CHEMPORT EUROPE

Changing the nature **of chemistry**

Chemport Europe is sustainable chemistry
between companies, universities and governments.

Chemport Europe.
Changing the nature of chemistry

Chemport Europe is the incubator for green chemistry. It meets all the conditions that enable the sustainable chemistry of the future to develop and flourish. Chemport Europe offers a dynamic ecosystem for companies committed to a greener chemical sector.

What is so special about Chemport Europe?

1 The presence of several chains for your company to link up with, green raw materials in abundance, increasing amounts of sustainable energy and fast connections with every part of the world.

2 The intensive cooperation between companies, universities and government in The Triple Helix. All share the same ambition. Permitting processes are expeditious and assisted by supportive NGOs.

We share the same ambition

Companies, universities and government have joined forces to make a future-proof chemical industry.

Government
- Policy
- Regulations
- Permits
- Infrastructure
- Launch customer

Education
- Knowledge
- Research
- Facilities

Business acumen
- Innovation
- Companies
- Employment
- Economic impulse
- Market demand

A unique combination of elements

Agro/Feedstock

A successful transition to a sustainable chemical sector requires renewable raw materials. The Top Dutch region has a well-organised agricultural sector that produces sugar beet, potatoes and other crops in a highly efficient manner. **There is no other part in the world that rivals the yield per hectare that is achieved here.**

Chemistry/The chain

Your company can link up to and use integrated systems for all utilities available at the communal infrastructure. There is also a central wastewater purification system.

Connections with the rest of the world

Chemport Europe is well connected to the world by road, rail, ship and air with three mainports and three airports within 200 km. So you can import and export your materials and products efficiently.

Playing field for innovation

We focus on innovation. Characterised by curiosity and hunger for knowledge. The area is a playing field where research and experiments guarantee innovative ideas for products and applications.

Plenty of sustainable energy

Chemport Europe already obtains a large part of the required heat and energy from sustainable sources. Investments in solar energy and wind parks, combined with smart energy solutions guarantee sustainable energy with a high security of supply.

Knowledge and human capital

The Top Dutch region houses a leading university and several universities of applied sciences. We have testing sites where research is carried out into new products and applications. The area is also home to many talented young people who are highly motivated to work on the chemistry of the future.

The seeds were sown in 1839

Chemport Europe has a rich history when it comes to bio-based chemistry. Even though nobody was familiar with the concept back in 1839, W.A. Scholten - a predecessor of Avebe - already extracted everything from a potato - starch, protein, glue and dextrose. If there was anything left at all, it was used to distil alcohol. ***There was no waste, the cycles were closed.***

The ecosystem building blocks

Our sugar and dairy industry already had successful cooperation between agricultural and processing companies, where maximum value was extracted from sugar beet and milk in the form of sugar, a range of dairy products and animal feed. The waste streams served as raw materials for the cardboard industry.

Thus the grain-processing industries, the potato-processing businesses of Avebe and the sugar factory of Royal Cosun - important building blocks of today's biochemical ecosystem - were founded. The discovery of salt, the opening of a soda factory and a nylon factory were powerful impulses for the region. The discovery of natural gas in 1959 accelerated the development of industry.

Companies and universities worked together intensively and raised the industry to a higher plan; fundamental and applied research by the universities of applied sciences and the university encouraged the development of Chemport Europe. They work even more closely together with bio-based companies since they entered into a new alliance known as BERNN. Today, Chemport Europe is the unique ecosystem for the continued development of green chemistry for decades to come.

