BIOBASED ECONOMY

AN IN-DEPTH OVERVIEW OF THE BIOBASED SECTOR IN BRABANT

BRABANT IS BRIGHT.nl

BOM

Table of Contents

Table of Contents

Colophon

Brabant, the Netherlands – An in-depth analysis of its Biobased economy,
a publication of the Brabant Development Agency (BOM), Tilburg, the Netherlands

AUTHORS
Peije Bruil & Paul Kleijne - ARCUSplus
Henry de Vaan - Fanion Onderzoek & Advies

PUBLICATION DATE
April 2022

DESIGN
maan identity. design. content. - Ulvenhout

1. INTRODUCTION TO BRABANT, THE NETHERLANDS

A. What has Brabant got to offer?

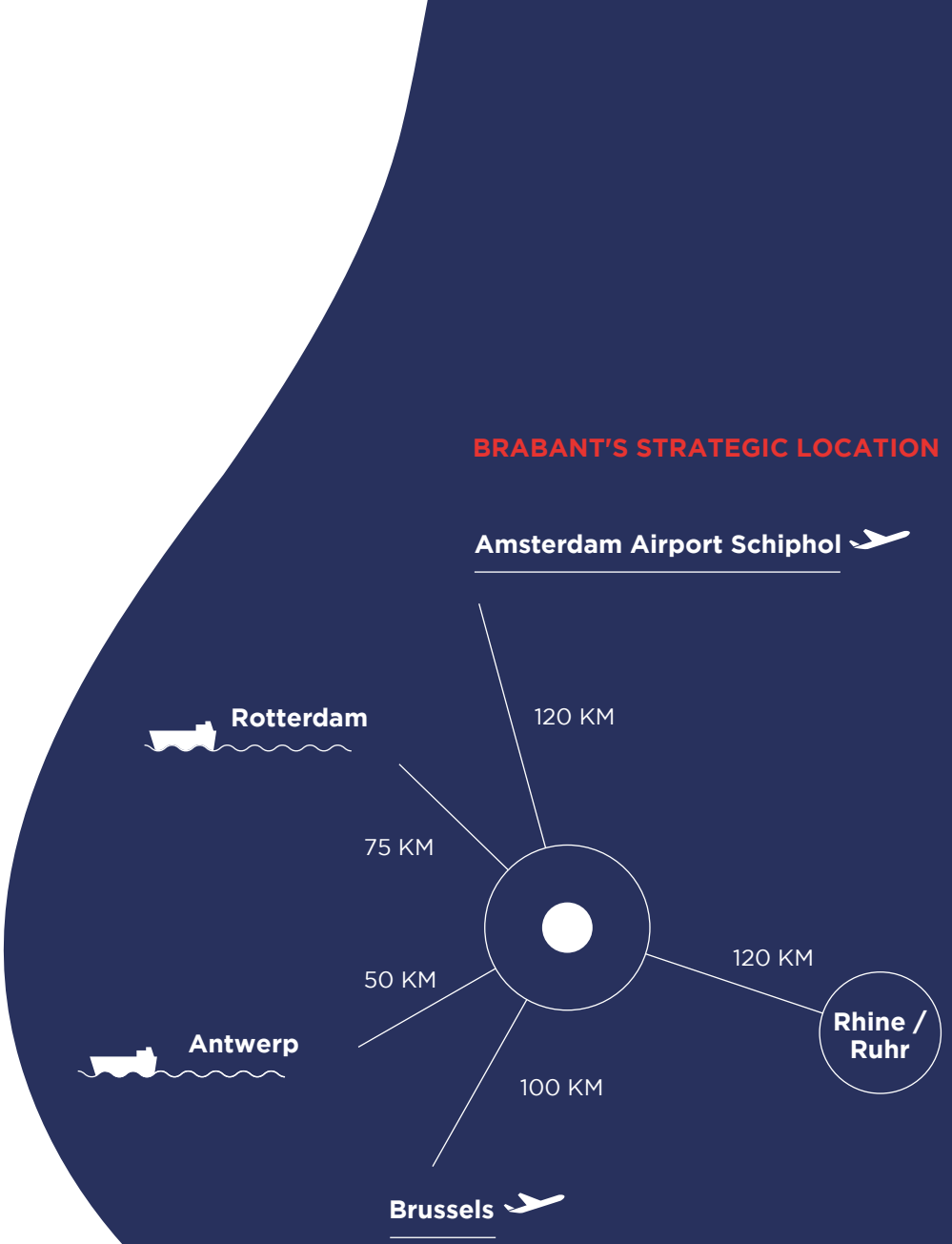
The Dutch province of Noord-Brabant is located in the southern part of the Netherlands, strategically situated between Amsterdam Schiphol Airport, Europe's leading seaport in Rotterdam, the Port of Antwerp, Brussels, and the major German economic heartland of the Rhine-Ruhr region. Brabant covers an area of 5,082 km², making it the second largest province in the Netherlands, and is home to some 2.5 million people spread across 62 municipalities.

- From a geographic perspective Brabant offers easy access to 170 million Europeans within a 500 km (310 mi.) radius. Physical and telecommunication infrastructure are best-in-class when it comes to establishing head offices and/or marketing & sales, R&D, manufacturing, and logistics operations.

- Costs-wise, the Netherlands has a favorable corporate tax regime in comparison to most European countries.

- Research, product, and process development and manufacturing are in Brabant's DNA. Ranging from primary production in agriculture and the food industry to the manufacture of semifinished products, all the way through to OEM production of the most complex electronic, biopharmaceutical, nutraceutical, and IT products and equipment – all these activities can be found in the region in abundance.

- The well-developed industrial and knowledge networks or "ecosystems" in High-tech Systems, IT & Data Science, Logistics, Life Sciences & Health, AgriFood, Chemicals, and Aerospace offer opportunities for cooperation at a very high level. Cross-industry partnerships in the region are a given.



Source: BOM, Info & Graphics

Figure 1: Brabant Strategic Located

B. Brabant's main benefits

The province of Brabant offers the famed Dutch business-friendly environment as well as a number of favorable geographical advantages:

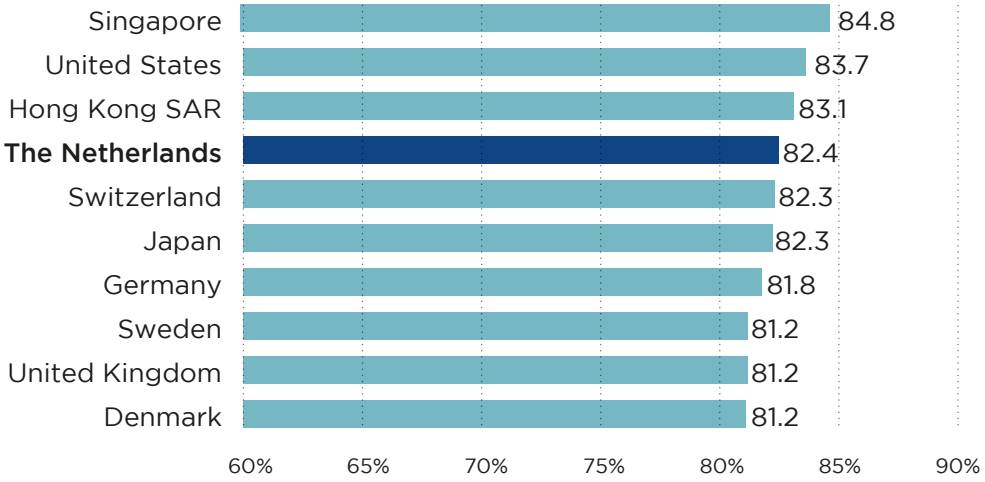
The Netherlands as a whole, and Brabant specifically, offer:

- an attractive tax climate, including personal and corporate income tax and value-added tax (VAT)
- a stable economic, political, and social climate
- competitive labor costs

Brabant is particularly well-located in Europe thanks to:

- its easy accessibility
- its excellent infrastructure

As a whole, time and again, the Netherlands – with Brabant at its innovative heart - proves to be a highly competitive economy on a global scale!



Graph 1: The Global Competitiveness Index

THE NETHERLANDS, ONE OF THE WORLD'S MOST COMPETITIVE ECONOMIES (WORLD ECONOMIC FORUM (2019) – THE GLOBAL COMPETITIVENESS REPORT 2019

C. Brabant's main cities

Covering 5,000 square kilometers (2,000 square miles), almost 15% (2.5 million inhabitants) of the Dutch population lives in Brabant. The capital of Brabant is Den Bosch, while its largest city is Eindhoven, followed by the cities of Tilburg, Breda, Den Bosch and Helmond.

Source: BOM, Info & Graphics

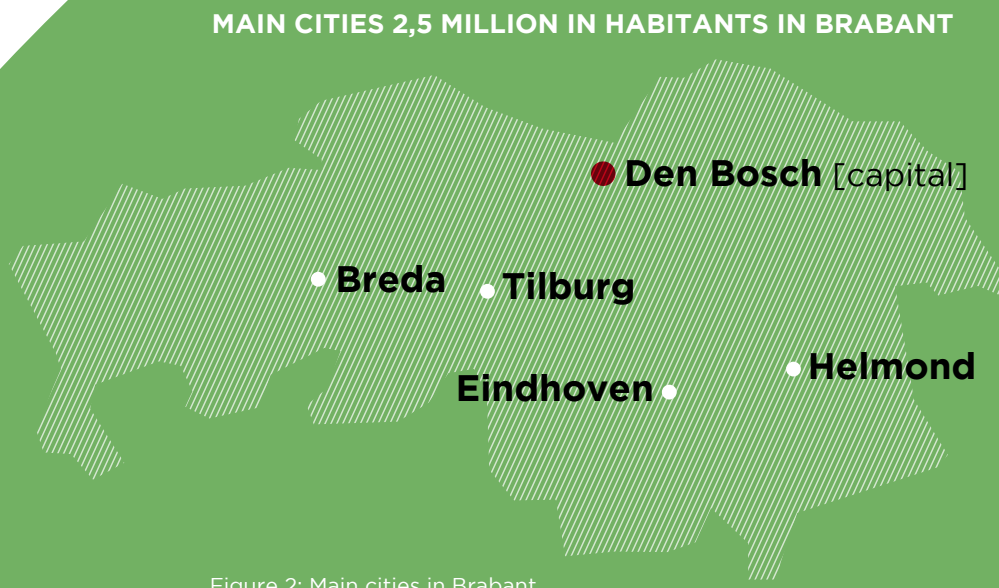


Figure 2: Main cities in Brabant

Brabant: industry, science, and innovation

Brabant is a productive, highly industrialized, and knowledge-intensive province in the Netherlands, and as such is a magnet for companies looking for (partnerships in) the fields of industrial innovation and/or state-of-the-art manufacturing.

In fact, Brabant is the most R&D-intensive region in the Netherlands and one of the most innovative regions in Europe, as aptly illustrated by the following three facts:

1. **30% of all industrial R&D in the Netherlands is undertaken in Brabant**
2. **Over 50% of all Dutch European patent applications are generated in Brabant**
3. **Brabant holds fifth place in Europe on the list of regions with the highest number of patent applications**

With over 34,000 people engaged in R&D activities, Brabant can provide the necessary brainpower, readily delivered by its bright people and numerous research and educational institutions. Geographical clustering enables cooperation between businesses, universities, and governmental research bodies. Joint R&D projects result in a mutual bolstering of strengths and inspiration and involves sharing technological knowhow and expensive research facilities, as well as joining forces in EU and other technology programs. The distinctive collaborative research style is the secret to significantly advancing R&D and innovation activities.

D. Facts and figures

1. Demography

Population, 01-01-2021
Brabant 2,573,949 (14.7%)
The Netherlands 17,474,417 (100%)

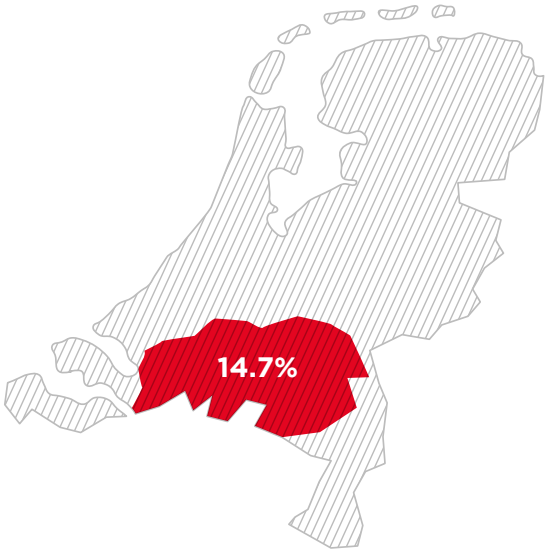
Population growth in 2020
Brabant 0.39%
The Netherlands 0.42%

Population density in km²
Brabant 525
The Netherlands 519

Non-Dutch population, 2020
Brabant: 163,035 (6.4%)
Netherlands: 1,192,309 (6.8%)

Age distribution

	The Netherlands	Brabant
0 - 14	15.5%	14.9%
15 - 64	64.7%	64.5%
65+	19.8%	20.6%
Total	100%	100%



Source: Statistics Netherlands, LISA, BOM, Province of Brabant

2. Economy

GDP* 2019 (in millions of euros, market prices)
Brabant 120,869 (14.9%)
The Netherlands 810,247 (100%)

Economic growth, 2020
Brabant -2.7%
The Netherlands -3.7%

Total own R&D spend as a percentage of GDP, 2019
Brabant 3.0%
The Netherlands 2.0%

Companies, 2020
Brabant 256,580 (14.3%)
The Netherlands 1,787,270 (100%)

Jobs, 2020
Brabant 1,341,750 (14.9%)
The Netherlands 8,983,430 (100%)

Foreign companies, 2020
Number of companies in Brabant 1,780
Brabant workforce 135,340

