCUS AREAS:

- **PLASTICS**
- **TEXTILES**
- **BUILDING & CONSTRUCTION**



KEY POINTS CIRCULAR ECONOMY BUSINESS

ENERGY

WATER

INFRASTRUCTURE

BUSINESS CLIMATE

JOBS

INNOVATION

EDUCATION

INVESTMENTS

ECOSYSTEM

HYDROGEN

R&D

UTILITIES

THE NORTHERN NETHERLANDS HAS IT ALL!

2.

Partners along the value chain

The unique strength of the Northern Netherlands is the fact that the ecosystem covers the entire plastic cycle and therefore we are able to effectively close the loop. We have an ecosystem that creates the perfect launching pad for the upcycling and recycling of plastics, with existing companies in our industrial parks and the space to develop a wider value chain. Through strong partnerships with knowledge institutions, we have set up programs to create awareness amongst citizens to use less plastic. We believe the best value chain offers close-by demand. With our local chemical companies, we have an economically viable system that creates opportunities for your converted waste stream as a feedstock. Companies that turn these waste streams into products are facilitated through public-private programs with the industrial parks as the logical centre points. Furniture, toys, half fabricates, automotive parts, building materials: all sorts of products that could be produced while making sure we close loops around plastics and waste.

Separating plastics: in the Northern Netherlands, we are experts in separation technologies. A world renowned player in this market is 'Bollegraaf Recycling solutions'. It originates from and is still headquartered in our region. Furthermore, the high-tech waste processing facilities of Omrin and Attero are located in the Northern Netherlands. In those plants collected waste is separated into different streams like cans, drink cartons, residual waste and compostable waste. The plastic streams are subsequently divided into different mono-streams which are usable for further processing and recycling. For example, recycling specialists in the region like Morssinkhof Plastics convert these mono-streams from Omrin into plastic granules that are supplied to companies such as IKEA and Philips. Another great example: the cable ducts along the high-speed railway (HSL) were produced by the German company Multiport from recycled plastics supplied by Attero. The separation facilities of Attero and Omrin process millions tonnes of waste per year. This year, EEW has started its building plans for a separation technology plant. Therefore, EEW will substantially contribute to this number.

Converting plastic waste into feedstock: we are facilitating companies that convert plastics into feedstock. We believe in chemical as well as mechanical recycling. In a circular world, we will require both of them. We match companies that produce recycled granules, aromatics and oils with companies in the chemical parks in our region, where these output streams can be further processed.

Recycling plastic waste into products: we not only help recycling companies by scouting customers for their products in our industrial parks, but also help them with partnerships for their end products. With the cities of Groningen, Leeuwarden, Heerenveen and Emmen plus good partnerships with nearby cities in the Netherlands, Germany and Belgium, we have an interesting customer base at hand to launch products and services.

Collecting plastic soup: we need to get waste and microplastics out of the water and our ecosystems. Therefore we have designated test facility locations for startups and scale-ups to have their ideas and inventions tested in real-life circumstances.

And last but certainly not least, **Reducing plastic pollution:** we stimulate education and citizen awareness programmes regarding circular design, waste prevention & waste reduction.



World Cleanup Day 2020 - Eemshaven

Creating awareness among the new generations

Since January 2017, Groningen Seaports has a longboat made of plastic waste. This plastic waste was collected in the ports of Delfzijl and Eemshaven by Bek & Verburg and Renewi. This special longboat, a so-called admiral sloop, contains 10,000 PET bottles. For the realization of this project Groningen Seaports collaborated with the organization Plastic Whale, an initiative that is committed to plastic-free waters. Groningen Seaports organizes tours on this longboat to create awareness among primary school and high school children.

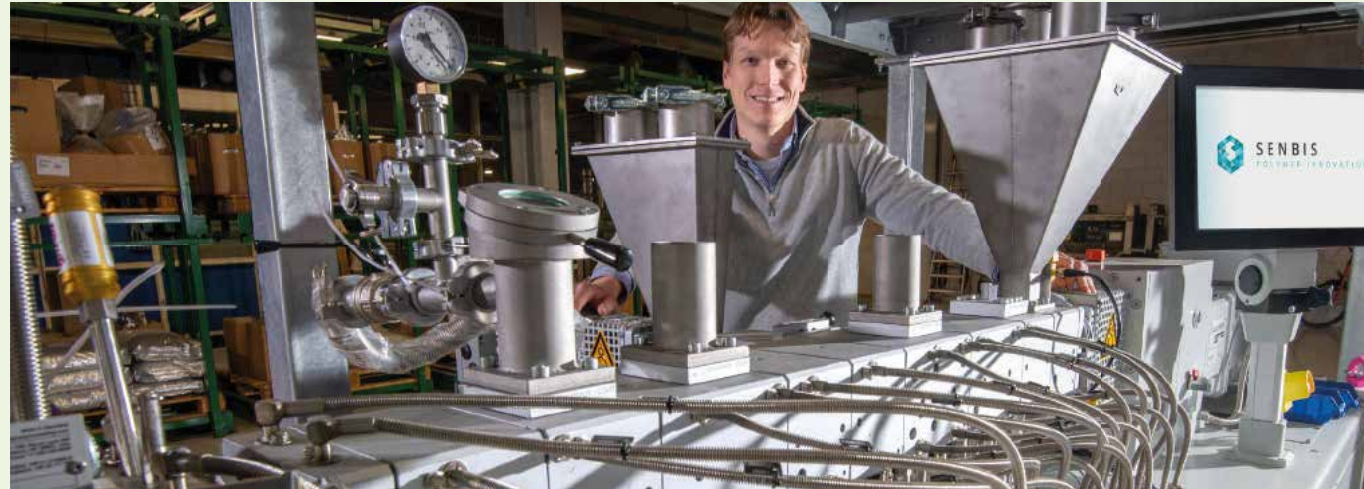


“ In Delfzijl, the Boss 1D technology of Impact Recycling focusses on recycling and decoloring of polyolifines and in Eemshaven they push their 1D technology to recycle all the Dutch fishing Nets, hereby contributing to the national green deal ”

“ In Emmen, the CuRe technology recycles and decolors polyester and hereby contributes massively to the circular economy goals ”

“ The separation facilities of Attero and Omrin process millions tonnes of waste per year ”

Senbis holds decades of experience in the development and production of plastics and yarns. They operate as true pioneers in the development of high-performance products made from biodegradable plastics. Their mission: to supply the world with biodegradable products aimed at reducing environmental pollution due to microplastics. A glimpse of their products: GreenFill (biodegradable high-performance infill), GreenLine (biodegradable trimmer line), (biobased) PLA yarns, Compostable horticulture twine.



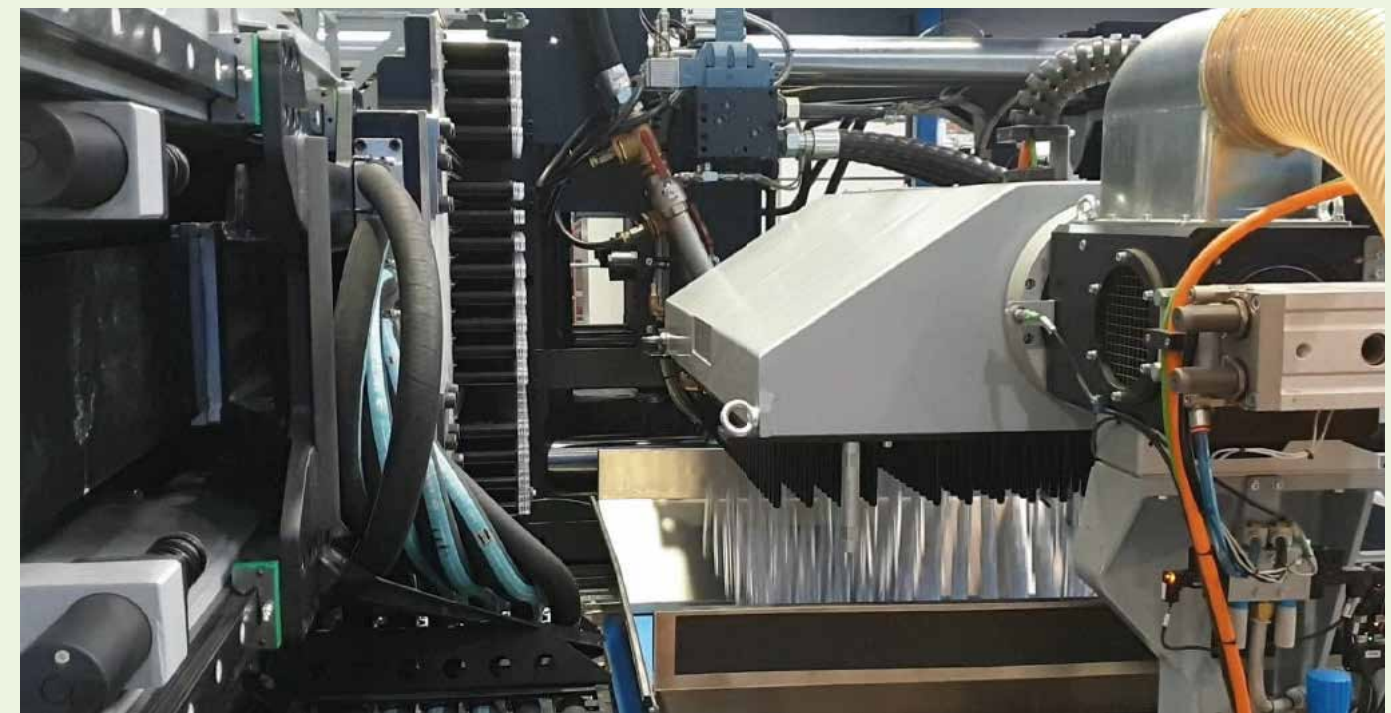
BioBTX produces the chemical building blocks Benzene, Toluene and Xylenes (BTX) from non-food biomass and mixed plastic waste with the use of an innovative technology. BTX are vital components needed to create high performance materials, such as new plastics. With the help of the innovative technology from BioBTX, the chemical & plastics industry can liberate itself from fossil resources.