Productivity

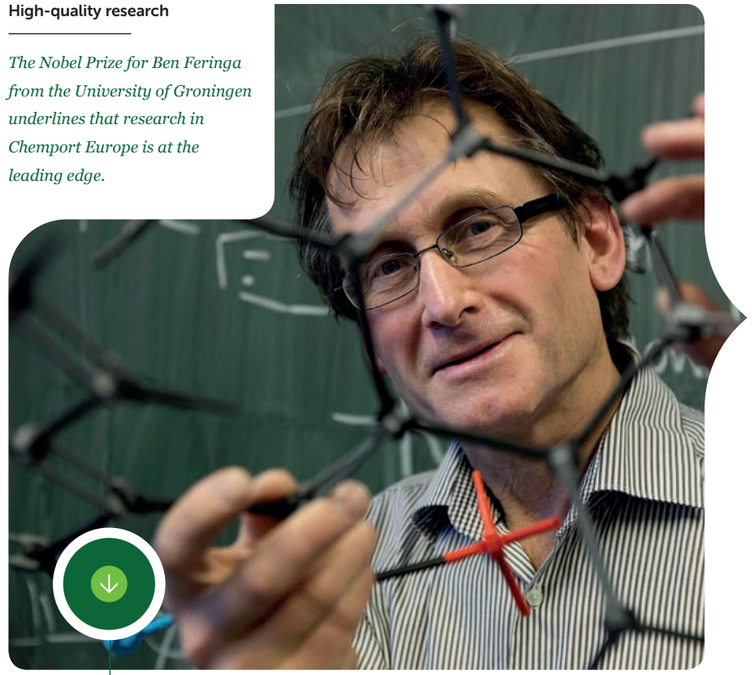
The agricultural businesses in Chemport Europe excel in productivity. In other words, green raw materials are available in abundance at competitive prices.

Two clusters

Delfzijl and Emmen are two important chemical clusters of Chemport Europe.

High-quality research

The Nobel Prize for Ben Feringa from the University of Groningen underlines that research in Chemport Europe is at the leading edge.



1839 W.A. Scholten started up 24 factories in the area of potato flour, potato malt wine, strawboard, sugar and peat litter.

1914 The incorporation of the fourth sugar cooperative, via CSM the predecessor of the biotechnology company Corbion.

1919 Incorporation of the Aardappel Zetmeel Verkoopbureau, the predecessor of Avebe.

1951 Construction of a nylon factory Algemene Kunstzijde Unie (AKU), predecessor of AkzoNobel in Emmen.

1958 Start Salt, Soda and Chlorine production in Delfzijl.

1959 Discovery of the largest natural gas field in West Europe under the Province of Groningen.

1976 Pilot plant for super-strong fibre 'Twaron' in Emmen.

2007 Avebe/Solanic is the first to manage to extract high-grade protein from potato juice.

2008 First large-scale biomethanol production by BioMCN.

2015 Designated as European best-practice region for 'sustainable chemicals'.

2016 The Dutch chemist Prof Dr Ben Feringa (RUG) was awarded the Nobel Prize for Chemistry.

Everything you need to go green

The chemistry of the future is sustainable chemistry - renewable raw materials are on the march and processes are optimised, ***the required energy is increasingly generated by wind, solar and sustainable heat.***

Feedstock in Chemport Europe

The supply of green raw materials, such as potatoes, sugar beet, grass and grain is guaranteed at competitive prices.

SUGAR BEET	WHEAT	CORN/GREEN FEED	POTATOES	RAPESEED	GRASS
28,000 hectares	117,000 hectares	301,000 hectares	74,000 hectares	14,000 hectares	620,000 hectares

Sources of platform molecules for the chemical industry

Symbiosis between agro and chemistry

Chemport Europe's agricultural sector is one of the most productive in the world. As a result of efficiency, innovation and a high level of organisation, the arable farmers are producing plenty of renewable raw materials that are used by the chemical industry to extract platform molecules.

Abundant energy

Over 8,000 MWh of energy is generated in the form of electricity and heat in Chemport Europe. Sustainable heat accounts for 70% of Chemiepark Delfzijl's requirements; additional solar energy and wind parks are under development accelerating the transition to green chemistry. The security of supply is extremely high.

"For AkzoNobel, Chemport Europe is the centre of our innovation programme, to develop and implement bio-based/renewable chemicals and energy. It is an excellent location for an integrated approach to bio-refinery, green chemistry and green energy."