Industrial property
Total available in January 2020 (ha) 1,260
Immediately available in January 2020 (ha) 713

2. SECTOR OVERVIEW

A. Trends and developments

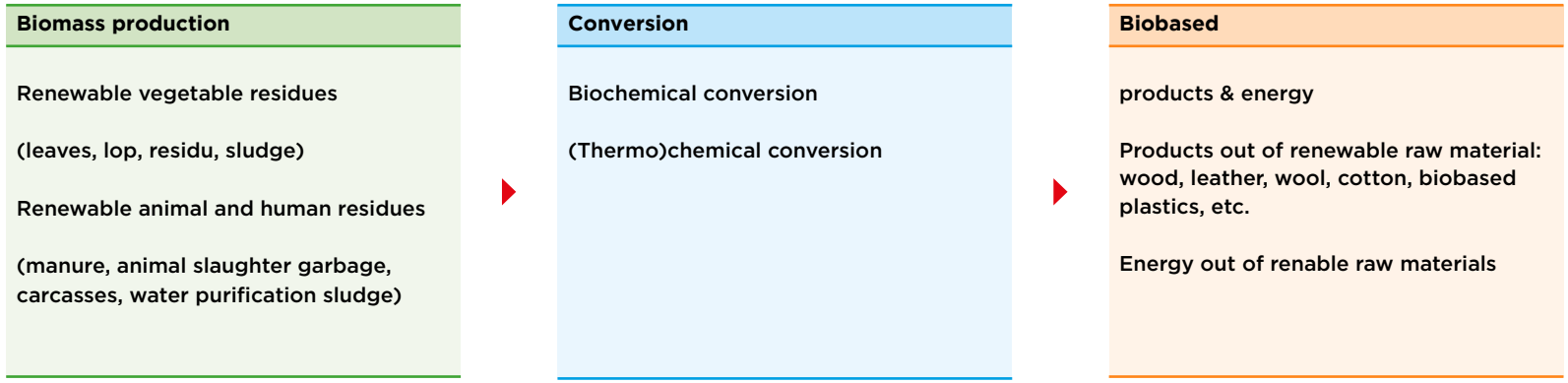
EU policies such as the European Green Deal and the Farm to Fork Strategy are crucial to reaching climate goals. Biobased industries are part of the solution and able to contribute to the transition to a circular economy, becoming climate neutral by 2050 and strengthening the EU industrial base. The biobased economy will play an important role in the pursuit of a low-carbon economy. This can be achieved if companies, governments and knowledge institutions work closely together.

In the Netherlands, the programme 'The Netherlands circular in 2050' has been drawn up. There is also a raw materials agreement that should stimulate the transition of five raw material chains: biomass and food, plastics, manufacturing, construction and consumer goods. The first goal of the government-wide programme Netherlands Circular in 2050 is ambitious: by 2030, the Netherlands must already use 50% fewer primary raw materials (minerals, metals and fossil). In addition to the circular transition plan, a Plastic Pact has been concluded between the Dutch government and a large part of the plastics industry in the Netherlands. It is therefore visible that manufacturers are increasingly taking on the responsibility of contributing to the biobased economy. Meanwhile, consumers are increasingly choosing biobased products and companies are setting sustainability requirements for their products.

Circular Biobased Delta is working on CO2 reduction in the southwest of the Netherlands by means of projects in 7 markets, namely: green chemistry, biofuels, bioenergy, agro, construction and infrastructure, transport and packaging. The province of Noord-Brabant considers the biobased economy is an engine for the Brabant knowledge economy and employment. They are committed, together with knowledge partners, the business community and development companies, to develop clusters and chains that make a difference (inter)nationally.

B. Definition of the Biobased Sector

BIOBASED ECONOMY



The biobased economy sector(BBE) can be defined as: *The production of goods with renewable natural raw materials, with the exception of the production of drinks and food for humans and animals (AgriFood).*

It is about the use of biomass as a resource for non-food products (transition from fossil based to biobased) such as chemicals, materials, energy and fuels.

The biobased economy chain consists of 3 parts: production of biomass, conversion of biomass and the production of biobased products ('markets').

C. Cluster size

OVERVIEW BBE IN BRABANT

Companies and jobs in Brabant and The Netherlands in biobased (related) economy, 2019

	Number of establishments	Number of jobs
Brabant	12,119	77,310
The Netherlands	70,263	390,540
Share Brabant	17.2%	19.8%

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

In 2019, Brabant Biobased related economy consists of 12,119 establishments, with in total 77,310 jobs. Brabant thus has a share of 17.2% in the total number of establishments and a share of 19.8% in the total number of jobs within Biobased related economy in the Netherlands.

Please note that a precise demarcation of biobased economy cannot be given, because many companies use a mix of artificial and (increasingly!) natural renewable raw materials. In this overview, we have therefore defined and demarcated branches that are related to the biobased economy, i.e. companies in Brabant already involved in biobased production processes and/or showing great potential for this in the near future.

JOBS BY REGION AND SUBSECTOR

Number of jobs in Biobased economy by region and sub sector, 2019

	Breda region	Tilburg region	Den Bosch region	Eindhoven/Helmond region	Brabant
Biomass production	**9,940**	**5,490**	**11,140**	**13,430**	**40,000**
• Agricultural Biomass -animal	1,800	2,140	5,750	4,910	14,590
• Agricultural Biomass-vegetable	4,840	1,310	2,290	2,460	10,890
• Agricultural Biomass - mix	540	340	760	710	2,350
• Biomass - waste	1,150	160	240	560	2,110
• Industrial - Biomass animal	170	790	1,110	3,310	5,380
• Industrial - Biomass vegetable	1,450	770	990	1,480	4,680
Conversion of biomass	**6,040**	**5,810**	**7,440**	**6,250**	**25,550**
Biobased products	**3,670**	**3,110**	**1,110**	**870**	**8,750**
Bio-energy	**440**	**230**	**1,790**	**270**	**2,720**
Research	**60**	**10**	**100**	**110**	**290**
Total biobased related	20,150	14,650	21,580	20,930	77,310
Total economy	316,570	238,880	351,960	428,200	1,335,610
Share biobased related in total economy	**6.4%**	**6.1%**	**6.1%**	**4.9%**	**5.8%**

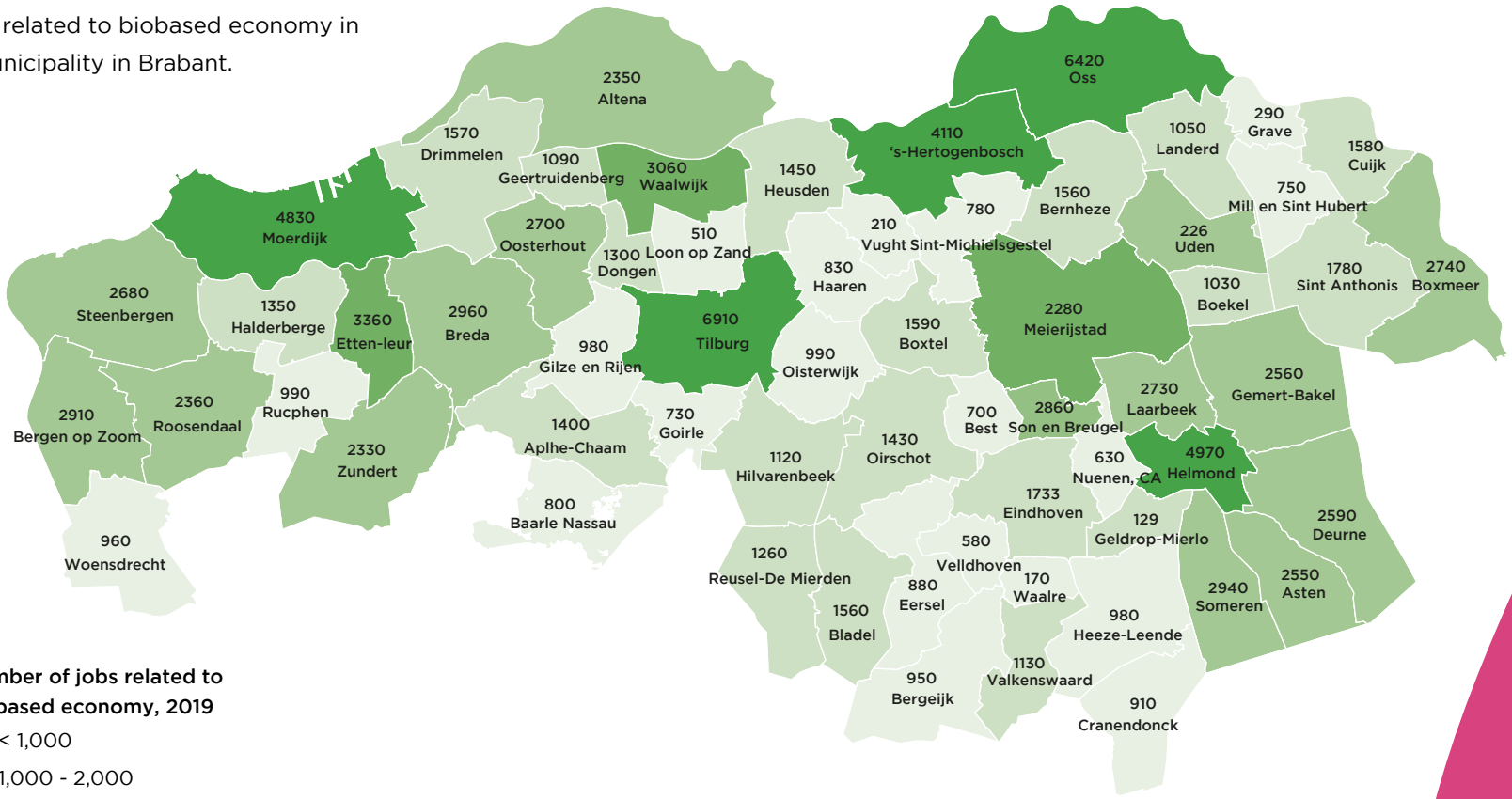
Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

D. Footprint

DISTRIBUTION OF JOBS

Share of jobs in Biobased related economy by municipality

The map below shows the number of jobs that are related to biobased economy in each municipality in Brabant.



Number of jobs related to biobased economy, 2019

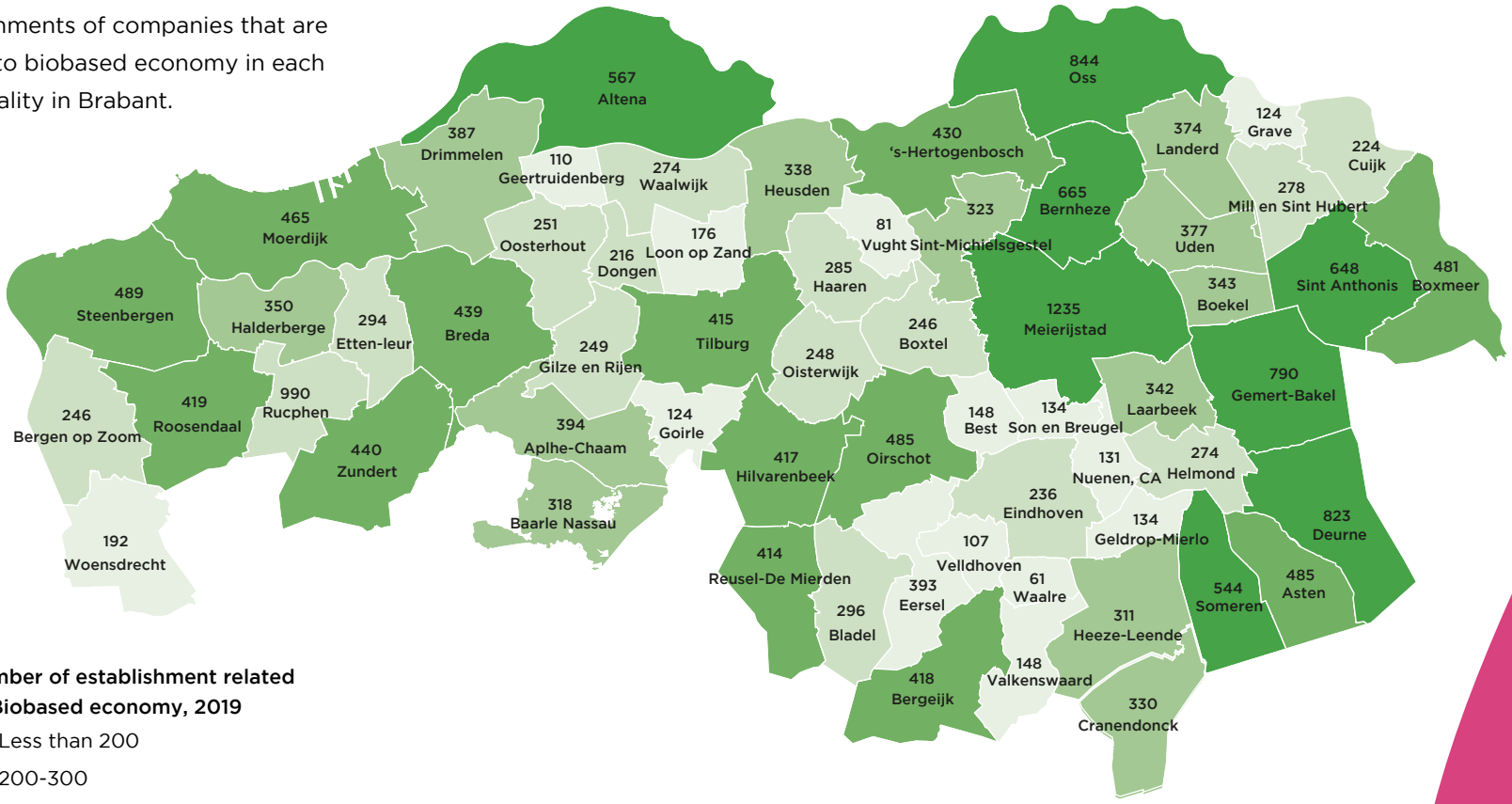
- < 1,000
- 1,000 - 2,000
- 2,000 - 3,000
- 3,000 - 4,000
- More than 4,000
- Municipalties in Brabant

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

DISTRIBUTION OF COMPANIES

Share of establishments in Biobased related economy by municipality

The map below shows the number of establishments of companies that are related to biobased economy in each municipality in Brabant.