H&P Moulding is a full-service, turn-key manufacturer of plastic injection moulded products/parts. They have a vast amount of experience in the injection moulding of (bio)plastics for several industries such as electronics, aerospace, consumer goods (beverage containers) and medical & laboratory equipment. H&P Moulding is continually exploring new markets in which injection moulded bioplastic products could have a great added environmental & economic value.



Morssinkhof is an internationally well-known producer of industrial yarns and renowned for transforming plastic waste into high performance recycled plastics. Areas of expertise are recycled PET and mechanical recycling of plastics. However, new product/market applications and sustainable materials alternatives (think biopolymers) are explored on a regular basis.



National Test Centre Circular Plastics & separation facility Omrin

With the unique facility of the National Test Centre for Circular Plastics in Heerenveen, the Northern Netherlands takes a leading role in the national and European transition towards a circular economy. Its customer base includes major companies from all over Europe.

We have a lot of regional initiatives that will stimulate circularity. In Emmen, the CuRe technology decolourises and recycles polyesters. In Eemshaven and Delfzijl, the Boss 1D technology decolourises and recycles polyolefins. In Groningen, BioBTX converts plastic waste into drop-in chemicals. Startup Noria is testing its plastic soup recovery system in the port of Delfzijl. Bollegraaf Recycling Solutions produces and pilots the newest separation machines close to Delfzijl.

In Groningen, Pezy Group helps customers to produce all kind of plastic products that are 'designed for recycling' or 'designed from recycling'. This list is not exhaustive. Within the Northern Netherlands, we cover the production and subsequent processing of a wide range of plastics; (r)PET, PA, PBT, TPE, HDPE, ABS, PS, PLA, PHA, PBAT. We invite you to visit our region and come see for yourself.



National Test Centre Circular Plastics - Heerenveen



Separation facility Omrin - Heerenveen

“ The National Test Centre Circular Plastics, located in Heerenveen, puts the Northern Netherlands in the forefront of the plastic R&D value chain ”

3. Cohesive ecosystem for sustainable chemistry and manufacturing

Circular business can never be done alone. Therefore, cooperation between knowledge institutes, governmental organisations and other value chain partners is frequently stimulated with the help of regional funds/subsidies for R&D and circular value chain related projects. These supportive programs can be of great value when working on innovative products or circular systems that involve new (types of) collaborations. Think of the development of biobased medical instruments for hospitals, enhanced recycling systems for (poly) textiles, soft-PVC recycling, return programmes for flooring products. These are just a handful of projects that are actively being worked on – which require close cooperation within the entire value chain. Working together is nothing new here; it is already in our mindset.

Companies who have circular ambitions can also request guidance via the regionally organized CIRCO Hubs. These hubs have been set-up with the goal to organize so called 'CIRCO tracks' (multi-day workshops) in which Circular Economy principles and tools are presented and tested. This will allow participants to transform their ideas or ambitions into concrete follow-up steps and give them a good knowledge baseline with regard to circular business models and circular product design. Attending such a track is perfect for companies that are in the early phase of exploring circular business opportunities. However, the track can also be of use for the more "seasoned" circular business practitioners to develop/strategise new business models or product lines.

To summarize, many initiatives are already set in place to smoothen and support your transition towards the circular economy.

Teijin Aramid, Chemical Park Delfzijl – Teijin Aramid is working in close partnerships with different stakeholders in the Northern Netherlands ecosystem on the circularity of their products, herewith being a role model in circular transition management.



Textiles

The fashion industry is responsible for 10% of global carbon emissions. Most of the adverse environmental impact in the textile chain comes from the production of raw materials. The textile industry is using large quantities of water, chemicals and energy, as well as generating waste, effluents and pollution. Two-third of the environmental impact of clothing is generated in the production phase. Furthermore, the textile industry uses an astounding 98 million tons of fossil fuels and other non-renewable resources every year. The textile industry causes 20% of industrial water pollution. Levi Strauss & Co was one of the first brands in 2007 to conduct a life cycle assessment study, revealing the impact of a pair of jeans during its entire life cycle, from the farm to the end of product life with the customer. Their findings showed that one pair of jeans consumes almost 4000 litres of water and emits 33 kg of CO₂. In Chemport Europe, we are changing the textile chain by fully integrating the clothing production in our ecosystem and utilities network. Naturally, we focus on the recycling of textiles and on biobased alternatives.

The Chemical cluster in Emmen has a strong heritage in fibres and in polyester production. This combination makes it an excellent location to start recycling initiatives of poly-cotton textiles. Organic side streams (e.g. cotton) can be readily used by industry partners.

In the province of Groningen, the municipalities, universities and a number of fashion oriented companies are developing the Groningen Fair Fashion, in which R&D, cooperation with students and local communities are a focal point. According to research by Dutch consultancy firm CE Delft, a potential six to seven jobs are created for every kilo tonne of recycled textiles, making textiles the most job-intensive recycling sector in the Netherlands.

Today significant parts of the production phase are dominated by developing countries, predominantly in Asia, and above all by China. This has mostly to do with the textile industry being historically dependent on cheap labour and on countries that are less stringent on environmental and social standards and regulations. Recycling also means re-shoring some activities. For example, in Delfzijl 'Social Working Hub Fivelingo' provides employment to people that have difficulty functioning in the regular labour market. Fivelingo facilitates training places, in a safe work environment, and meaningful daytime activities for approximately 450 people.

They carry out assignments in the textile industry for governments, companies and private individuals in the region, such as sewing, laundry service and assembly work. 'Social Working Hub Fivelingo' and others are committed to an inclusive labour market and to helping those who need help with finding work or training courses. Currently, we are building strong partnerships between big fashion companies (in production as well as recycling) and these social working hubs. The companies actively participate in this concept. Together, we grow towards a more inclusive society.

“ Levi Strauss & Co was one of the first brands in 2007 to conduct a life cycle assessment study, revealing the impact of a pair of jeans during its entire life cycle; from the farm to the end of product life with the customer. Their findings showed that one pair of jeans consumes almost 4000 litres of water and emits 33 kg of CO₂ ”

4000

Liters of water consumed by 1 pair of jeans emitting 33kg of CO₂



CuRe has established a robust continuous process that can recycle and decolor all regular types of polyester in an economically viable way. It can handle materials that include colorants, fillers, flame retardants, scavenger, organic materials, catalyst, spin finish, etc. Target markets include carpets, textile, food trays, bottles, ropes, slings and (safety)belts. By turning waste into feedstock, the CuRe technology effectively closes the (polyester) loop.





Building & Construction

With all the massive building and construction projects in the Northern Netherlands, the Circular Construction Agenda is very meaningful to us. In Groningen we have an R&D hub called BuildinG. This R&D hub focuses on future-proof construction and infrastructure in the Northern Netherlands. With a testing ground, specific knowledge and network, BuildinG helps entrepreneurs, researchers, residents and governments to innovate for a better built environment and a vital construction economy. Circular, sustainable, lifecycle and earthquake resistant: BuildinG builds the foundation for the future.