Marco Waas
Director RD&I and Technology at AkzoNobel

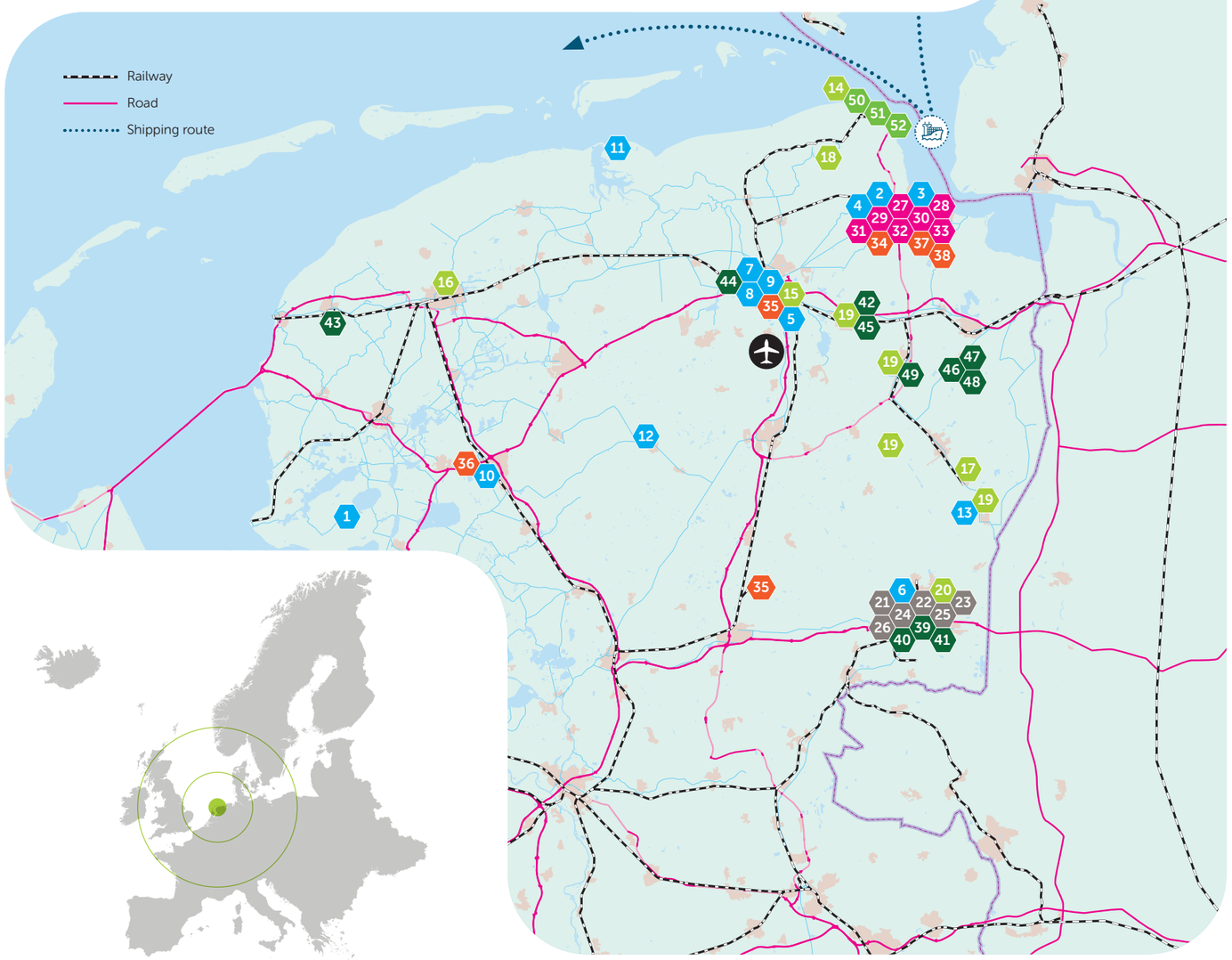
Chemport Europe has a unique combination of elements that creates 'the right chemistry' for attractive business cases.