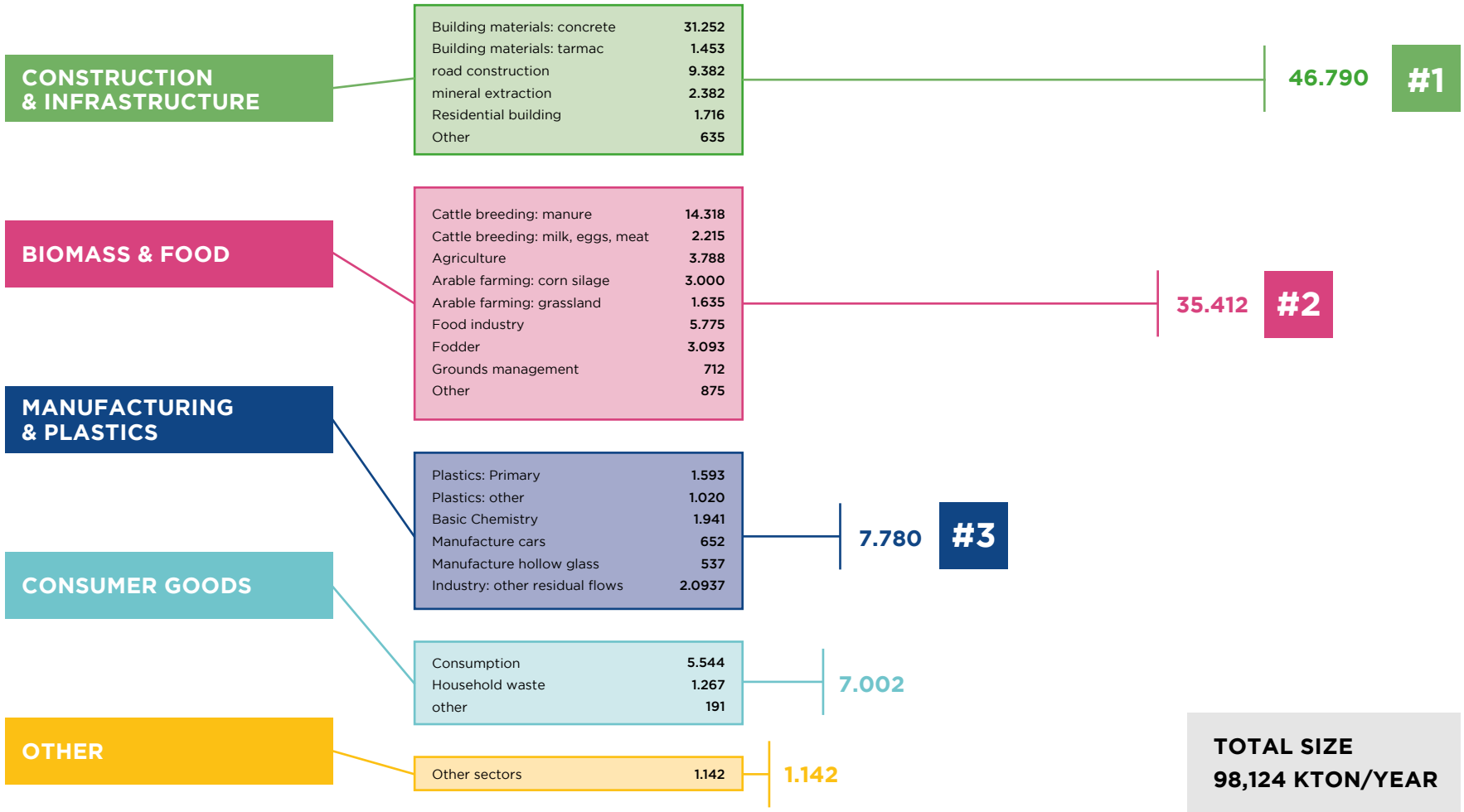
Number of establishment related to Biobased economy, 2019

- Less than 200
- 200-300
- 300 - 400
- 400-500
- More than 500
- Municipalities in Brabant

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

E. Feedstock

FIGURE 11: RAW MATERIAL FLOWS IN THE PROVINCE OF BRABANT IN DIFFERENT SECTORS, WITH QUANTITIES IN KTON/YEAR



This overview shows the amount and type of raw material flows in Brabant (2020) as a potential base for the circular economy. Natural raw materials ('biomass') are the second largest potential provider of raw materials with over 35.000 KTON/year.

Brabant offers a competitive feedstock position. Feedstock is widely available within the region and deliverable in time (‘guaranteed stock delivery’). Feedstock can be obtained from various resources, such as sugar beets, cellulosic biomass, residues and manure, and at favorable costs. Currently the Netherlands, and more specific the sugar beets area in the southwestern part of the country, is one of the most efficient sugar production areas in the world.

Feedstock can also be obtained in the field of starches. For example, Cargill processes wheat and corn into starches, starches derivates, wheat proteins and glucose. Also, main potato manufacturers are based in the region, offering opportunities for starches related feedstock producers.

Another example: the company of Darling processes organic food waste to energy in Brabant.

Alternative feedstock (a.o. agricultural waste streams, woody biomass) can be regionally sourced or imported via the (deep) seaports of Rotterdam, Antwerp, Moerdijk, Terneuzen, Vlissingen and Ghent. As such, supply of feedstock can be ensured.

All the basic ingredients and knowledge for new eco-friendly products are available in Brabant. Companies in North Brabant think green. They are agilely and skillfully responding to fast-growing demand for organic plastics, natural colorants and biodegradable packaging materials.

An example is the availability of suppliers of sucrose and glucose/DE 95 in and near the western part of Brabant;

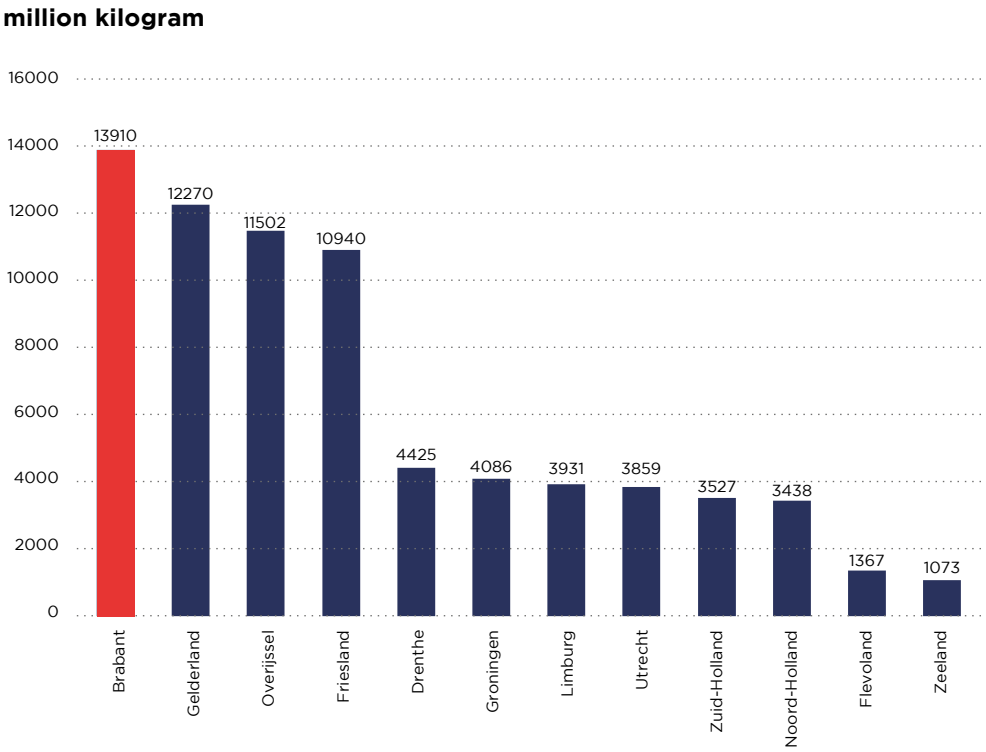
5 companies producing and trading close to 3 million tons sugar annually;

This secures raw material supply at favorable cost.

Another example is the large availability of manure, especially in the eastern part of the province.

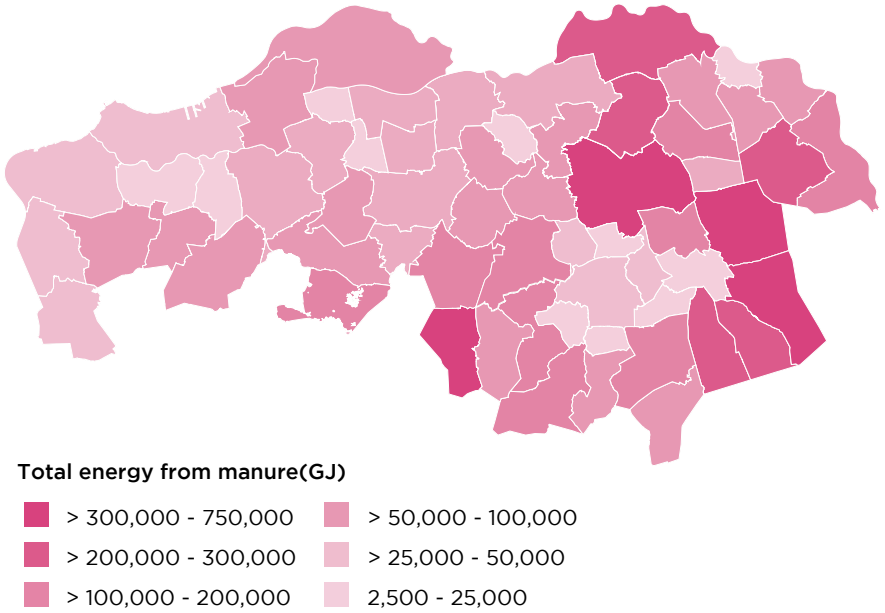
This offers opportunities for fermentation of manure ('biomass') into biogas.

PRODUCTION OF MANURE 2020



Source: CBS, 2021

BIOMASS FLOWS: MANURE



F. Subsectors in Brabant

Three main and cohesive BBE-production chains can be distinguished that are important within the Brabant economy and offer opportunities to become a bigger part of the biobased ecosystem.

1) Plastics from biobased raw materials

Brabant has an extensive plastics industry, with a large packaging industry in particular. This packaging industry is in turn linked to the large agri-food industry in Brabant. This ranges from pots for plants to packaging for packaging foodstuffs. The packaging industry is eager reducing the environmental pressure and CO2 emissions of the packaging industry with circular activities and the use of biobased plastics. In addition, there are all kinds of other manufacturers that make plastic products for consumers and semi-finished products that are working with biobased variants.

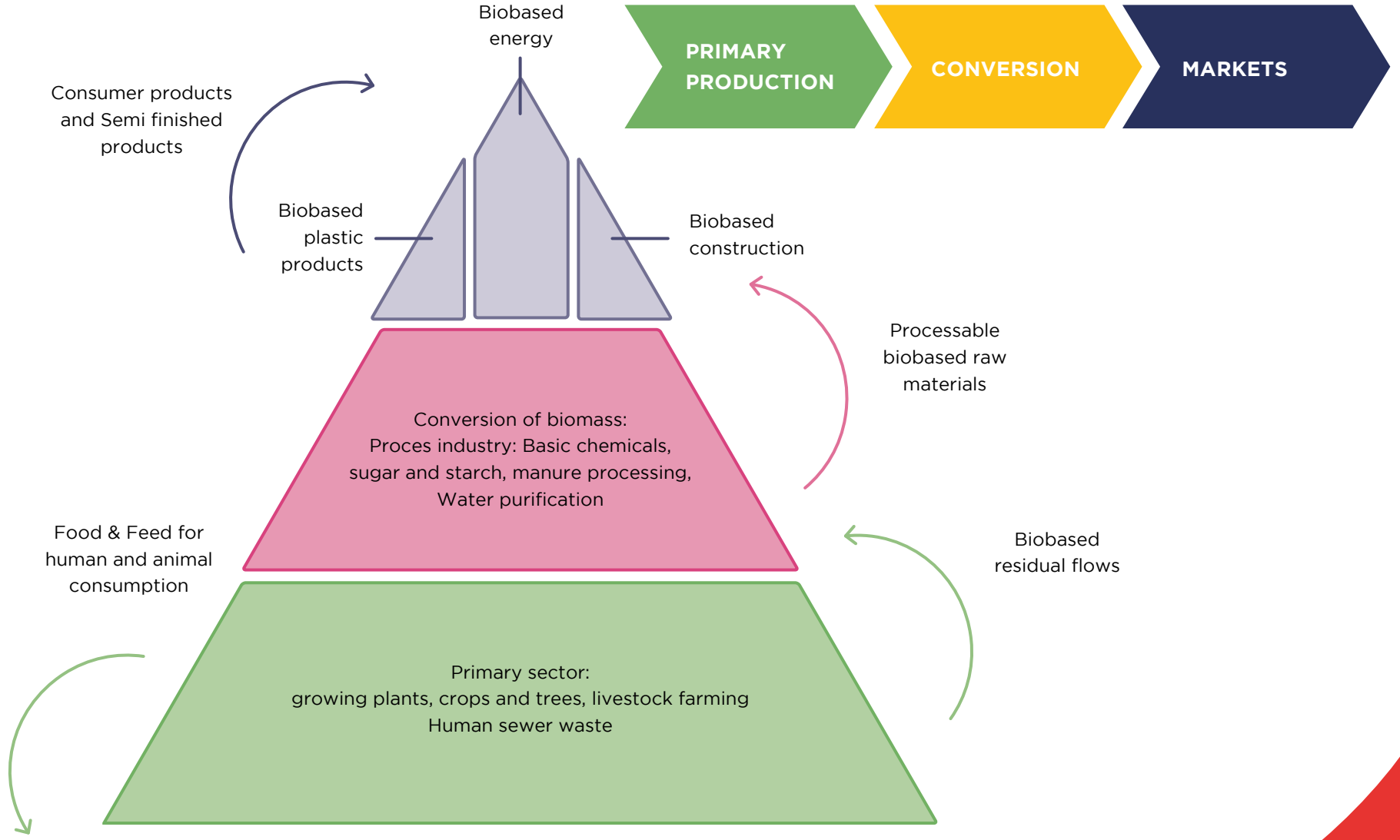
2) Biobased energy

An important challenge is to make the energy supply CO2 neutral. This is partly done with energy generated from water and sun, but also with biomass plants and biofuels. An important issue is also whether we can add value to the manure surplus from East Brabant and use it for the sustainable energy issue.