The region is pioneering new building concepts. Van Wijnen is investing in a factory in which houses are made using production processes similar to those of the automotive industry. Different technologies and (biobased) construction materials are being tested in Groningen in a living lab environment at the site of a former sugar factory. The construction sector produces about one-third of all global waste. In the Northern Netherlands we work hard on various circular solutions for this sector.

Construction

One of these solutions can be found in the recycling of composites. At the port of Eemshaven, located in the Northern Netherlands, this is a natural focus point. Also, Eemshaven is one of the leading offshore wind ports around the North Sea. Already 16 wind farms at the North Sea are being realized via the port of Eemshaven as the logistic base hub during construction and installation. Besides that, Eemshaven is a service base (O&M) for 4 wind farms (316 turbines). Furthermore, Eemshaven houses the largest onshore wind farm in the Netherlands. Over the course of coming years, the number of wind farms in the North Sea will increase enormously. In particular with the recently announced North2 project where Groningen Seaports together with Shell, RWE, Equinor and Gasunie aim to build an extra 10 GW of installed offshore wind capacity. The Northern Netherlands sees great opportunities around decommissioning programs starting in the next few years and is therefore investing heavily in composite recycling. The decommissioning is in large part triggered by the repowering of current on- and offshore wind turbines. The existing supply chain and service industry in Eemshaven will be a centerpoint for these activities.

We are active in the automotive sector as well, which is a possible market opportunity for companies that can recycle the composites from the wind blades into fibres. For example, Nedcam in Heerenveen excels in XXL 3D printing of recyclable composites for wind blades, as well as in building yachts and bridges. Lankhorst in Heerenveen, manufacturer of KLP® Hybrid Polymer Sleepers, is the sole supplier of polymer sleepers for KiwiRail in New Zealand. In the area of Groningen Seaports, Heuvelman GSO has placed large footbridges made of recycled composite. This underlines the Northern Netherlands' strong commitment to contributing to the circular construction agenda.

But it does not stop at composite recycling. In the Northern Netherlands the complete value chain for primary and secondary building materials is present. Different companies, specialized in products and services for the soil, road, water and concrete construction industries, have been established here. For example, Theo Pouw produces sustainable concrete which consists of at least 30% recycled concrete granulate. Purified Metal Company recycles steel scrap contaminated with asbestos, or various hazardous components like mercury, PCB's or chrome VI into purified metal blocks, which are ready to be used as building material again.



Eemshaven is the Netherlands' leading offshore wind port, with a track record of constructing 17 wind farms, including many German wind farms that are also serviced from Eemshaven. The emergence of the decommissioning market once again makes Eemshaven an important hub. The Northern Netherlands is therefore investing heavily in composite recycling and in producing recyclable composites. A number of companies focus on this market with tailored circular solutions. Companies like Nedcam in Heerenveen not only focus on XXL 3D printing of recyclable composites for wind blades, but also on yacht building and bridges. Lankhorst in Heerenveen, manufactures of KLP® Hybrid Polymer Sleepers, is the sole supplier of polymer sleepers for KiwiRail in New Zealand. In the area of Groningen Seaports, Heuvelman GSO has placed large footbridges made of recycled composite. This underlines the Northern Netherlands' strong commitment to contributing to the circular construction agenda.



PP from separated residual waste was recycled into a high-quality granulate. Achieved thanks to a collaboration between Philips, Morssinkhof, NHL / Stenden, Groningen University, and Omrin. This unique breakthrough produces such high quality and high purity raw-material granulate, that it can be re-used on a large scale and to produce high-quality 'new' plastic for consumer products in any color. This unique recycling plant has been designed and build by Bollegraaf Recycling Solutions.



With Theo Pouw in Eemshaven, one of the Netherlands' founding fathers of circular asphalt, gravel and sand, we have one of the sector leading pioneers in our ecosystem. APW - an asphalt producer - uses lignine in asphalt to replace bitumens. Field test are ongoing. Icopal and Soprema are experimenting with rubber and bitumen roofing solutions based on recycled materials. All these developments, investors and cooperations make us a strong integrated and efficient powerhouse for the thriving circular economy.



Lankhorst Engineered Products, manufacturer of KLP® Hybrid Polymer Sleepers, is the sole supplier of polymer sleepers for KiwiRail in New Zealand. The main reasons for KiwiRail to choose KLP® Hybrid Polymer Sleepers are the high quality combined with the long life-time of the product. The polymer sleepers will be applied in main track and in turn outs.



4.

Access to green feedstock and energy

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

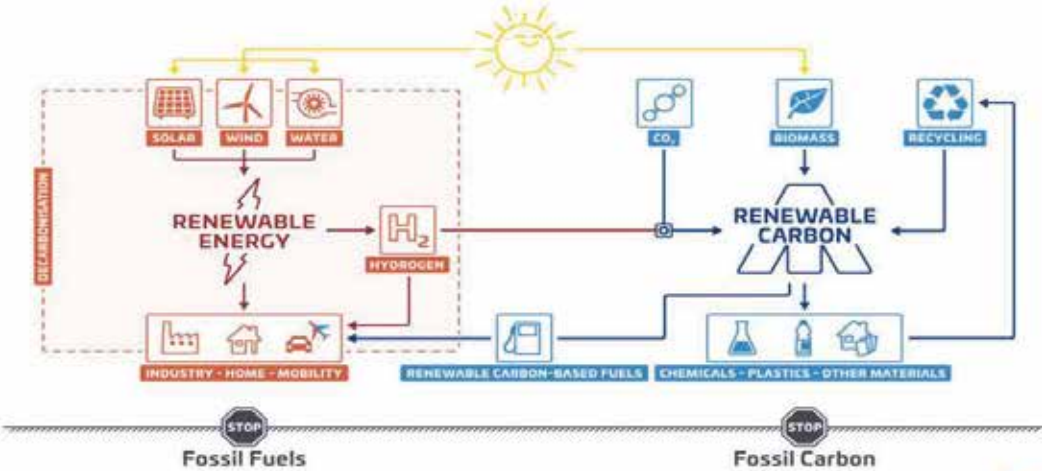
Green feedstock

- Use raw and biorefined agricultural feedstock. Our rich agricultural hinterland provides us with valuable feedstock, such as sugars and starches, from which we can produce chemical building blocks. We have both 1st and 2nd generation sugar production facilities.
- Import additional feedstock or specialized chemical building blocks via our regional seaports, which are close to the agricultural hinterlands of Germany and Scandinavia.

Green energy and Energy efficiency

- Located at a major landing spot for offshore electricity with the possibility for direct connections.
- Solar energy from solar parks.
- Wind energy. The rather flat coastal regions are windy and generally considered one of the best wind energy areas of the Netherlands. Combined with the growing offshore wind farms connected to our ports, we are a true wind energy roundabout.
- Biomass energy. We produce green electricity and steam with biomass.
- Imported green energy. Our ports are connected with Norwegian hydropower production and Danish wind energy through the NorNed cable (longest 700 MW power cable worldwide) and the COBRA cable (also 700 MW).
- Optimize energy efficiency. We optimize the energy efficiency of our processes by reusing heat and waste flows and investing in clean technologies.
- Exchange residual heat. Via a pipeline network, we exchange residual heat and biosteam.

Renewable Energy and Renewable Carbon for a Sustainable Future



5.

European 'hydrogen valley'

The Northern Netherlands is dedicated to producing 100 percent green hydrogen, widely used as building blocks in (green) chemical processes.

Advantages of the current gas value chain

- Located on one of Europe's largest natural gas reserves, the Northern Netherlands has all the advantages of existing assets that can be reused for the hydrogen economy.
- We have the best gas infrastructure in Europe with an abundance of pipeline systems and underground storage locations.
- The region will stop extracting natural gas in 2022 and therefore has the strongest motive to rebuild the current system to an highly efficient hub delivering hydrogen to North West Europe.