- Guaranteed supply of raw materials (feedstock), such as sugar beet and potatoes, grass, grains, salt and water
- Opportunity to import biomass via seaports
- Extremely reliable supply of energy - local, green and sustainable
- Two sustainable chemical clusters around intermediate chemicals, innovative polymers and fibres
- Knowledge institutes of world renown, such as the University of Groningen, Hanze and Stenden Universities of Applied Sciences, Van Hall/Larenstein and NHL, cooperate in BERNN
- Unique cooperation between companies, government and universities (Triple Helix), ensuring that policy, facilities and financing are focused on successful business operations
- Excellent connections with purchase and sales markets by sea, rail, road and air
- Availability of capital in the form of investments, credits and subsidies
- Smooth permitting process

Integrated and connected to the market

Entrepreneurs benefit from cooperation in the chemical chain. Everyone can use the available networks with many utilities. Water purification is arranged centrally. Chemport Europe is heading towards a circular economy - the waste flows of one business are the valuable raw materials for another. The environment benefits too.

Excellent connections with suppliers of raw materials and sales markets worldwide.



Connections

United Kingdom
490 km
300 miles

Scandinavia
790 km
490 miles

Baltic States
1030 km
640 miles

Ruhr area
270 km
166 miles

Rotterdam
280 km
170 miles

Antwerp
340 km
210 miles

Hamburg
280 km
170 miles

Businesses

BIOCHEMICALS

1 Paques
www.paques.nl

2 ChemCom Industries
www.chemcom.eu

3 Musim Mas / DGR
www.musimmas.com

4 OCI / BioMCN
www.oci.nl

5 BioBTX
www.biobtx.com

6 Sunoil Biodiesel
www.sunoil-biodiesel.com

7 Biofuran Chemical Products
www.biofuran.com

8 Royal Cosun
www.cosun.nl

9 Syncom
www.syncom.nl

10 BASF
www.basf.com

11 Telson
www.telson.nl

12 Ecostyle
www.ecostyle.nl

13 Ofichem
www.ofichem.com

FOOD

14 Holland Malt
www.hollandmalt.com

15 Suiker Unie
www.suikerunie.nl

16 Koopmans Meel
www.koopmansmeel.nl

17 Ten Kate
www.tenkate.nl

18 Waddenmolen
www.waddenmolen.nl

19 Avebe
www.avebe.nl

20 Jellice
www.jellice.eu

SUSTAINABLE MATERIALS & APPLICATIONS

21 Low & Bonar
www.lowandbonar.com

22 Morssinkhof Groep
www.morssinkhof-groep.nl

23 Teijin
www.teijinaramid.com

24 DSM
www.dsm.com

25 Innofil3D
www.innofil3d.com

26 HP Moulding
www.hpmoulding.com

CHEMICALS

27 AkzoNobel
www.akzonobel.com

28 Delamine
www.delamine.com

29 DOW
www.dow.com

30 Evonik Industries
www.evonik.com

31 PPG
www.ppg.com

32 Teijin
www.teijinaramid.com

33 Zeolyst International
www.zeolyst.com

GREEN ENERGY & RECYCLING

34 Eneco
www.eneco.nl

35 Attero B.V.
www.attero.nl

36 Omrin
www.omrin.nl

37 EEW Energy B.V.
www.eew-energyfromwaste.com

38 North Water
www.northwater.nl

SUSTAINABLE BIOMATERIALS

39 Senbis Polymer Innovations
www.senbis.com

40 Cumapol Polyester Upgrading
www.cumapol.nl

41 DSM
www.dsm.com

42 Covestro AG
www.covestro.com

43 Huhtamaki
www.huhtamaki.com

44 Polyvation
www.polyvation.com

45 ESKA
www.eska.com

46 Dunagro
www.dunagro.nl

47 Hempflax
www.hempflax.com

48 Solidus Solutions
www.solidus-solutions.com

49 Dynaplak
www.dynaplak.nl

ENERGY

50 NUON
www.nuon.nl

51 RWE
www.rwe.com

52 ENGIE
www.engie-services.nl

Young, talented and inquisitive people

The world of green chemistry has only been charted to a limited extent. There is plenty of room to discover, research and find out. Curiosity and an investigative attitude are essential. These traits are available in abundance in the university, universities of applied sciences and the many vocational institutes in the region.