3) Bio-based building materials

Another important development is biobased construction. Naturally, this concerns several raw material flows and developments: timber frame construction, biobased plastics, bio-aromatics (paints and resins), biobased asphalt, etc. This also largely concerns the circular reuse of raw materials, but also the application of biobased materials. For example, projects are underway to build with blocks from grasses and mycelium (fungi).

The biobased pyramid below illustrates the unique biobased production chaines in Brabant, as a part of the three stages (production, conversion, markets/products) within the biobased economy.



1. Biobased plastics

BIOBASED PLASTIC PRODUCTS

The production chain for biobased plastics consists of 3,903 establishments with 29,410 jobs. The largest group, with 3,439 establishments and 29,410 jobs, is the primary sector that provides biomass residual products. The conversion of biomass is done by 152 establishments with 5,580 jobs. Brabant has a large group of companies that produce products of plastics. In addition to the large agrofood sector in Brabant there are a lot of companies that produce plastic packaging material and plastic pots for the agriculture. There are also a number of companies that produce consumer products out of (biobased) plastics and there are number of companies that produce semi-finished product for the High tech Systems and Maintenance (HTSM). HTSM is also strongly represented in Brabant.

Increasingly, biobased plastics are also being processed within in companies active in plastics

	establishments	jobs
Biobased plastic products	**3,903**	**29,410**
Biomass	3,439	14,190
Biomass conversion	152	5,580
Application: biobased plastics	312	9,640

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

Primary sector:
Biomass residual products
3,439 establishments
29,410 jobs

Conversion of biomass
152 establishments
5,580 jobs

Application: Biobased plastics
312 establishments
9,640 jobs

Companies in biomass residual products	Companies in biomass conversion	Companies in Biobased plastics
• Peka Kroef • Rijk Zwaan Breeding • Agristo • Lamb Weston Meijer • Van der Avoird Trayplant • Van Adrichem Kwekerijen • Greenco • Driemaster • Aviko • Gebr. Raijmakers Kwekerijen • GP Someren • Kwekerij L.W. van der Houwen • W. Peters Kwekerijen • Fudinto • Kwekerij Van Oers • Gagel Fruit • Verhoeven QH Kwekerij Gebr. Mies • GoFresh • Middenweg Andel	• SABIC Innovative Plastics • Royal Cosun • Lamb Weston/Meijer Bostik Benelux • Allnex Netherlands • Cargill • Koninklijke Sanders • Centraal Kantoor Suiker Unie • Basell Benelux • Synthos Breda • Sensus • Dr. W. Kolb Nederland • ChemConnection • Chugoku Paints • BEWISynbra RAW • Synthomer • BASF Nederland • Paccor Netherlands • Plastica Thermoforming • Equal Opportunity Biofuels & Biochemicals • Bionative Industries	• Tarkett • Pet Power • Elho • Oerlemans Plastics • Smurfit Kappa ELCORR • Weener Plastics Netherlands • Curtec Nederland • Alpha Packaging • Desch Plantpak • Scholle Ipn Europe Holding • Naber Plastics • Aarts Plastics • Cups4you Bato Plastics • Unipak • HAVAL Disposables • Rodenburg Biopolymers • Berry Global Promens. • D.R.I. Rubber • Poly Products • Millvision

Knowledge institutions:

AVANS Centre of Expertise Biobased Economy (https://www.coebbe.nl/), Biopolymeer Applicatie Centrum (https://bac.biobased-applicatiecentra.nl/), Natuurvezel Applicatiecentrum (https://natuurvezelapplicatiecentrum.eu/), Groene bouwmaterialen (www.groenebouwmaterialen.nl), WUR Food & Biobased Research (https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksinstituten/food-biobased-research.htm), TNO Biobased and circular technologies (https://www.tno.nl/nl/aandachtsgebieden/energietransitie/expertisegroepen/biobased-en-circulaire-technologieen/), Polymer Technology Group (PTG, https://www.ptgeindhoven.nl/nl/), IRS (www.irs.nl, Knowledge centre for the sugar beet cultivation), KWS Benelux (www.kws.nl), Cosun Innovation Center

Campuses:

Green Chemistry Campus, TU Eindhoven

Networks:

Biobased Delta, Biobased Renewable Innovative Construction (BRIC, www.bric.nu)

PRODUCTION CHAIN BIOBASED PLASTICS: ESTABLISHMENTS, 2019

	establishments			
Regio	**Biomass production**	**Conversion of biomass**	**Biobased plastics**	**Total**
Breda region	1,079	55	76	1,210
Tilburg region	478	25	78	581
Den Bosch region	999	32	62	1,093
Eindhoven/Helmond region	882	40	96	1,018

PRODUCTION CHAIN BIOBASED PLASTICS: JOBS, 2019

	jobs			
Regio	**Biomass production**	**Conversion of biomass**	**Biobased plastics**	**Total**
Breda region	5,580	3,520	3,920	13,020
Tilburg region	1,880	700	2,890	5,470
Den Bosch region	3,140	1,010	660	4,810
Eindhoven/Helmond region	3,220	350	2,170	5,740

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

A NEW BIOBASED COMPOUND BY RODENBURG BIOPOLYMERS

Rodenburg Biopolymers is one of the pioneers in bioplastics. Its first products were biodegradable plastics, introduced around 2000. Since then numerous compounds for specific applications have been developed in cooperation with custofers.

New biobased thermoplastic compounds
Today, Rodenburg Biopolymers has expanded its portfolio with new biobased thermoplastic compounds with a reduced carbon footprint. These thermoplastic polyolefin compounds are drop-in plastics, produced from feedstocks from renewable resources, filled with natural fibers.

Fiber content
The most attractive compounds are with hemp and bamboo fibers. Other fibers are available for testing and opment. These fibers are sourced from side streams of other production processes. The fiber content can be customized ranging from 10 to 30 weight %. The biopolymers in the compounds are from a reliable source and certified by ISCC according to the 'Chain of Custody method.

Manufacturing
A wide range of grades can be produced for extrusion, rotational molding and injection molding.

Source: Rodenburg Biopolymers, https://biopolymers.nl/, Oosterhout

THE BIODEGRADABLE PLANT POT MADE OF BELL PEPPER STEM FIBERS

Millvision developed together with Rodenburg Biopolymers and Bato Plastics a biodegradable plant pot of pepper stem fibers. The residual flow of bell pepper plants comes from growers in the region like grower Christ Monden from Etten-Leur.

The three companies work together in the Biobased Composites

Technologies Consortium and developed a degradable plant pot for cultivation in the cold soil

Millvision collects, in collaboration with ZLTO, the fibers from bell pepper plants come from growers in the region. Rodenburg supplies the bioplastic
and Bato processes the raw materials into pots.

Organic pots have been in production for much longer, but this pot has more qualities,: With this pot the rate of degradability can be controlled and the pot serves as fertilizer for the plant. Research has shown that the plants grow better in the bio pot than in a normal pot.

Source: De Nieuwe Oogst (https://www.nieuweoogst.nl/nieuws/2016/01/09/biopot-met-potentie-in de-maak), Millvision, Raamsdonksveer

2. Biobased energy

Biobased energy is the largest production chain with in total 9,768 establishments and 36,250 jobs. There are two sources in biomass production for bio energy: vegetable based sources like sugar beats, potatoes, cereals, pruning and clipping and animal based sources like mature and offal. This makes the Biomass production twice as large as for biobased plastics and biobased construction that are based more on plant-based sources.

	establishments	jobs
Biobased Energy	**9,768**	**36,250**
Biomass production	9,590	30,060
Biomass conversion	152	5,580
Application: biobased energy	26	610

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

A total of 15.800.000 ton biomass is currently produced in Brabant. The largest volumes are Manure, arable waste streams, green management & maintenance, domestic waste and sewage sludge. In Netherlands Brabant is the province with the largest production of manure.

The highest potential for biobased energy is to be found in the eastern parts of Brabant and municipalities in the northwestern parts of Brabant. There are also possibilities in Tilburg at the large landfill the Spinder.

Agricultural vegetable waste streams are most readily available in West Brabant, while manure is the most important biomass stream in East Brabant.

Residual flows from green maintenance and management are mainly available in the southern municipalities of Brabant. Household and industrial waste can mainly be found in industrial municipalities, which are usually the larger cities.

Within Brabant there are many initiatives that can be classified under this theme, from simple to more complex:

Some Brabant examples:

- Co-firing of biomass in the Amer power station;
- Capture of biogas at water purification plants (Energiefabriek Sleeuwijk)
- Pyrolysis cluster in the port of Moerdijk
- Biorefinery at the Energy and Raw Materials Factory (EFGF)
- Manure valorisation in East Brabant;
- Biofuels from sugar beet (Cosun).

Companies in biomass residual products

Livestock Farming

- Coöperation DEP (Poultry farms)
- Smits Group - Frago Poultry
- Kuikenbroederij Van Hulst B.V.
- Pigfarm Van Laarhoven
- PluCo
- Hendrix Genetics/Hypor
- Biogas Heydehoeve
- Pigfarm Rijnen - Eco-Energy
- ZLTO

Sugar Beets

- CVS Covas (cooperation beet growers)
- KWS Benelux (consultants)
- IRS (knowledge institute)
- Jongenelen akkerbouw
- M. van Schendel akkerbouw
- Flipsen akkerbouw
- J.W. van Drunen - Akkerbouw
- ZLTO

Biomass

- Staatsbosbeheer
- Attero
- Indaver compost and biomass
- Van Berkel biomass
- Water treatment plants (Waterschappen)

Companies in biomass conversion

- RWE Generation Amercentrale
- Cosun beet company
- Ecoson - Darling Ingredients
- Cargill - Bio-ethanol
- BioDry - Woodle
- Energiefabriek Sleeuwijk - Waterschap Rivierenland
- Biomassa Centrale Moerdijk (BMC)
- Wabico - Waterschap Brabantse Delta
- Blue Sphere (manure digestion)
- Ingenia consultants
- Andritz Feed and Biofuel
- Orinso (organic industrial solutions)
- Charcotec
- Waste4Me
- Attero Steamturbine
- Bio Energie Centrale Cuijk
- Afvalstoffendienst - Den Bosch -Treurenburg
- Eco-Energy Oirschot
- Rendac

Companies in Biobased plastics

- RWE Essent
- Bio Energie Centrale Cuijk
- Wabico
- PZEM Energy
- Zitta Biogas Sterksel and Tilburg (pending)

Knowledge institutions:

AVANS Centre of Expertise Biobased Economy (https://www.coebbe.nl/), Groene bouwmaterialen (www.groenebouwmaterialen.nl), WUR Food & Biobased Research (https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksinstituten/food-biobased research.htm), IRS (Knowledge centre for the sugar beet cultivation), KWS Benelux (www.kws.nl), Cosun Innovation Center (https://www.cosun.nl/) TNO-ECN (https://www.ecn.nl/energy-research/index.html), Smart Energy Link (https://smartenergylink.eu/)

Campuses:

Green Chemistry Campus, Nieuw Prinsenland, Port of Moerdijk (Pyrolysis testing ground/Biomassa Centrale Moerdijk).

Networks:

Biobased Delta Community

PRODUCTION CHAIN BIOBASED ENERGY: ESTABLISHMENTS, 2019

	establishments			
Regio	**Biomass production**	**Conversion of biomass**	**Biobased energy**	**Total**
Breda region	1,851	55	7	1,913
Tilburg region	1,394	25	6	1,425
Den Bosch region	3,476	32	7	3,515
Eindhoven/Helmond region	2,868	40	6	2,914

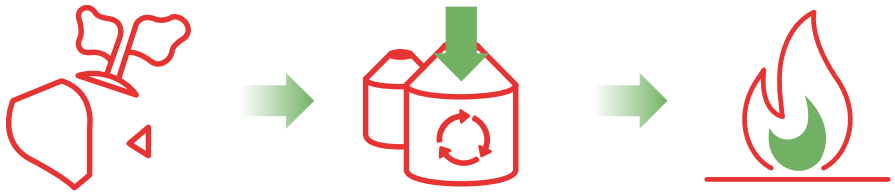
PRODUCTION CHAIN BIOBASED ENERGY: JOBS, 2019

	jobs			
Regio	**Biomass production**	**Conversion of biomass**	**Biobased energy**	**Total**
Breda region	8,280	3,520	430	12,230
Tilburg region	3,900	700	40	4,640
Den Bosch region	8,970	1,010	110	10,090
Eindhoven/Helmond region	8,530	350	40	8,920

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

GREEN GAS BY COSUN BEET COMPANY

Processing sugar beet produces residual flows, such as beet pulp, beet tips, foliage and molasses. These flows are fermented in biomass digesters to produce energy in the form of biogas. All the valuable minerals remain in the digestate, the feedstock remaining after digestion. The digestate is used to fertilise the farmers' fields, thus closing a loop in the supply chain. This helps maintain soil health and is a good example of a circular process to close local loops in the supply chain. Each of Cosun Beet Company's digesters processes more than 100,000 tonnes of biomass every year. This vegetable raw material is sourced mainly from Cosun Beet Company's own factories.