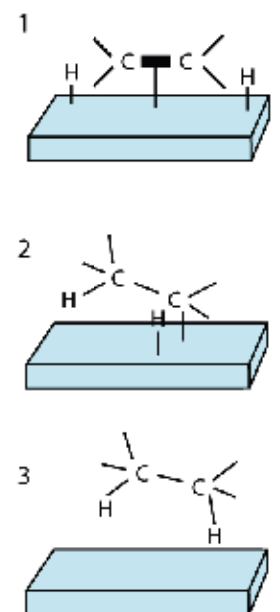
Roadmap towards the Green Hydrogen Economy

- Gasunie is looking at building a national main hydrogen network, which will connect industries, hydrogen storage facilities and production sites, as well as the countries surrounding us. This primarily using existing infrastructure.
- After switching to a hydrogen transmission pipeline network, a stepwise transition can be made from grey to blue to green hydrogen.
- The region is scheduled to have a green hydrogen production capacity of at least 4 GW by 2030 - and 1 GW by 2027 - together with our 20 industry partners, including Eneco, ENGIE, Equinor, NAM, Gasunie, Nobian, RWE, Vattenfall, Shell and others.
- From here green hydrogen production will increase contributing to a fully sustainable cluster of industries with zero CO₂ emissions.

Hydrogenation

Hydrogen is a very important raw material of the future. Currently, it is used as an energy source and as feedstock for fertilizer production and methanol production. However, more processes will adapt and the circular economy and this will enhance the role of hydrogen significantly. For example, through hydrocracking or hydrogenation.

In hydrocracking, plastic polymers are broken down using hydrogen and heat, resulting in products that can be processed by refineries. Hydrogenation of plastics is a potential alternative for breaking down the polymer chain. Compared to treatments in the absence of hydrogen, hydrogenation leads to the formation of highly saturated products, avoiding the presence of olefins in the liquid fractions, which favours their use as fuels without further treatments. In the Northern Netherlands, we have hydrogen in abundance, which makes us the perfect landing place for chemical recyclers.



6.

World Class knowledge and access to talent

Technical skills

The Northern Netherlands is home to 60,000 IT-skilled people over a wide age range, 35% of whom have over 10 years of working experience in this field. Nearly 100,000 of our residents have technical competences, with over half of them having more than 10 years of experience working in a technical job.

We are the fourth technologically ready country according to a report by World Economic Forum and INSEAD. With a score of 9.44 out of 10, the Netherlands scores perfectly across almost all sub-indicators, including internet use, patents, scope of e-government and research infrastructure.

A culture of multilingualism

Because Dutch is not widely spoken internationally, Dutch children start learning different languages in school from a very young age. 90% of Dutch people are fluent in English and many also speak German, French, Spanish or another language. In the EF English Proficiency Index 2018 we ranked second non-native English speaking country in the world.

Excellent talent & knowledge development

The Northern Netherlands' population has a good mix of experience and youth. From fresh young graduates to established professionals, and everybody in between; businesses have a broad spectrum of talent to work with. Anybody who comes to join us here will feel right at home in our vibrant, all-inclusive region.

With 14 research universities, 34 universities of applied sciences and a variety of specialized training facilities, the Netherlands occupies a top 10 worldwide position when it comes to education systems and occupy number 2 in terms of university education in the world, according to IMD's World Talent Ranking 2018.

Much of this high-quality education takes place in the Northern Netherlands region at renowned establishments such as the University of Groningen and the Hanze and NHL Stenden universities of applied sciences. This high level and diversity of education also attracts many international students, whilst our internationalized culture and working opportunities keeps them here.



Groningen's large student population makes it the youngest city in the Netherlands, within an average age of just 36.4



7. Excellent Infrastructure

Circular Economy: the need for excellent infrastructure

Circular economy involves many transport movements on both the input and output side. Excellent infrastructure is necessary.

One of the strong points of the Northern Netherlands is its excellent accessibility, by sea, road, rail and inland shipping. The ports in the region have a very favourable strategic location in respect of Northwest Europe in particular.



Waterways

The Port of Rotterdam, the world's third largest seaport, is easily accessible from the Northern Netherlands. And because we're situated on the Netherlands' northern coast, we're home to three more of our country's biggest seaports: Eemshaven, Delfzijl and Harlingen. We also have a main inland port in Meppel which directly connects to Amsterdam and Rotterdam

Road

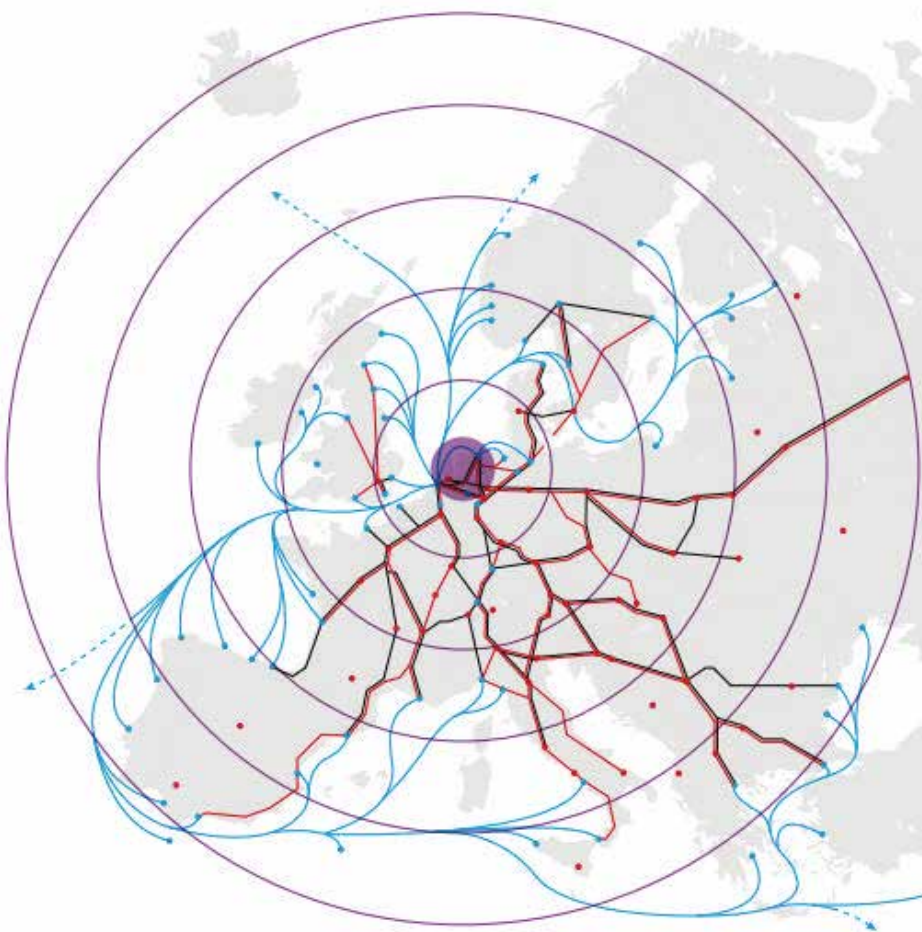
Uncongested, well maintained highways connect the Northern Netherlands region with the rest of the Netherlands and Germany.

Air Travel

Amsterdam Schiphol Airport, one of Europe's biggest business hubs, is only a couple of hours from the Northern Netherlands. We also have our own regional airport: The international Groningen Eelde Airport.

Rail

The Northern Netherlands has direct rail connections to Amsterdam Schiphol Airport, the Port of Rotterdam and to the Euroterminal rail terminal (business park border crossing with Germany), Groningen Railport and Friesland Rail Terminal.