New insights and ideas

Chemport Europe is an ecosystem where research fuels the flames of innovation. Scientists and entrepreneurs work closely together in test centres, laboratories and demo-sites.

Knowledge is developed and shared; new products are conceived and businesses are created around new insights and ideas. This is how science helps the chemical industry to advance and vice versa.

Research fuels the flames of innovation

Facilities where education and business work together on development and innovation

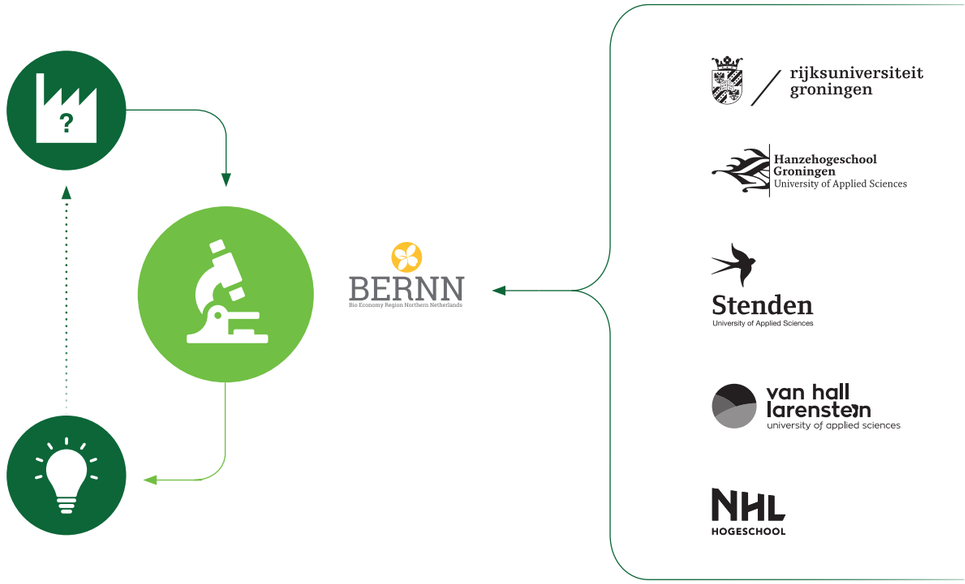
- Energy Academy
- Innolab Chemie
- EnTranCe
- ZAP Facility
- GreenPAC (COCI & iLab)

Research and education

Campus Groningen is the hotspot for research, innovation and start-ups. Corporation with other universities guarantees the availability of top talent at all levels. Laboratory staff, researchers, product developers and process operators, but also business consultants, marketeers and ICT professionals like to live and work in the Top Dutch region. The combination of lively city centres and the peace and quiet of the countryside makes for an extremely pleasant place to live.

BERNN (Bio Economy Region Northern Netherlands)

BERNN is the alliance of the four Northern universities of applied sciences and the University of Groningen. The shared ambition is to strengthen the position of green chemistry in the region even further. Demand-driven cooperation between companies and universities is essential.



Characteristics of Campus Groningen

Students in academies and universities:	Percentage of inhabitants of Groningen with higher education:	ShanghaiRanking 2016 University of Groningen:	Research programmes focused specifically on bio-based developments:	Awarded Nobel Prizes:
>55,000	44%	72	8	3

Chemport Europe enables chemistry to flourish

Chemport Europe is the sum of qualities that explains the flourishing ecosystem - ***the power of synergy***.

"Our investment here in Delfzijl expands our capabilities and delivers growth focused on innovative and sustainable technology and demonstrates PPG's continued commitment to our global customers. We worked in partnership with local authorities who helped us with a smooth permitting process. Furthermore this region has good staff with a high loyalty and productivity which makes Delfzijl the ideal place for our expansion."

Jos Hudepohl
Plant Manager PPG Delfzijl

Sustainability is about sharing

Agriculture, technology, science and the ambition to make chemistry more sustainable arew widely supported in our local society. We share knowledge, networks and facilities. It makes everything easier, building your new plant, obtaining raw materials and energy, and developing innovative products.

Investors supporting your vision

Investments, funds and subsidies - the sustainability ambitions of Chemport Europe make it easier to acquire capital.