Residual products
The tails of the sugar beet and other plant residues are put in the reactor.

The production of gas
In the reactor, green gas is produced by means of fermentation.

Green gas
The green gas fesed in the factory or by households.

The sugar factories in Dinteloord and Vierverlaten also operate methane reactors to purify washing water and simultaneously recover biogas.

The biogas is upgraded to green gas. When all the digesters are running at full capacity, Cosun Beet Company feeds more than 25 million cubic metres of green gas into the national gas transmission network, enough for 20,000 households a year. Of the 25 million cubic metres, about 8 million are used instead of natural gas in Cosun Beet Company's own factories. This cuts their nat consumption by about 10% a year. Cosun Beet Company is the biggest producer of green gas in the Netherlands.

Source: Cosun Beet Company

NEW LARGE MANURE DIGESTER IN STERKSEL

A brand new manure digester at the Poort 43 business park in Sterksel has been supplying green gas to the Dutch gas network for a few weeks now.

The new plant in Sterksel will ferment 135,000 tons of manure per year and another 135,000 tons of other waste. It is one of a series of large manure digesters that are being built in the Netherlands.

Green gas of instead of natural gas

According to GasTerra, the company that buys the green gas from Sterksel, the new large digesters play an important role in the energy transition, the process whereby the Netherlands switches from fossil fuels to renewable energy sources. They should help reduce greenhouse gas emissions. The Netherlands currently burns 35 billion cubic meters of natural gas per year.

In a fermenter, the bacteria in the manure make methane. That is called biogas. The Netherlands has 250 (often) smaller digesters. Half of the methane is used to generate electricity or heat. The other half processes the methane and then supplies it as green gas to the natural gas network.

The new large digester in Sterksel is owned by the American company Blue Sphere and is co-financed by BNG. Blue Sphere also has fermenters in Italy. Blue Sphere has the digester built and operated by Anaergia.

Re-N has plans for a manure processor in Tilburg under the name Zitta-Biogas.

Source: Omroep Brabant, february 24th 2022

DARLING INGREDIENTS/ECOSON: BIOBASED FUEL AND BIOGAS OUT OF ANIMAL WASTE STREAMS

Ecoson is part of Darling Ingredients. This American company is a global player in the innovative and sustainable processing of organic residual flows and animal by-products into natural ingredients for foodstuffs, livestock and animal feed, fertilizers and bioenergy. The aim of Ecoson is to give animal residual material a new value as much as possible. Since 2007, they have been using animal fat - which is produced by Rendac - for the production of raw materials for the second generation of biodiesel in the Ecoson energy park. It also produces biofuel that is supplied as an energy source to power plants and cement kilns. Organic manure is also produced as a fertilizer substitute. Biogas is produced that is partly used in our Ecoson's combined heat and power installations to produce electricity and partly is upgraded into green gas that is supplied to households.

Source: Ecoson, https://www.ecoson.biz/, Son en Breugel

3. Biobased construction

4,114 companies with 23,460 jobs are active in the production chain of biobased construction. The basis again lies in the primary sector, where agricultural residues come from. In addition, 51 companies with 2,010 jobs are active in converting biobased raw materials into usable raw materials. Ultimately, 629 companies with 7,340 jobs are active with biobased building materials.

	establishments	jobs
Biobased construction	**4,114**	**23,460**
Biomass residual products	3,434	14,110
Biomass conversion	51	2,010
Application: contruction materials	629	7,340

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

Primary sector:
Biomass residual products
3,434 establishments
14,110 jobs

Conversion of biomass
51 establishments
2,010 jobs

Application: Biobased construction materials
629 establishments
7,340 jobs

Companies in biomass residual products	Companies in biomass conversion	Companies in Biobased plastics
• Peka Kroef • Rijk Zwaan Breeding • Agristo • Lamb Weston Meijer • Van der Avoird Trayplant • Van Adrichem Kwekerijen • Greenco • Driemaster • Aviko • Gebr. Raijmakers Kwekerijen • GP Someren • Kwekerij L.W. van der Houwen • W. Peters Kwekerijen • Fudinto • Kwekerij Van Oers • Gagel Fruit • Verhoeven QH • Kwekerij Gebr. Mies • GoFresh • Middenweg Andell	• SABIC Innovative Plastics • Royal Cosun • DSM Coating Resins • Bostik Benelux • Allnex Netherlands • Royal Cosun/Cosun Beet Company • Lyondell Basell Benelux • Synthos Breda • Dr. W. Kolb • Chugoku Paints • BEWISynbra RAW • Synthomer • Poly Products • Coatex Netherlands • SPSStoncor • BioBlocks • BioDry - Woodle	• Polytec • Tarkett • Kingspan Unidek • Caligen • Alkulux • Alligator Plastics Industry • Colasit • DK Polyester • Poly Products • Isobouw • Ecor • Martens keramiek • Impershield • Finnhouse houtbouw • Groene bouwmaterialen • De Meeuw toekomstbouwers • Millvision • Isovlas - ETS Isolatie

Knowledge institutions:

AVANS Centre of Expertise Biobased Economy (https://www.coebbe.nl/), Biopolymeer Applicatie Centrum (https://bac.biobased-applicatiecentra.nl/), Natuurvezel Applicatiecentrum (https://natuurvezelapplicatiecentrum.eu/), Groene bouwmaterialen (www.groenebouwmaterialen.nl), WUR Food & Biobased Research (https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksinstituten/food-biobased-research.htm), SPARK Makers zone, AVANS, Cosun Innovation Center

Campuses:

Green Chemistry Campus, Nieuw Prinsenland, Port of Moerdijk

Networks:

Biobased Delta community, Biobased Renewable Innovative Construction (BRIC, www.bric.nu)

PRODUCTION CHAIN: ESTABLISHMENTS BIOBASED CONSTRUCTION, 2019

	establishments			
Regio	**Biomass production**	**Conversion of biomass**	**Biobased energy**	**Total**
Breda region	1,077	15	112	1,204
Tilburg region	477	12	113	602
Den Bosch region	998	10	179	1,187
Eindhoven/Helmond region	880	14	225	1,119

PRODUCTION CHAIN: JOBS, BIOBASED CONSTRUCTION, 2019

	jobs			
Regio	**Biomass production**	**Conversion of biomass**	**Biobased energy**	**Total**
Breda region	5,380	560	1,950	7,890
Tilburg region	1,650	920	1,650	4,220
Den Bosch region	3,040	430	1,060	4,530
Eindhoven/Helmond region	3,170	100	2,690	5,960

Source: Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

BIOBASED INSULATION MATERIAL

BioFoam® is a new patented insulation material similar to EPS (expanded polystyrene). It looks qua structure looks the same and has almost the same properties as EPS. The big difference is that EPS is produced from polymers that run on fossil raw materials (finite material) are based. The raw material for BioFoam consists of biopolymers, which are made of vegetable raw materials (infinite material). BioFoam is the first foam insulation made from a biological base material. This causes that BioFoam, like EPS, can be reused turn into. In addition, it is also organic degradable and at high temperatures below influence of moisture and bacteria industrial compostable. BioFoam® is available in almost all construction applications durable and long-lasting to use.

Source: isobouw, www.isobouw.nl. Someren

BIOCOMPOSITES BY POLY PRODUCTS

By working with natural materials, composite products are made that have a very low environmental impact while retaining the important composite properties such as freedom of shape, appearance, light weight and strength.

By actively applying knowledge and expertise in the field of composite materials, the applications of biocomposite are expanding every day. In order to arrive at the right composition, production testing with various biobased raw materials is important. Some examples of natural materials are flax and hemp fibres, biobased foam and FSC wood. By choosing the right combination for each product, the already low environmental impact is even lower compared to traditional materials.

One of the projects is this 3D printed Fender profile.

Source: Poly Products, https://www.polyproducts.nl/, Werkendam

DSM: PLANT BASED COATING

Plant-based paint existed long before DSM-in fact, it's been around for 17,000 years. In more recent times, we've seen a move from solventborne to waterborne resin and coating technology. But now, a new plant-based revolution is being ushered in by our bright minds at DSM.

Decovery is a family of eco-friendly paint resins that contains anywhere from 30 to 50% plant-based content-with a 70% version already being prototyped. Despite being made from corn, seeds, tree bark, castor beans and other agricultural waste- with very little effect on the food chain - Decovery resin delivers a performance that is at least equal to that of conventional acrylic paints, while enabling a carbon footprint reduction of up to 34%. This is why customers of DSM-and their customers-are now using Decovery to deliver a fine, durable finish in everything from children's furniture to walls, and wood.

Source: DSM Resins, Waalwijk, https://www.dsm.com/decovery/en/home.html

3. UNIVERSITIES AND KNOWLEDGE INSTITUTES

A. Universities in Brabant

1. Eindhoven University of Technology (TU/e)

The crucial facts and figures for the TU/e are:

- 12,000 students
- 5,000 knowledge workers
- 90 nationalities
- 14 unique laboratories

SPIRIT OF COLLABORATION

Eindhoven University of Technology is a young university, founded in 1956 by industry, local government and academia. Today, that spirit of collaboration is still at the heart of the university community. The university fosters an open culture where everyone feels free to exchange ideas and take initiatives.

Eindhoven University of Technology provides academic education that is driven by both fundamental and applied research. Its educational philosophy is based on personal attention and room for individual ambitions and talents. TU/e's research meets the highest international standards of quality and the work produced pushes the boundaries of science. This puts TU/e at the forefront of various rapidly emerging areas of research.

Eindhoven University of Technology combines scientific curiosity with a hands-on approach. Fundamental knowledge enables the institution to design solutions for the highly complex problems of today and tomorrow. Its motto is: 'We understand things by making them and we make things by understanding them'.

The TU/e Campus is in the centre of one of the most powerful technology hubs in the world, Brainport Eindhoven. Globally, the university stands out when it comes to collaborating with advanced industries, as it has done with Royal Philips since its inception. Together with other institutions, TU/e forms a thriving ecosystem with one common aim – to improve quality of life through sustainable innovations.

TU/E HAS 10 RESEARCH DEPARTMENTS

I. Biomedical Engineering
II. Built Environment
III. Electrical Engineering
IV. Industrial Design
V. Industrial Engineering and Innovation Sciences
VI. Chemical Engineering and Chemistry
VII. Applied Physics
VIII. Mechanical Engineering
IX. Mathematics and Computer Science
X. Eindhoven School of Education

TU/E HAS 10 STRATEGIC RESEARCH AREAS

1. Artificial Intelligence
2. Smart Mobility
3. Energy
4. Engineering Health
5. Integrated Photonics
6. High Tech Systems
7. Complex Molecular Systems
8. Data Science
9. Humans and Technology
10. Smart Cities

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

AGRIFOODTECH@TU/E

TU/e has one focal point that is being nurtured together with other universities, research institutes and industrial partners: developing the interdisciplinary and data-intensive field of AgriFoodTech (this means encouraging crossovers between AgriFood and engineering, including data, materials, robotics, sensors, logistics and business models).

AgriFoodTech@TU/e works closely with Wageningen University & Research (WUR) and other universities/knowledge institutions such as the HAS University of Applied Sciences (Den Bosch), the University of Utrecht (Future Foods programme) and JADS (the Jheronimus Academy of Data Science in Den Bosch).

A longer-term goal of the initiative is to build an effective ecosystem of companies, organisations and knowledge institutions for rapidly integrating innovation and deep fundamental research. AgriFoodTech@TU/e focuses on three key themes:

1. Smart Farming: e.g. precision farming for crops and animals, breeding, urban and vertical farming
2. Smart Foods: e.g. food processing and personalised foods
3. Education

Translating the three themes into a coherent and sustainable programme and attracting structured funding is an important objective. Key phrases and challenges of AgriFoodTech include:

- to go beyond existing approaches to feed nine billion people sustainably by 2050
- to combine different types of people in cross-functional teams
- to deal with the effects of climate change and related water and energy issues
- the digitisation of society (IoT, big data, algorithms)
- food practice (making the right choices, lifestyle monitoring), health and wellbeing

STRONG PARTNERSHIP BETWEEN WAGENINGEN UNIVERSITY & RESEARCH (WUR) AND EINDHOVEN UNIVERSITY OF TECHNOLOGY (TU/E)

Wageningen's strategic plan means that it is seeking out further partners, and Eindhoven University of Technology is firmly in its sights. Researchers from WUR and TU/e are already working together on precision agriculture, printed food and plasma technology... with much more to come.

AgriFood meets *High Tech*, over and over again, and increasingly so. Three years ago, WUR joined the cooperative federation of the technical universities of Delft, Eindhoven and Twente, with the 3TU now called 4TU. WUR's favoured partner in this 4TU is Eindhoven. TU/e, which focuses its high tech research on health, energy and mobility, now sees opportunities in the world of AgriFood.

And partnership is growing at a rapid rate, as can be seen by the following joint projects:

2. Avans University of Applied sciences

The Avans University of Applied Sciences provides education and hosts research in ten different fields and across 13 locations in Breda, Den Bosch, Tilburg, and Roosendaal. Avans has six centers of expertise and more than 25 research groups. These groups of researchers conduct practical research.

In December 2020 there were **35,083 students** registered with Avans, with a **professional staff** contingent of **3,300**.