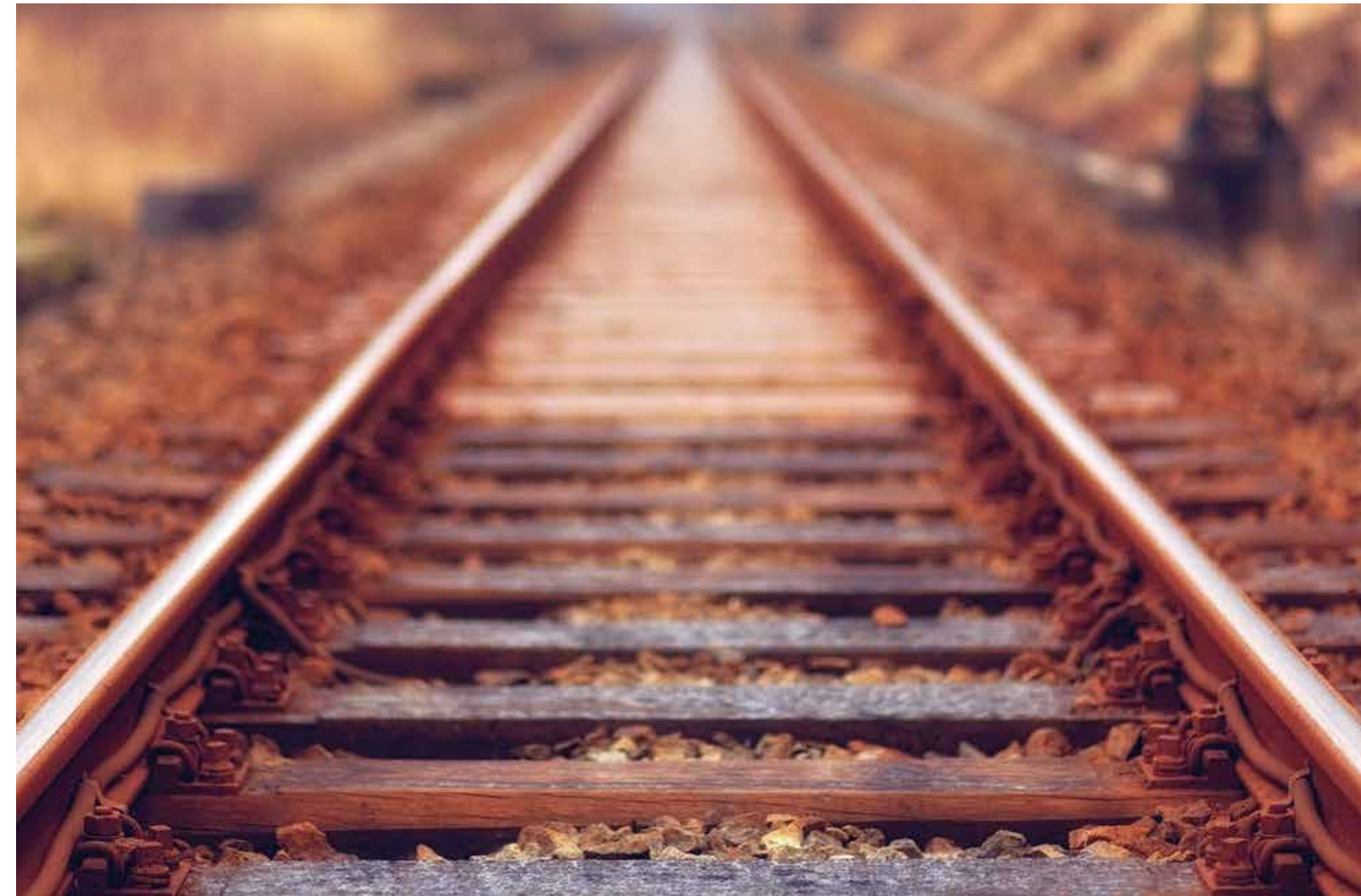


Northern Netherlands: Logistic hub

The Northern Netherlands has direct rail connections to Amsterdam Schiphol Airport, the Port of Rotterdam and to the Euroterminal rail terminal (business park border crossing with Germany), Groningen Railport and Friesland Rail Terminal.

Gateway to Europe

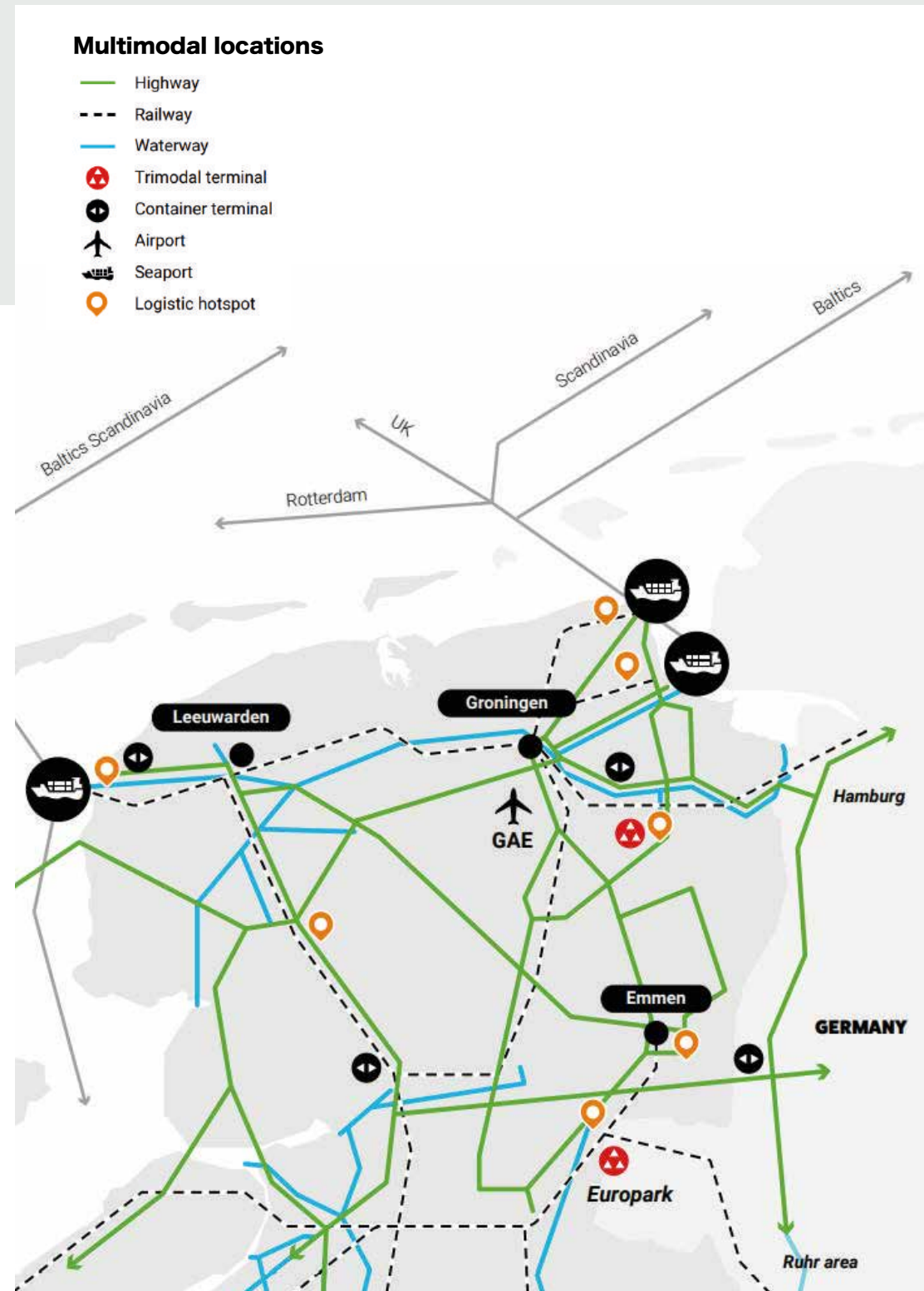
- Seaway
- Highway
- Railway



The world's most connected country

The Netherlands is the world's most logistically connected country. For the fourth time, DHL's 2018 Global Connectedness Index has ranked the Netherlands number one.

The Northern Netherlands benefits from being a part of transport, communications and energy infrastructures which are among the best in the world. Excellent physical connections by road, rail and (inland) waterways means the rest of our country and our European neighbors are easily accessible. As are the air- and seaports which put the whole world within reach. We enjoy fast and reliable online communications, along with a plentiful supply of energy to keep everything running.



8.