The law of creating possibilities

Your plans quickly become reality in Chemport Europe. The government and nature organisations support the fast transition to green chemistry that is taking place in Chemport Europe.

What we have and where we will go

Chemport Europe is a fertile breeding ground for companies that want to advance bio-based chemistry right now. Our ambitions go beyond that and progress is made daily. Where will Chemport Europe be in 2030?

The future of chemistry started in Chemport Europe. The stories of the companies and the products that have been developed in our ecosystem speak for themselves.

Join us in changing the nature of chemistry. Take your first step and contact Chemport Europe. More details are noted on the back.

Visit us on
www.chemport.eu

'We facilitate the transition and location of companies that work with us towards sustainable chemistry. We have the talent, we are dynamic, we have gumption; we don't hang about, we roll up our sleeves and get stuck in.'

Patrick Brouns
Regional Minister of Economic Affairs, Province of Groningen

The 100% bio-based PET bottle;
from dream to reality

Step into the future

Some ambitions have already become reality and will have an even greater impact in the future. What about yours?

Biomethanol from sugar-beet pulp

- **Biomethanol from sugar-beet pulp**
  Sugar-beet pulp is used to generate green gas. Green gas is processed by BioMCN into biomethanol, a basic raw material in the chemical sector.

- **Replace PVC in coco mats with starch**
  The backing of coco mats has always been made of PVC. Dynaplak in Veendam has managed to make backing of 'engineered' starch

- **Fewer microplastics in our environment**
  Senbis in Emmen is developing strimmer wire and fishing-net fibre based on a biodegradable polymer. Due to this product there are fewer microplastics in our gardens, parks and oceans.

Grass fibre - raw material for packaging

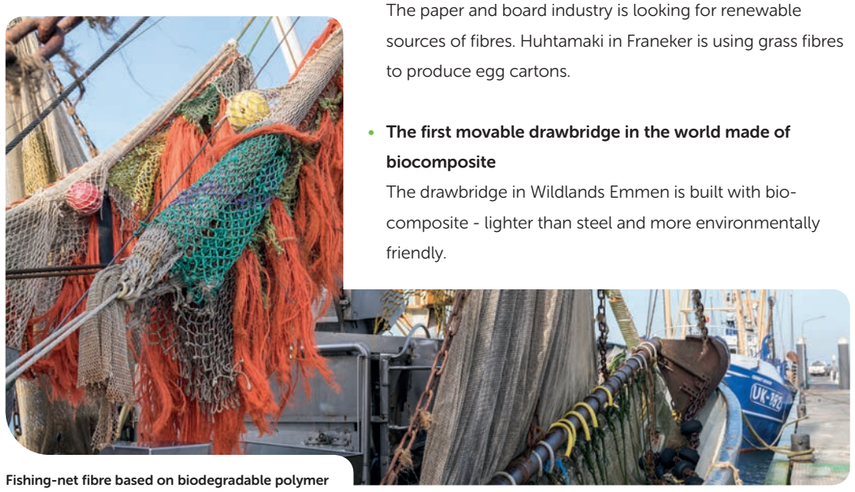
- **100% Bio-PET for sustainable PET bottles**
  BioBTX and Cumapol have managed to make products of 100% Bio-PET. Applications of Bio-PET in large numbers of PET bottles on the horizon.

- **Slow-release fertilizer helps agriculture**
  ChemCom Industries in Delfzijl produces a special 'slow-release fertilizer' that is used in agriculture.

- **Hemp in passenger vehicles**
  Hemp is grown and refined in the region. The fibres are processed into insulation material for passenger vehicles, amongst other things.

- **Grass fibre - raw material for packaging**
  The paper and board industry is looking for renewable sources of fibres. Huhtamaki in Franeker is using grass fibres to produce egg cartons.

- **The first movable drawbridge in the world made of biocomposite**
  The drawbridge in Wildlands Emmen is built with bio-composite - lighter than steel and more environmentally friendly.



Fishing-net fibre based on biodegradable polymer

Join us to change the nature **of chemistry**

Contact us today!

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