Avans conducts research through a number of research groups, the majority of which are part of one of the centers of the following applied research:

- Art, Design and Technology
- Caring Society 3.0
- Center of Expertise Biobased Economy
- Public Safety and Criminal Justice
- Sustainable Business
- Technical Innovation

3. HAS University of Applied Sciences in AgriFood and the Environment, Den Bosch

HAS University of Applied Sciences is the best educational and expertise centre in the southern Netherlands when it comes to the AgriFood and environmental industries, with its main campus in Den Bosch and a secondary campus in Venlo in the province of Limburg. The university has over 450 staff members, 3,000 students and 300 participants in professional courses.

HAS sets itself apart in the AgriFood educational sector by focusing on working together with farmers and the food industry to effectively implement new knowledge and technologies in AgriFood businesses. HAS is truly an enterprising, outward-focused university with a comprehensive educational programme in agribusiness, food and the environment. As a result, 70% of HAS graduates are employed within two months of graduating.

HAS is an independent university that works actively with both local and international businesses. The HAS educational concept is an entrepreneurial way of studying, involving substantial cross-fertilisation with day-to-day business practice in agriculture and/or the food industry. These ties provide real-life experience for HAS students and lecturers as well as strong support for businesses in terms of innovation, development and life-long learning.

EDUCATION

HAS offers the following 15 bachelor programmes in AgriFood subjects and the environment:

1. Business management in agriculture and food
2. Business administration and AgriFood business
3. Business administration and agribusiness
4. Business administration and food business
5. International food and agribusiness
6. Horticulture and business management
7. Animal husbandry
8. Applied biology
9. Environmental innovation
10. Food innovation
11. Food technology
12. Geomedia and design
13. Healthy living
14. Horticulture and arable farming
15. Spatial and environmental planning

EXPERTISE AND RESEARCH CENTRES

Expertise and research centres (ERCs) are knowledge groups within higher education institutions that establish connections between education, professional practice and applied research in areas of social relevance. In most cases, an ERC consists of a 'knowledge circle', a group of lecturers and lecturer-researchers led by a professor.

HAS currently has 15 expertise and research centres, and its Sustainable Protein Sources, Precision Livestock Farming and Protein Transition in Food ERCs are all active in fields of great current relevance.

1. Design Methods in Food
2. Future Food Systems
3. Food and Health
4. Green Health
5. Healthy Farming
6. Innovative Bio-Monitoring
7. Innovative Entrepreneurship in Rural Areas
8. Location Intelligence
9. New Business Models for Agriculture and Food Transition
10. New Cultivation Systems
11. Plant-Soil Health
12. Sustainable Protein Sources
13. Precision Livestock Farming
14. Protein Transition in Food
15. Sustainable Production

Source: www.hasuniversity.nl

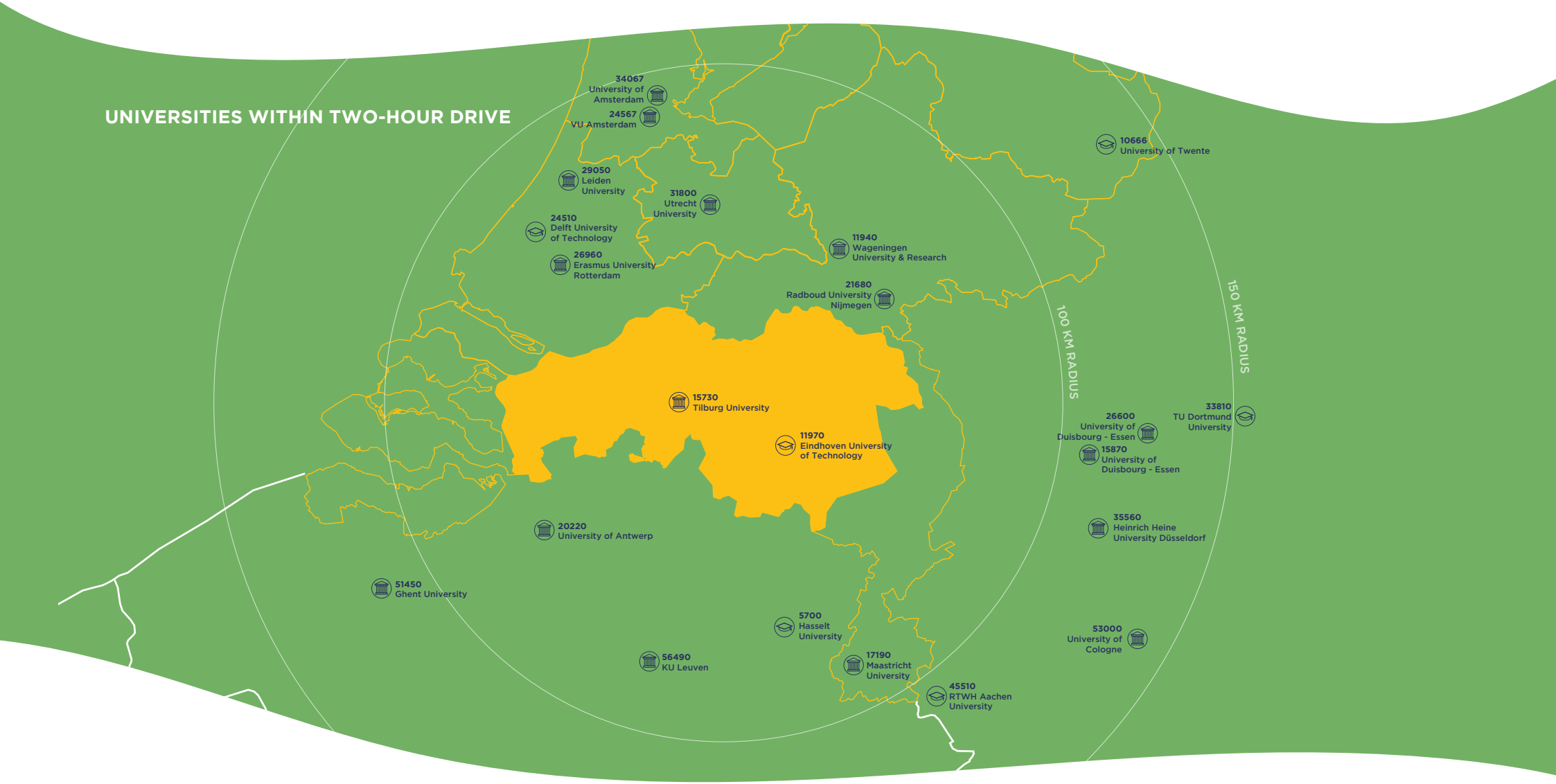
HAS KNOWLEDGE TRANSFER

Over and above its education mission, HAS University of Applied Sciences is also committed to a two-way 'knowledge transfer' network with local companies. HAS' knowledge transfer is consequently another important source of interns for local companies, thanks to their understanding of innovation in AgriFood production and processing. HAS has initiated a number of programmes to support companies in themes such as food, green areas, agribusiness, animal and the environment.

Source: www.has.nl/en/has-collaborates/collaboration-opportunities

B. Relevant education outside Brabant

Within a radius of 150 km (about a two-hour drive) of the center of Brabant, there are 22 universities, of which 11 are general universities, 5 are universities of technology and 6 are specialized in other fields.



C. Institutes

1. Cosun Innovation Center

General description	Cosun Beet Company works closely with the other Cosun business groups in the Cosun innovation center in Dinteloord. Opened in 2017, this high-tech campus is a knowledge and expertise centre for product development, process technology, analysis and research.
Objectives	Cosun's goal is to enhance the development of biobased concepts, products and applications in the food and non-food industries. Cosun R&D also actively takes steps to create added value from the raw materials processed by the Cosun business groups. By-products are used to extract various materials for animal feed and energy generation. Cosun R&D works closely with universities and other knowledge institutions, both in the Netherlands and abroad.
Core competences	Cosun R&D specializes in two fields: support and improvement andd development. Its Support & Improvement division supports and improves existing products and production processes, while the Development division works with the Cosun group of businesses to initiate and oversee the development of new product concepts, production processes and to investigate the sustainability of current and future production facilities.
Test/lab facililties	Cosun Innovation Center offers state-of-the art research laboratories, conference rooms, a pilot factory, application laboratories companies and startups/scaleups where opportunities exist for synergy.
Application areas	Cosun Beet Company makes intensive use of the facilities and uses them to welcome its customers, partners and business associates. The Cosun innovation center facilitates and encourages cooperation and knowledge sharing because collaboration with the other business groups accelerates the group's results. The Institute for Rational Sugar Production (IRS) has been housed in the Cosun innovation center since 2018.

2. Biorizon

General description	Shared Research Center Biorizon, initiated by TNO and VITO, is located on the Green Chemistry Campus in Bergen op Zoom. Biorizon aims to achieve commercial production of bio-aromatics by 2025.
Objectives	Biorizon is focusing on upscaling the technology required to pave the way for industrial-scale production coupled with continuous processing. Biorizon is presently engaged in validating its continuous processes and working with industry partners towards the next stage – the demonstration phase. Once the technology is successfully demonstrated, the knowledge gained will facilitate commercial implementation. This will result in bio-aromatic building blocks that are highly functional, renewable, competitively priced and safe, and will also mean a significant reduction in CO2 emissions, helping to combat climate change.
Core competences	In co-creation with global leaders and SME companies in the fields of feedstock, conversion, equipment and end-products Biorizon creates renewable aromatics that outperform their fossil counterparts. Biorizon has developed three programme lines or Horizons that industrial partners can be a part of: • Horizon I focuses on thermochemical processes • Horizon II focuses on sugar/furan technology • Horizon III focuses on lignin technology.
Test/lab facililties	Shared Research Center Biorizon has state-of-the-art facilities at its disposal.
Application areas	For companies that would like to introduce lignin-derived chemicals into their biobased products, Biorizon launches its Biorizon Lignin Application Center.

3. Biopolymeer Applicatie Centrum (BAC)

General description	The Biopolymer Application Centre (BAC) helps students, startups, and companies in finding solutions with biobased plastic. BAC is part of the Centre of Expertise Biobased Economics.
Objectives	The aim of BAC is to bring biopolymers to the wide attention in order to help shape the transition to a biobased economy. BAC is at the forefront of the transition from synthetic to biobased plastics, or biopolymers.
Core competences	The Biopolymer Application Centre (BAC) has a permanent team of employees. In addition, there are continuous interns from HBO and MBO working within the BAC. Within the internship team, students work multidisciplinary from the art academy, industrial design, marketing/sales, laboratory research, and technical manufacturing courses. This is supported by various partners from the business community and knowledge institutions. For example, there is always access to practical experience and theoretical knowledge.
Test/lab facililties	BAC is not only a knowledge centre, but also a test and development centre. BAC can help with research into biobased plastics, designs of products can be made, there are possibilities for manufacturing products and prototypes and the BAC has expertise in conducting market research.
Application areas	Among others: Material selection, Material research, Product design, Product prototyping, 3D design and printing, 3D scanning, Injection molding.

4. Dutch Polymer Institute

General description	The Dutch Polymer Institute (DPI) is a public-private partnership performing pre-competitive research into polymers and their application, linking scientific knowledge to the industrial need for innovation. This results in added value for universities in the form of scientific publications and for companies in the shape of intellectual property. Some 250 researchers (PhDs and post-docs) are currently involved in DPI projects at knowledge institutes throughout the world.
Objectives	DPI is an industry-driven international collaboration platform for pre-competitive research. Within DPI, collaboration is at the pre-competitive level, which means that competitors and non-competitors sit around the same table and work together on topics of common research needs and interests. Knowledge institutes participating in DPI therefore become part of an active international community consisting of the world's leading universities and research institutions in the field of polymer chemistry, polymer physics and polymer processing. With its chain-of-knowledge approach, DPI integrates the scientific disciplines and competences of its academic partners to maximise knowledge utilisation. The global not-for-profit DPI platform consists of industrial partners and selected academic groups. Sharing the knowledge pre-competitively gives companies the opportunity to accelerate their innovation.
Core competences	The industrial partner base of DPI extends across the polymer value chain and includes producers as well as processors and (end-)users of polymeric materials in many parts of the world. Participating in DPI is a cost-effective way for companies to meet their ongoing research needs while at the same time addressing challenges that extend beyond their individual research and innovation portfolios. By pooling resources they can jointly work on research topics of common interest, both within and across value chain segments. DPI research projects are carried out by leading polymer science groups across the world. DPI enables companies along the value chain to work together to gain new insights in the understanding of polymers.
Test/lab facililties	-
Application areas	The research programme focuses on the following three programme areas: Polyolefins, Performance Polymers and Polymers for Oil and Gas.

5. Centre of Expertise BBE

General description	The Centre of Expertise Biobased Economy (CoE BBE) is central to the transition to a biobased economy as a knowledge partner of many companies and organizations. The centre conducts applied research, helps companies with their biobased ambitions and ensures that biobased gets a place in all levels of education. The CoE BBE is a partnership between Avans University of Applied Sciences and HZ University of Applied Sciences.
Objectives	CoE BBE helps companies with their bio-based ambitions by innovating Higher Professional Education (HBO) and carrying out practice-based research. For example, CoE BBE provides highly educated professionals who can support and shape the transition to a bio-based society.
Core competences	CoE BBE's activities are tailored to the needs of the business community. It provides well-qualified professionals, facilities for prototyping and a central knowledge point for bio-based education, research and facilitation. CoE BBE contributes to more than 50 research projects, all of which add to the treasure trove of new knowledge concerning the bio-based economy. With input from researchers, lecturing researchers and students, CoE BBE helps companies and government agencies investigate and realise biobased innovations.
Test/lab facililties	4 application centers and 3 international living labs.
Application areas	There are 4 research groups at the Centre of Expertise Biobased Economy (CoE BBE): Biobased Building, Biobased Building Blocks & Products, Biobased Resources & Energy and Marine Biobased Specialties.