European exposure and funding opportunities

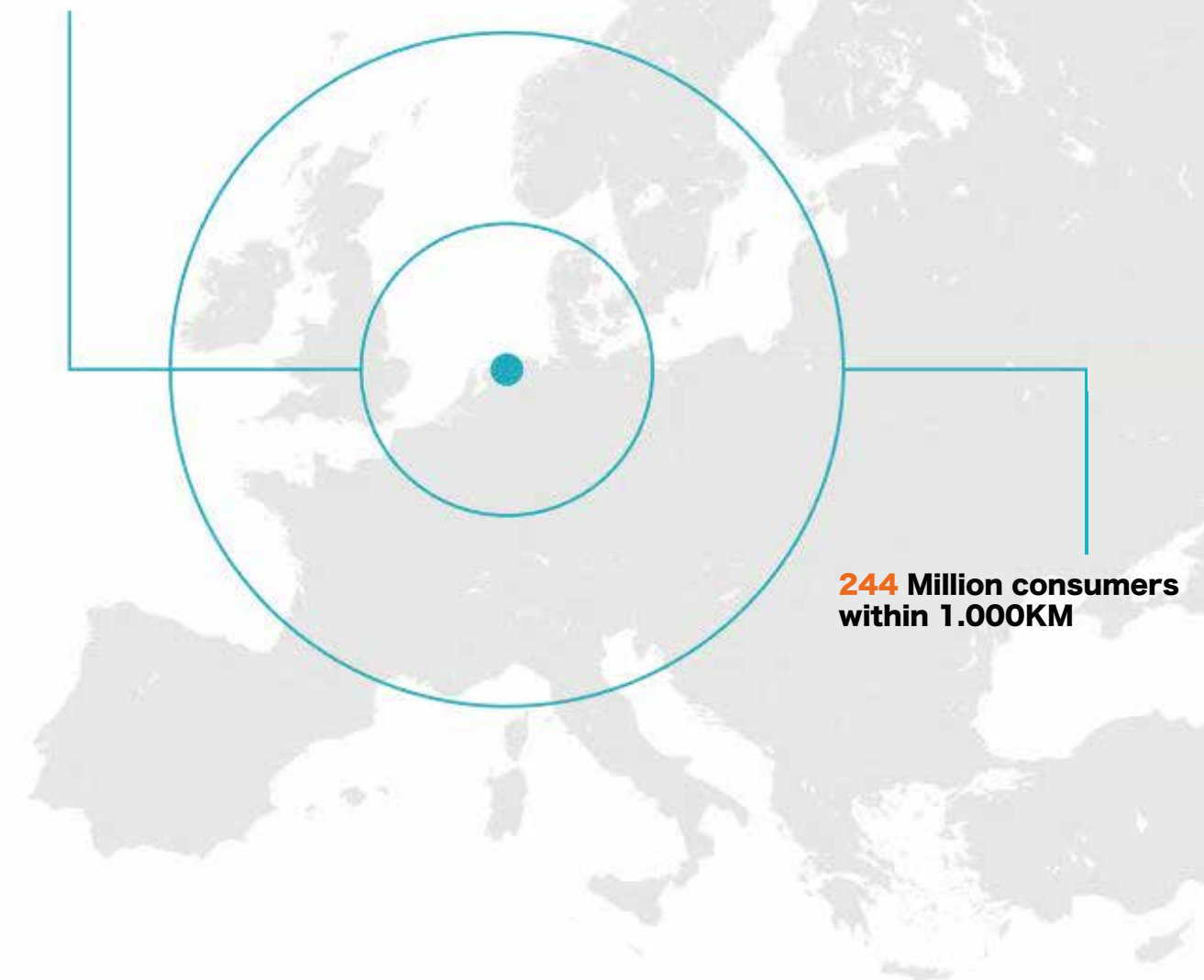
EU membership

The Netherlands - including the Northern Netherlands- is a full member of the European Union, which means all businesses registered here benefit from the international access and trade agreements that comes with EU membership.

Netherlands-based businesses enjoy direct access to the 508.2 million inhabitant EU market, unimpeded by geopolitical borders. Not just that, but there are also no barriers to employing citizens of any member state. We also have numerous trade agreements with countries from outside the EU, providing ease to our companies when doing business with the rest of the world.

Here in the Netherlands, we're particularly efficient when it comes to customs processing of goods being imported into the EU. Our country has a number of speedy entry points, many of which are either within or very close to the Northern Netherlands.

170 Million consumers within 500km



244 Million consumers within 1.000KM

9.

Reliable and ambitious government

Economic environment

The Netherlands ranked 5th in the 2018 International Tax Competitiveness Index. The business in the Northern Netherlands benefits from competitive corporate income tax rates, a wide tax treaty network and a number of attractive incentive programs, including special provisions for highly skilled expatriate workers.

The Netherlands offers a healthy business environment, which sustains the competitiveness of our enterprises.

■ Corporate Tax

At 25% (and 20% on the first €200,000), the Netherlands has one of Europe's most competitive statutory corporate income tax rates. Certainty in assessments relating to future tax positions also helps multinational companies to thrive here.

#6
on IMD's World
Competitiveness
Rankings 2019

#5
International Tax
Competitiveness
Index 2018

■ Provisions for relocated employees

The Netherlands has a well-structured tax code, which is easy for taxpayers to comply with and which promotes economic development while raising sufficient revenue for the government's priorities.

The Netherlands assists companies who need to bring employees in from other countries through a number of tax provisions. These include a sizeable limited-time tax break and tax-free ability to reimburse international school fees, relocation expenses and moving allowances.

The 30% ruling is a Dutch tax exemption for employees who were hired abroad to work in the Netherlands. If a number of conditions are met, the employer is allowed to pay 30% of their salary as a tax-free allowance. The tax-free allowance is considered a compensation for the expenses that the employee has by working outside his or her home country.

■ GDP & Prosperity

In the Netherlands we have a high GDP per capita compared to our fellow EU countries. And furthermore, here in the Northern Netherlands we exhibit the same growth trends as the country as a whole, while having a lower cost of living. We're in a very good place!

The Northern Netherlands' population has a good mix of experience and youth. From fresh young graduates to established professionals, and everybody in between; businesses have a broad spectrum of talent to work with. Anybody who comes to join us here will feel right at home in our vibrant, all-inclusive region.

■ Different business culture

A can-do mentality and pro-business attitude is deep-rooted throughout the Netherlands' culture. With 50% of the country's GDP being derived internationally, the presence of internationals is generally viewed as positive.

This is particularly true of the Northern Netherlands region city of Groningen, where 71% of people agreeing with this statement puts it in the top 5 in European cities according to research commissioned by the European Commission.

The Netherlands excels on the Global Innovation Index with a number 1 ranking in business sophistication, number 2 ranking in knowledge & technology outputs and number 3 ranking in creative outputs.

■ Open culture of innovation

Our government, educational systems and businesses know they share a common aim: Supporting innovation. Therefore, there is a focused culture of collaboration between them.

The Dutch economy scores second best in terms of innovation performance worldwide, according to the Global Innovation Index 2018 published by WIPO, INSEAD, and Cornell University.

#1
Business
sophistication

#2
Knowledge
and technology

#3
Creative
outputs

#2
on Global Innovation
Index 2018



Circular Economy: a growing market

A new and developing market, with new booming technologies needs proper financing to flourish. Government financial instruments can provide incentives for entrepreneurs to develop and finance profitable circular business models. Furthermore, financial incentives can motivate citizens to make responsible choices in the purchase, use and disposal of products.

The Dutch government stimulates organizations to make the switch to circular entrepreneurship. They do this with grants, loans and tax benefits. There is a wide variety of possibilities in this matter, we can send specific details focused on your business case.

Quality of life

Our landscape is a great mix of dynamic cities and tranquil countryside. Our residents can enjoy all the benefits of city life, whilst still being surrounded by vibrant natural environments. We're also less crowded than the western part of the Netherlands: Which means less traffic, cleaner air, lower costs of living and less pressure.

We're a seriously good place to live - proven by the fact that our city of Groningen is ranked as the 5th happiest place on earth by the World Happiness Report! The Netherlands as a whole has also moved up the ladder in terms of 'happiest countries in the world', now taking on the 5th position worldwide.

#5

happiest country in the world :) on UN World Happiness Report 2019

#1

work/life balance on the OECD's Better Life Index

#4

Global household wealth on Credit Suisse's 2018 Global Wealth Report

High quality of life, happy society

The Northern Netherlands has always had a healthy attitude to work/life balance. Our inherently open-minded culture, cosmopolitan cities and stable economy has made our country a welcoming and comfortable place to live and work. We're very successful in combining work, family commitments and personal life.

25% lower housing costs per m2



housing costs Amsterdam

Cost of living

Lower property prices in the Northern Netherlands, compared to other parts of the Netherlands, mean base expenditure is lower so people enjoy a higher ratio of disposable income. And because there are plenty of recreational activities and good shopping facilities here, they get to make the most of it!

The Northern Netherlands offers a wide range of affordable housing options in each segment: from low-income housing to authentic canal buildings; from short-stay studios to long-term rentals. Average housing prices are 25% lower than in central Amsterdam. The relatively low cost of living in the Northern Netherlands means labor costs can be lower, without foregoing quality in the workforce.

Schools and colleges

In the Northern Netherlands, government subsidized English language education is available for pupils from 5 to 19. Most university education is taught in English, with a broad range of courses offered at renowned establishments such as the University of Groningen, and the Hanze and NHL Stenden universities of applied sciences.

The University of Groningen is proud to be among the global elite with a classification in the top 100 of the Shanghai ARWU and the The World University Rankings.

Healthcare

Like everyone else in the Netherlands, residents of the Northern Netherlands region have access to excellent healthcare via the Dutch healthcare insurance system.

#2

Euro Health Consumer index 2018

Top100



10.

Extensive Startup & Scale-up and R&D ecosystem

In the Northern Netherlands, you can test and optimize your new circular business model and supply chain. Test the market for circular products at an industrial scale before going to full production, start regional scale fast(er) to national and European level and plug into an existing large-scale ecosystem. The Northern Netherlands' business ecosystem has very well-developed networks, so it's easy to find new supporters and get advice from experienced entrepreneurs.

Innovation takes many forms. A new product or process, or innovations and smart adaptations to existing facilities. With a great deal of flexibility and entrepreneurship, we are accustomed to responding quickly to market developments. That way we create (sometimes literally) new connections.

We have numerous interesting parties, accelerator programs and events in the Northern Netherlands that boost innovation, like InnovationPact Fryslan, Startup Assist, Startup Visa, the Sustainable Industry Challenge, Groningen Open, Startup Weekend and the Young Business Awards. This list is not exhaustive, but we invite you to give us a call and we will show you around this bustling ecosystem.

One of the projects we like to highlight is the Startup in Residence program. This offers startups the opportunity to actively collaborate for six months with the municipalities of Leeuwarden, Groningen, Assen and Emmen, the Hanzehogeschool and Noorderpoort, Groningen Seaports, Campus Groningen and partners, and the Provinces of Friesland and Groningen. During the program the entrepreneurs receive support and guidance from professional coaches to further develop their idea and prototype into a good product.



Campus - Groningen



Cumapol - Emmen

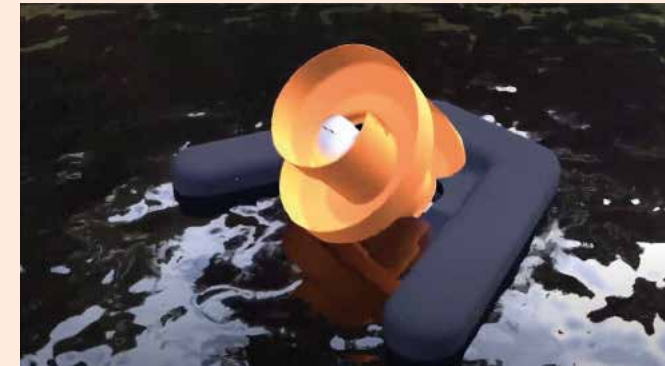


CuRe - Emmen

Technology and R&D

But R&D does not necessarily need to come from startups and scale-ups. With more than 55 years of experience, world market leader Bollegraaf Recycling Solutions, originating from and still located with their R&D plant in Appingedam, close to the port of Delfzijl, is still developing the newest and sometimes even market-disrupting recycling machines. With its equipment used all around the world and with its branch office in New York, Bollegraaf Recycling is a well known international player in its field, again putting the Northern Netherlands on the world map for the circular economy.

Startup Noria 'Startup Noria is currently participating in the Startup in Residence challenge of Groningen Seaports and will test their Canal Cleaner in the Port of Delfzijl. After that they will scale-up the project scope to the whole Northern Netherlands together with the Ministry of Infrastructure and Water and the Waddenfoundation.



“ In the Northern Netherlands, you can test and optimize your new circular business model and supply-chain. Test the market for circular products at an industrial scale before going to full production, start regional and scale fast(er) to national and European level and plug into an existing large-scale ecosystem ”

Eemshaven - Delfzijl



Purified Metal Company is the first company in the world to responsibly process contaminated steel scrap into a high-quality raw material. The process is patented and developed to separate the contaminants from the steel in a 100 percent safe way. In their factory in Delfzijl, the hazardous steel scrap is processed into steel blocks, the so-called Purified Metal Blocks™ (PMBs), which serve as a high-quality raw material for the steel and foundry industry. In fact, every kilogram of PMB's produced saves 1 kg of CO₂ because steel is not produced by iron ore.



Furniture from recycled plastic



Forbo
FLOORING SYSTEMS



VAN DE SANT
a Circular Innovation Company



Plastic Whale

SEN BIS
POLYMER
INNOVATIONS



Biodegradable infill

H&P



Biobased medical devices

morsinkhof plastics



Development of PLA yarn

HEMP
FLAX



Scooter made from bioplastic composite

Plastic Whale



Boat made from PET bottles

BioBTX



Bio-PET made from Fyring oil

FrieslandCampina



Sustainable packaging

BOLLEGRAAF
RECYCLING
SOLUTIONS



Biobased medical devices

Circular Plastics Ecosystem Northern Netherlands

- **Innolab Chemistry**
- **Pezy Pilot Factory** (demo/commercial scale)
- **Zernike Advanced Processing Facility (ZAP)**
- **Polymer Sciences & Chemical Engineering** - University of Groningen
- **Industrial Design** - Hanze University of Applied Sciences
- **Minerva School of Arts** - Hanze University of Applied Sciences
- ● ● **Innovation Centre Chemistry & Engineering**

- **Maritime Offshore Innovation**
- **Mechanical Recycling Pilot Site** - Bek & Verburg
- **Analytical Lab** - SGS
- **Chemport Innovation Centre**
- **The Planet Calls**

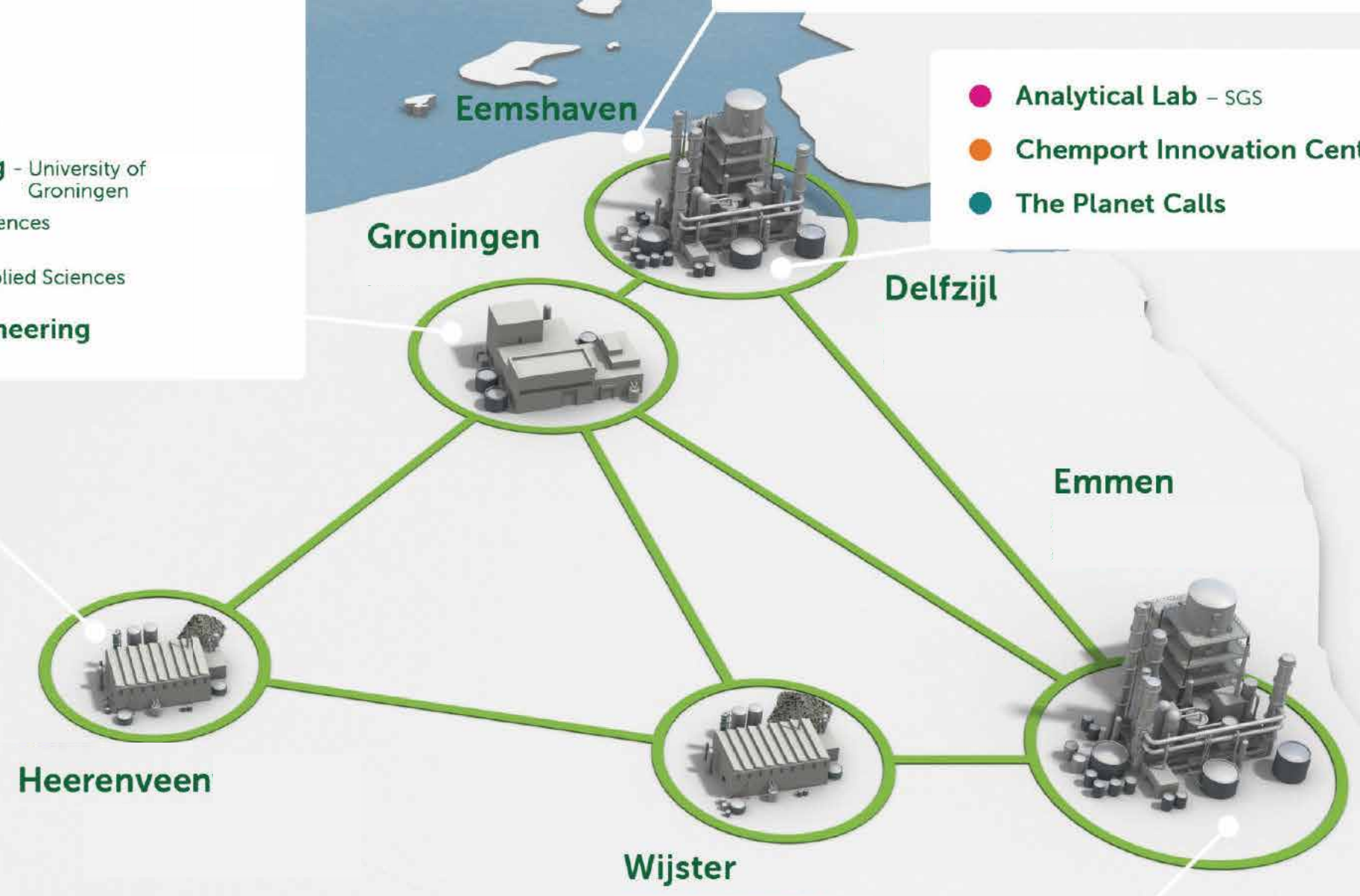
- ● ● **National Test centre Circular Plastics (NTCP)**