6. Other BBE-institutes

Center	Location	Activity
NAC (Natuurvezel applicatie centrum)	Raamsdonksveer	Het NAC is dé ontwikkelpartner in de circulaire biobased economy, met de focus op (natuur)vezel productietechnologie en (natuur)vezel gebaseerde materialen, producten en applicaties.
KLAC (Kleuren Applicatie Centrum)	Bergen op Zoom	Development and application of bio-based dyes in collaboration with Intermediate Vocational Education (MBO) and Higher Professional Education (HBO) institutes and SMEs.
KATC (Kunststoffen Applicatie en Training Centrum)	Bergen op Zoom	Het KATC is een open innovatiecentrum, waar onderwijs en bedrijfsleven elkaar ontmoeten op het gebied van ontwikkeling van nieuwe (groene) kunststoffen, natuurvezels en composieten. Daarnaast is het KATC een opleidings- en trainingslocatie voor studenten én voor medewerkers uit de kunststofindustrie.
Biorizon Lignine Application Center	Bergen op Zoom	The aim: to develop valorization routes for lignin and to create materials such as resins and composites that outperform their fossil-based counterparts.
Relement	Bergen op Zoom	Relement is a spin-off of Biorizon, a program of TNO Sustainable Chemical Industry. Relement converts biomass residues into high-quality chemical ingredients; bio aromatics.
VARTA (Valorisatielab reststromen tuin- en akkerbouw)	Nispen	Valorisatielab Reststromen Tuin- en Akkerbouw, oftewel VARTA, houdt zich bezig met onderzoek naar planten. Bij iedere teelt is er een deel dat nu afgevoerd of gecomposteerd wordt, dit kan gaan om onderste stengelstukken of afgekeurde bloemen en planten.

7. R&D companies

Name	City	Activity	Size in jobs	Country of origin
IRS	Dinteloord	Knowledge and research center for sugar beet cultivation. Also researching chicory.	20 - 50	Netherlands
Masterlab by Nutreco	Boxmeer	Analysis in the food chain of food and feed	20 - 50	Netherlands
RobaLaB	Deurne	Microbiological, chemical and nematological analyzes for the agro, feed and food sector	20 - 50	Netherlands
Cerescon	Heeze	Advanced mechanized selective harvesting solutions	20 - 50	Netherlands
AB Mauri Research	Made	Research on baking	20 - 50	United Kingdom
Nutreco Swine Research Centre	Sint Anthonis	Research on breeding of swine	10-20	Netherlands
Horti-consult International	Deurne	Cultivation advice in greenhouse vegetables	10-20	Netherlands
Van de Meerakker Service	Heeswijk-Dinther	Manure, silage, water, soil, horticulture, animal feed analyzes	10-20	Netherlands

4. TALENT AND EDUCATION, INCLUDING THE LABOR MARKET

A. General characteristics of Brabant's labor market

LABOR FORCE

Brabant's labor force has proven to adapt easily to the cultures of foreign companies and multilingual skills are common. More than 94% of the labor force has conversational knowledge of a second language with English (90%), German (71%) and French (29 %) as the most commonly used languages. At least three-quarters of the population speaks two foreign languages and over one-third is competent in three languages. Two world-class universities (in technical education and economics & law) and numerous universities of applied sciences ensure a steady influx of new talent into the province.

LABOR FORCE 2019

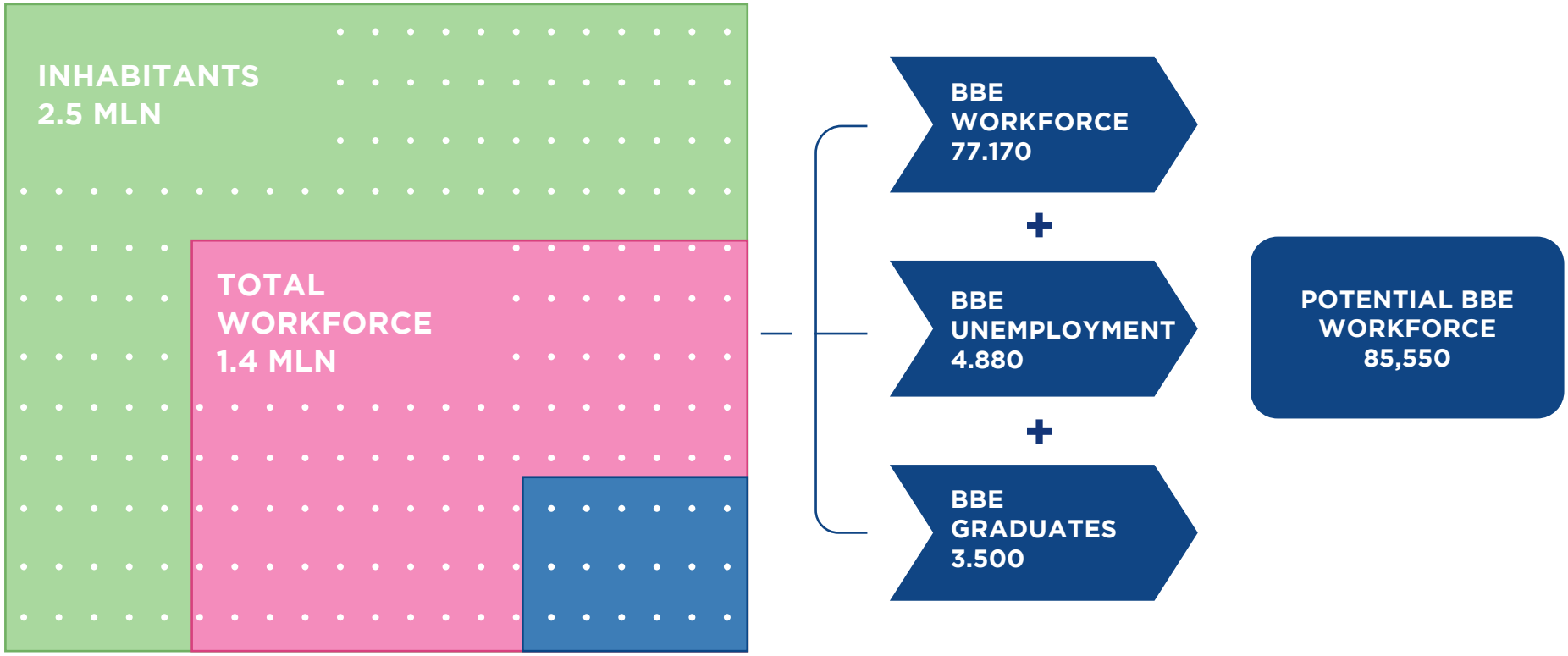
Brabant 1,396,000 people 15.1%
The Netherlands 9,267,000 people 100%

LABOR FORCE BY SEX AND AGE

Sex	Breda region	Tilburg region	Den Bosch region	Eindhoven region	Brabant	Participation rate
Male	183,00	141,000	194,00	232,000	750,000	76.9%
Female	160,000	123,000	169,000	193,000	645,000	67.7%
Total	343,000	265,000	364,000	425,000	1,396,000	72.4%

Age	Breda region	Tilburg region	Den Bosch region	Eindhoven region	Brabant	Participation rate
15-24 yr	55,000	46,000	59,000	68,000	227,000	73.7%
25 - 44 yr	131,000	104,000	136,000	171,000	542,000	89.5%
45 - 74 yr	157,000	115,000	168,000	186,000	626,000	61.8%

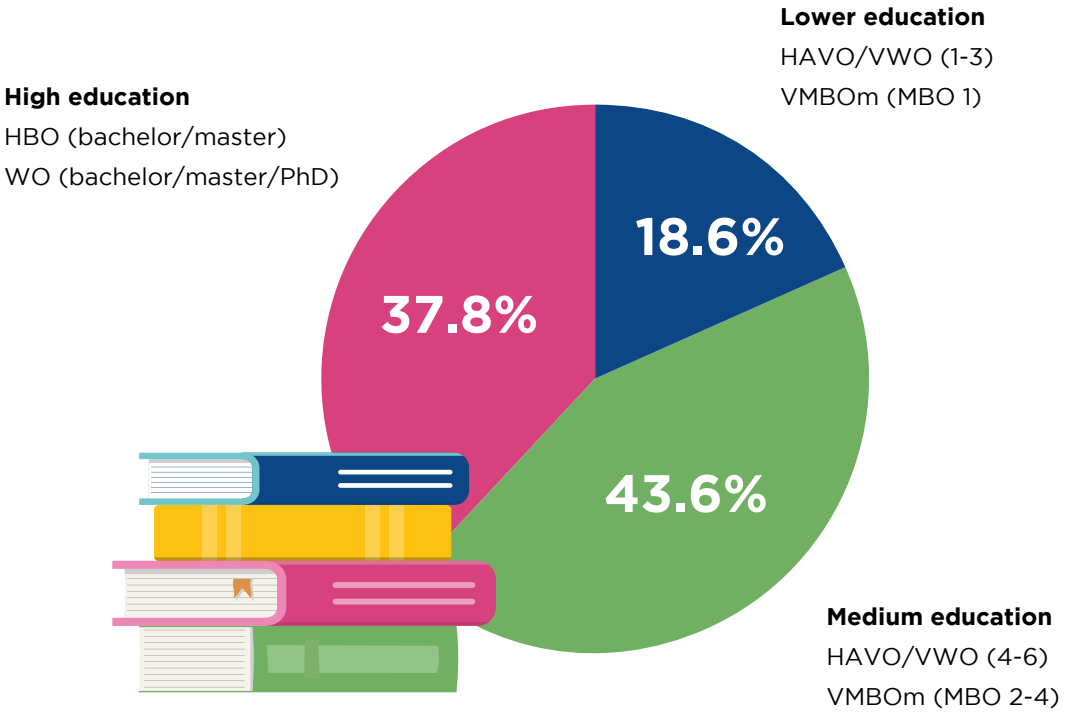
B. Labor market in Biobased sector



1. Labor market: Biobased workforce
Highly educated workforce

NUMBER OF JOBS BY EDUCATION LEVEL IN THE BIOBASED ECONOMY

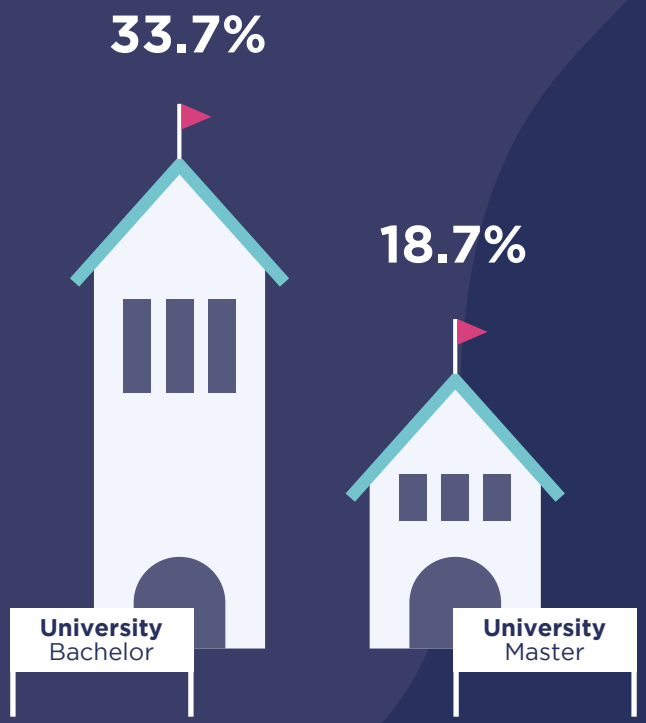
Percentage of Brabant's Biobased labour force



Source: CBS, LISA 2020, Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

NUMBER OF GRADUATES IN THE BIOBASED ECONOMY

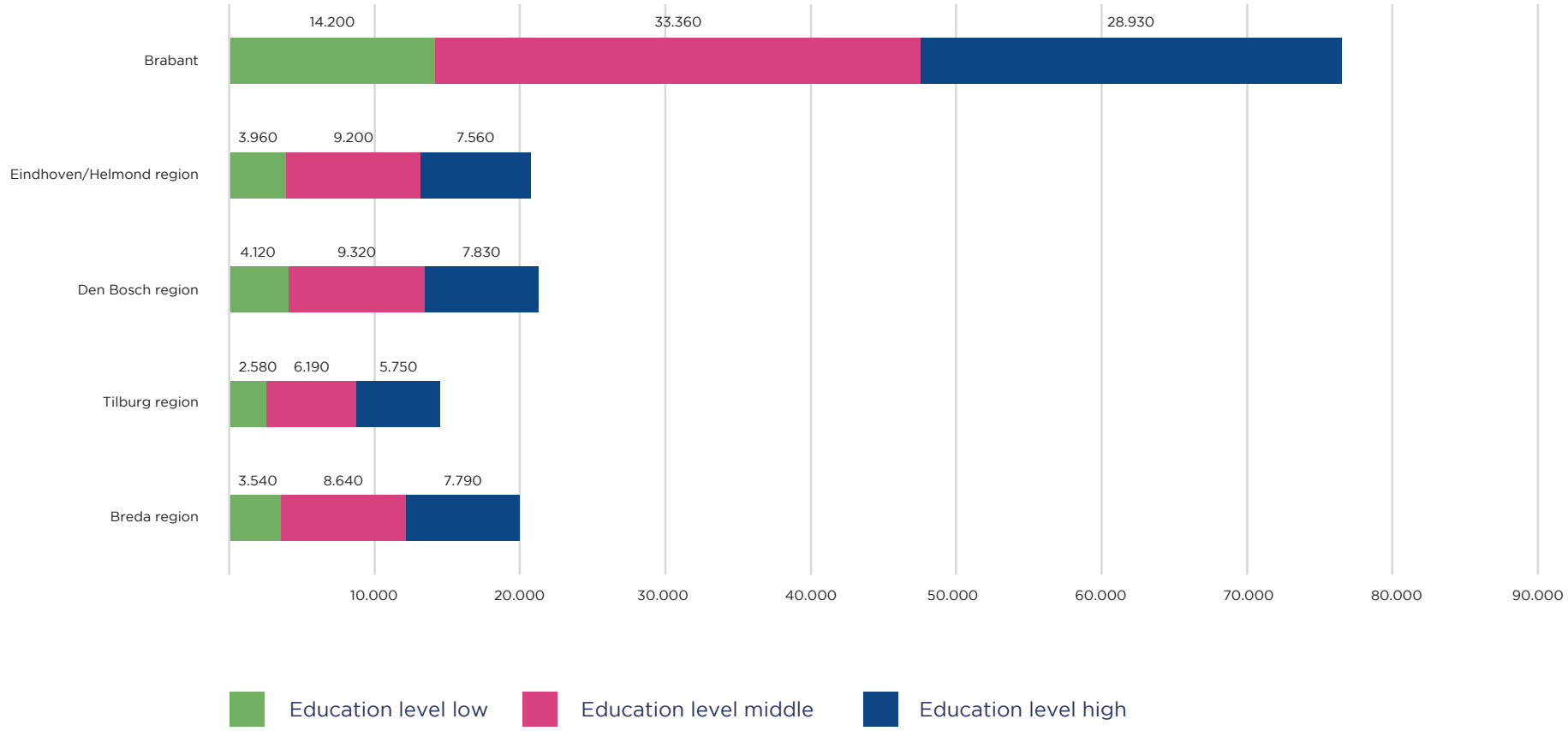
% growth since 2016



Source: DUO, 2020. Adapted by Fanion onderzoek & advies

2. Labor market: Biobased employment by level of education

JOBS BY EDUCATION LEVEL IN BIOBASED ECONOMY, 2019



Source: Source: CBS 2020, Vestigingenregister Noord-Brabant 2019, edited by Fanion onderzoek & advies