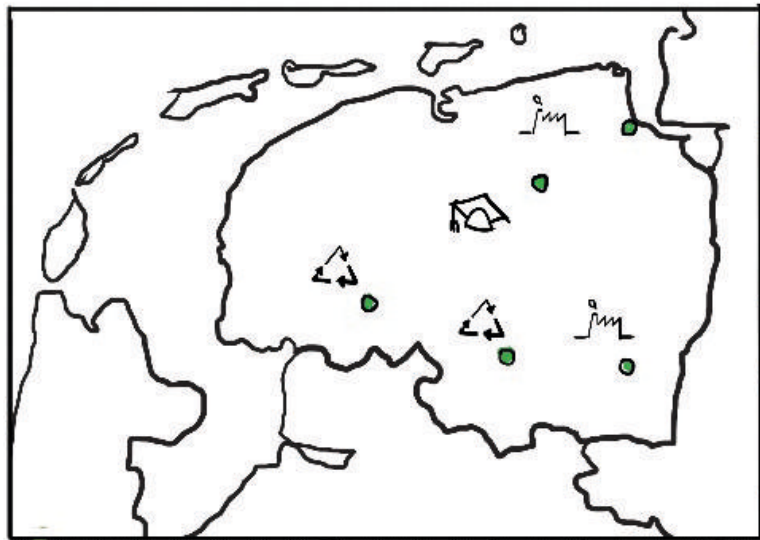
- **Mechanical Recycling Lab** - Van Hall Larenstein
- **Circular Design Lab** - NHL-Stenden University of Applied Sciences

Supporting infrastructure

- **Analytical labs / polymer labs**
- **Pilot facilities**
- **Knowledge**
- **Demo site**

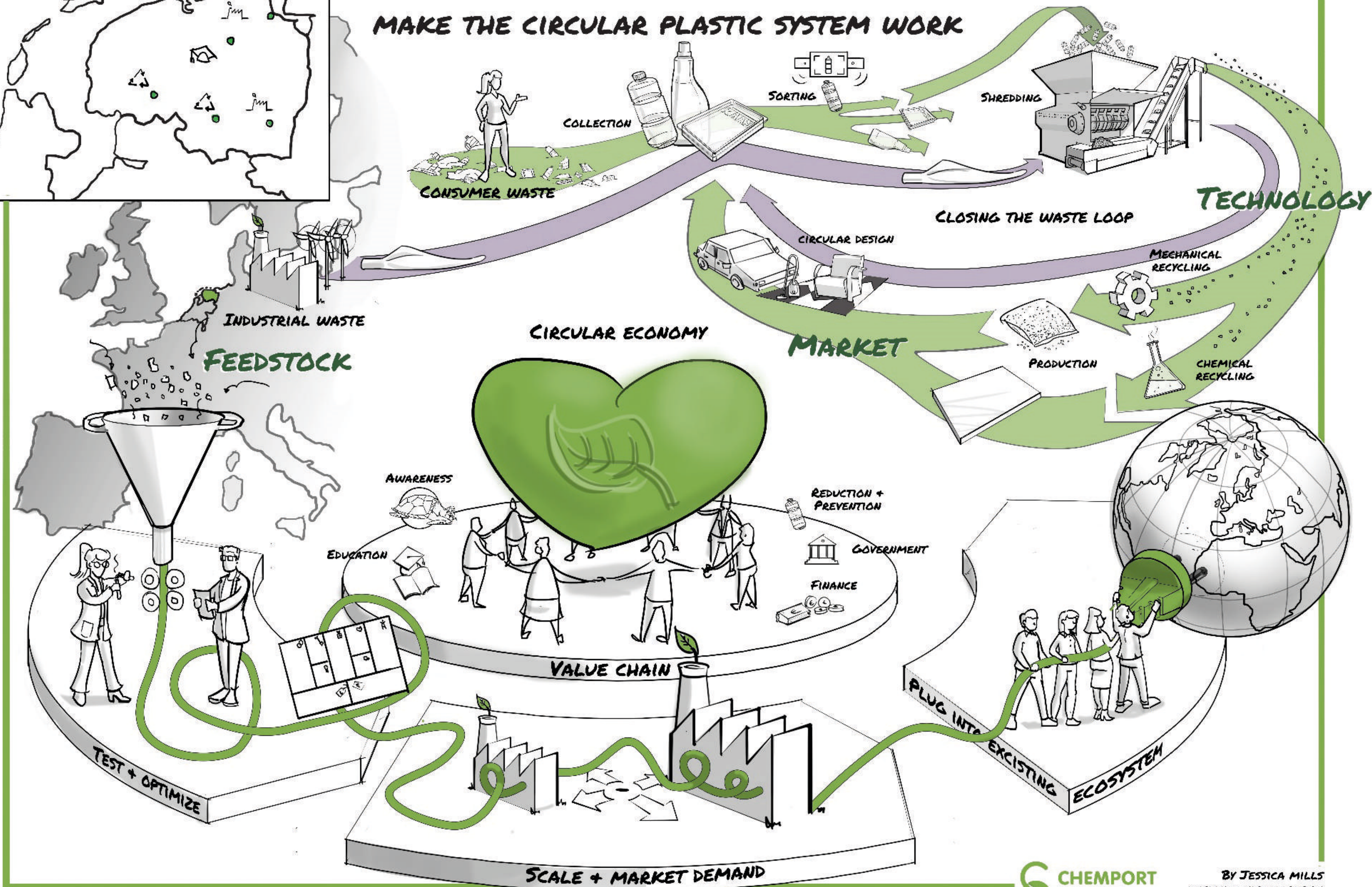
- **Polymer Engineering** - NHL-Stenden University of Applied Sciences
- **Chemical Recycling Lab** - NHL-Stenden University of Applied Sciences
- **Circular Plastics Lab** - NHL-Stenden University of Applied Sciences
- **Materials Lab** - Emmtec Services
- **Polymer Lab** - Senbis Polymer Innovations
- **Sustainable Polymer Innovation Cluster (SPIC)**





CHEMPORT

MAKE THE CIRCULAR PLASTIC SYSTEM WORK





Aliancys	Forbo Novilon	Photanol
Area	FrieslandCampina	Plixxent
Attero	GipsRec	Polem
Avantium	H&P Moulding	Polytech
AVR	Hempflax	Probo
BASF	Heuvelman GSO	Prodin
Bek & Verburg	Icopal	Schur Flexibles
BioBTX	Impact Recycling	Senbis Polymer Innovations
Bollegraaf	Lankhorst	Sidijk
ChemCom	LIMM	Soprema
Cumapol	Low&Bonar	Subcoal
CuRe Technology	LPF	Purified Metal Company
Delamine	Lubrizol	Suez
DOW	Lubo Systems	Sylvaphane
DSM	NNZ	S4GroNext
DVC	Nova Riet	Teijin Aramid
Elzinga & van der Krieke	N+P Group	Theo Pouw
Enerpi	MF Emmen B.V.	Torgas
EPS Nederland	Morssinkhof Plastics	TRH Recycling
Essentra	Nedcam	Van Afval
EuroProvyl	Oerlemansplastics	Van de Sant
EV Biotech	OMRIN	VEPA
EEW	Paques	Virol
Flexoplast	Pezy Group	Vita Plastics
Foamplant	Philips	VDL Wientjes

SNN - VNO NCW - SBE Eemsdelta - Province of Groningen - Province of Drenthe - Province of Friesland - Groningen Seaports - NOM - Circular Friesland - Community Plastic Free Waddensea - House of Design - Northern Netherlands Plastic Foundation - Port of Harlingen - Port of Lauwersoog - TCNN - NHL Stenden University of Applied Sciences - Alfa College - Noorderpoort College - Van Hall Larenstein - Drenthe College - ROC Frieseport - Friesland College - University of Groningen - Nordwin College - Minerva Schools - AOC Terra



**Join us to make the
circular economy work!**



Willemien Veele

willemien.veele@circulairfriesland.frl
+316 – 47 97 04 26



Errit Bekkering

e.bekkering@chemport.eu
+316 – 25 00 83 70



Heleen van Wijk

h.vanwijk@ groningen-seaports.com
+316 – 31 65 19 86