3. Labor market: universities within 150 km radius

City	University	Driving distance	Type of University	Number of students	Students in Nature, Health and Technology
Tilburg	Tilburg University	0	Specialized University	15.730	460
Eindhoven	Eindhoven University of Technology	0	Technical University	11.970	11.900
Nijmegen	Radboud University Nijmegen	80km	Broad University	21.680	7.090
Utrecht	Utrecht University	90km	Broad University	31.800	13.580
Rotterdam	Erasmus University Rotterdam	90km	Specialized University	26.960	3.830
Delft	Delft University of Technology	110km	Technical University	24.510	23.900
Wageningen	Wageningen University & research	110km	Specialized University	11.940	11.840
Maatsricht	Maastricht University	110km	Specialized University	17.190	5.590
Leiden	Leiden University	130km	Broad University	29.050	6.390
Amsterdam	VU Amsterdam	130km	Broad University	24.570	10.060
Amsrterdam	University of Amsterdam	130km	Broad University	34.070	8.960
Enschede	University of Twente	180km	Technical University	10.670	7.650
Total Netherlands				**260.140**	**111.250**

City	University	Driving distance	Type of University	Number of students	Students in Nature, Health and Technology
Hasselt	Hasselt University	70km	Specialized University	5.700	3.30
Antwerp	University of Antwerp	90km	Broad University	20.220	9.310
Leuven	KU Leuven	110km	Broad University	56.490	29.110
Ghent	Ghent University	150km	Broad University	51.450	23.360
Total Belgium				**133.860**	**65.110**

City	University	Driving distance	Type of University	Number of students	Students in Nature, Health and Technology
Duisburg	University of Duisburg - Essen	130km	Broad University	15.870	-
Dortmund	TU Dortmund University	130km	Technical University	33.810	33.810
Aachen	RTWH Aachen University	130km	Technical University	45.510	45.510
Essen	University Duisburg - Essen	140km	Broad University	26.600	-
Düsseldorf	Heinrich Heine University Düsseldorf	140km	Broad University	35.560	
Cologne	University of Cologne	170km	Broad University	53.000	-
Total Germany				**604.340**	**255.680**

Source: DUO, Dataloep Vlaanderen, DEStatis/Statisisches Budesambt (2019), edited Fanion onderzoek & advies

4. Labor market: students and graduates

EINDHOVEN UNIVERSITY OF TECHNOLOGY

In 2019 325 bachelors and 146 masters graduated at Eindhoven University of Technology in courses that are relevant for Biobased economy. Between 2015-2019 the number of bachelors that graduated grew 33.7%. The number of master students that graduated increased with 18.7 % in the same period.

Also the number of enrolled students is growing. In 2020 2,067 bachelor students and 514 master students were enrolled at Eindhoven University of Technology in programs relevant for biobased economy. An increase by respectively 21.9% and 22.4% compared to 2016.

UNIVERSITIES OF APPLIED SCIENCES

In Brabant there are three universities of applied sciences that offer courses that are relevant to the biobased economy: AVANS UAS, Fontys UAS and HAS UAS. In 2020 a total of 5,304 students are enrolled in a course that is relevant to biobased economy. An increase of 14.9% compared to 2016.

Also the number of graduates is strongly growing. In 2019 there were 983 students graduating in a course relevant to biobased economy, an increase of 23.3% in comparison to 2015.

REGIONAL TRAINING CENTERS FOR SECONDARY VOCATIONAL EDUCATION

The ROC's (Regional Training Centers for secondary vocational education) offer 116 different courses that are relevant for Biobased economy, of which 49 for professions in green maintenance and agriculture and 116 for technical professions. In 2020 a total of 2,040 students graduated at a secondary vocational education level. A decrease of 11.8% in comparison to 2016.

Source: DUO, Dataloep Vlaanderen, DEStatis/Statisisches Budesambt (2019), edited Fanion onderzoek & advies

5. Labor market: Biobased education TU/e

Registered studends and Graduates in Biobased related at Eindhoven University of Technology

ENROLLED STUDENTS

Courses	2016	2017	2018	2019	2020	2016/2020
B Chemichal Engineering	318	331	371	383	421	32.4%
B technical Innovation Sciences	470	500	566	610	488	3.8%
B Mechanical Engineering	915	962	1013	974	1167	27.5%
Total bachelor	**1,703**	**1,793**	**1,950**	**1,967**	**2,076**	**21,9%**
M Chemical Engineering	219	238	251	271	294	34.2%
M Innovation Sciences	75	67	83	84	101	34.7%
M Sustainable Energy Technology	126	128	110	112	119	-5.6%
Total Master	**420**	**433**	**444**	**467**	**514**	**22.4%**
Total	**2.123**	**2.226**	**2.394**	**2.434**	**2.590**	**22.0%**

GRADUATES

Courses	2015	2016	2017	2018	2019	2015/2019
B Chemichal Engineering	65	47	71	62	46	-29.2%
B technical Innovation Sciences	47	78	98	81	105	123.4%
B Mechanical Engineering	131	146	175	161	174	32.8%
Total bachelor	**243**	**271**	**344**	**304**	**325**	**33.7%**
M Chemical Engineering	53	69	82	71	91	71.7%
M Innovation Sciences	23	24	13	20	17	-26.1%
M Sustainable Energy Technology	47	48	47	49	38	-19.1%
Total Master	**123**	**141**	**142**	**140**	**146**	**18.7%**
Total	**366**	**412**	**486**	**444**	**471**	**28.7%**

6. Labor market: BBE-education universities of applied sciences enrollments

Enrollments students Universities of Applied Sciences

AVANS UNIVERSITY OF APPLIED SCIENCES

Courses	2016	2017	2018	2019	2020	2016/2020
B Biology and Medical Lanoratory research	631	711	681	683	803	27.3%
B Chemistry	522	586	649	675	676	295%
B Chemical technology	188	180	182	187	179	-4.8%
B Environmental science	195	223	240	240	264	35.4%
B Mechanical engineering	864	858	848	879	827	-4.3%
Ad Chemical Technology	2	0	0	0	0	-
Ad Engineering	0	0	44	115	165	-
Total Avans	**2.402**	**2.558**	**2.644**	**2.779**	**2.914**	**21.3%**

FONTYS UNIVERSITY OF APPLIED SCIENCES

Courses	2016	2017	2018	2019	2020	2016/2020
B Mechanical engineering	759	757	722	710	624	-17.8%
B Second degree secondary teacher in Chemistry	89	103	114	111	109	22.5%
B Second degree secondary teacher in Biology	238	225	217	199	195	-18.1%
B Secondary education teacher Technology	43	42	46	47	52	20.9%
M Biology teacher	52	44	48	56	59	13.5%
M Chemistry teacher	53	50	43	34	39	-26.4%
Ad Mechanical Engineering	0	29	58	71	61	-
Total Fontys	**475**	**493**	**526**	**518**	**515**	**8.4%**

HAS UNIVERSITY OF APPLIED SCIENCES

Courses	2016	2017	2018	2019	2020	2016/2020
B Animal and Livestock Farming	402	411	410	389	345	-14.2%
B Environmental science	159	179	197	234	236	48.4%
B Applied Biology	528	587	624	593	702	33.0%
B Horticulture and Arable farming	258	281	283	275	284	10.1%
B Food technology	392	394	355	357	308	-21.4%
Total HAS	**2.739**	**1.852**	**1.869**	**1.848**	**1.875**	**7.8%**
Total Biobased related Brabant	**4.616**	**4.903**	**5.039**	**5.145**	**5.304**	**14.9%**

7. Labor market: Biobased education universities of applied science graduates

Graduates students Universities of Applied Sciences

AVANS UNIVERSITY OF APPLIED SCIENCES

Courses	2015	2016	2017	2018	2019	2015/2019
Ad Chemical Technology	5	2	0	0	0	-
Ad Engineering	0	0	0	0	22	-
B Biology and medical Laboratory Research	93	89	102	109	95	2.2%
B Chemistry	63	61	82	94	97	54.0%
B Chemical Technology	30	29	34	36	42	40.0%
B Environmental science	23	26	34	42	39	69.6%
B Mechanical engineering	140	125	143	157	138	-1.4%
Total Avans	**354**	**332**	**395**	**438**	**433**	**22.3%**

FONTYS UNIVERSITY OF APPLIED SCIENCES

FONTYS University of Applied Science	2015	2016	2017	2018	2019	2015/2019
B Mechanical engineering	105	97	96	98	108	2.9%
B Second degree secondary teacher in Chemistry	10	8	20	8	16	60.0%
B Second degree secondary teacher in Biology	26	28	42	42	36	38.5%
B Secondary education teacher Technology	6	8	9	5	9	50.0%
M Biology teacher	12	17	7	8	8	-33.3%
M Chemistry teacher	12	10	19	13	11	-8.3%
Ad Mechanical Engineering	0	0	0	6	12	-
Total Fontys	**171**	**168**	**193**	**180**	**200**	**17.0%**

HAS UNIVERSITY OF APPLIED SCIENCES

Courses	2015	2016	2017	2018	2019	2015/2019
B Animal and Livestock Farming	73	83	64	79	91	24.7%
B Environmental science	25	24	24	32	26	4.0%
B Applied Biology	80	77	81	88	97	21.3%
B Horticulture and Arable farming	38	49	51	47	50	31.6%
B Food technology	56	68	85	69	86	53.6%
Total HAS	**272**	**301**	**305**	**315**	**350**	**28.7%**
Total Biobased related Brabant	**797**	**801**	**893**	**933**	**983**	**23.3%**

8. Labor market: Biobased graduates medium vocational level

Graduates in biobased economy related studies at medium vocational level 2016-2019

Region	2016	2017	2018	2019	2020	2016/2020
Green maintenance & agriculture	**962**	**1145**	**1069**	**959**	**804**	**-16.4%**
Region Breda	211	288	208	187	152	-28.0%
Region Den Bosch	751	857	861	772	652	-13.2%
Technology	**1.356**	**1.390**	**1.252**	**1.490**	**1.238**	**-8.7%**
Region Breda	313	293	363	363	326	4.2%
Region Tilburg	191	203	120	171	157	-17.8%
Region Den Bosch	413	428	368	487	410	-0.7%
Region Eindhoven/Helmond	439	466	401	469	345	-21.4%
Biobased related total	**2.318**	**2.535**	**2.321**	**2.449**	**2.042**	**-11.9%**

Regional Training Centers for secondary vocational education in green maintenance and agriculture and technology

Region Breda	curio		
Region Tilburg	Helicon	ROC TILBURG	DE ROOI PANNEN
Region Den Bosch	Helicon	KONING WILLEM I COLLEGE	de leijgraaf
Region Eindhoven / Helmond	Helicon	SUMMA College	rocteraa

Source: DUO 2021, edited by Fanion onderzoek & advies

5. LOCATION, CAMPUSES AND FACILITIES

A. Location

1. BRABANT, THE NETHERLANDS: YOUR GATEWAY TO EUROPE

In geographic terms the Netherlands – and Brabant in particular – has historically been the key port of entry to mainland Europe.

This is also true in a literal sense, as Brabant is part of the delta stretching between Rotterdam (Europe's largest port) and Antwerp (the continent's second largest port) and three of Western Europe's busiest airports: Amsterdam Schiphol, Brussels Airport and Dusseldorf International Airport. Excellent infrastructure (by road, rail, water and air) and IT and data communication networks that are second-to-none anywhere in the world are added bonuses.

This combination of strengths helps industry in the area to fluidly reach 170 million consumers in a radius of 500 kilometres (300 miles). These consumers with significant financial means (north-western Europe is one of the wealthiest markets in the world) are all within 24 hours of Brabant.

#1 LOGISTICS
Hub in Europe

3 MAINPORTS
For air, data and sea

Efficient logistics services empowered by **INNOVATION & COLLABORATION**

COMPETITIVE COST
for labour, real estate and transport

EXCELLENT CONNECTIVITY
To Europe and all continents

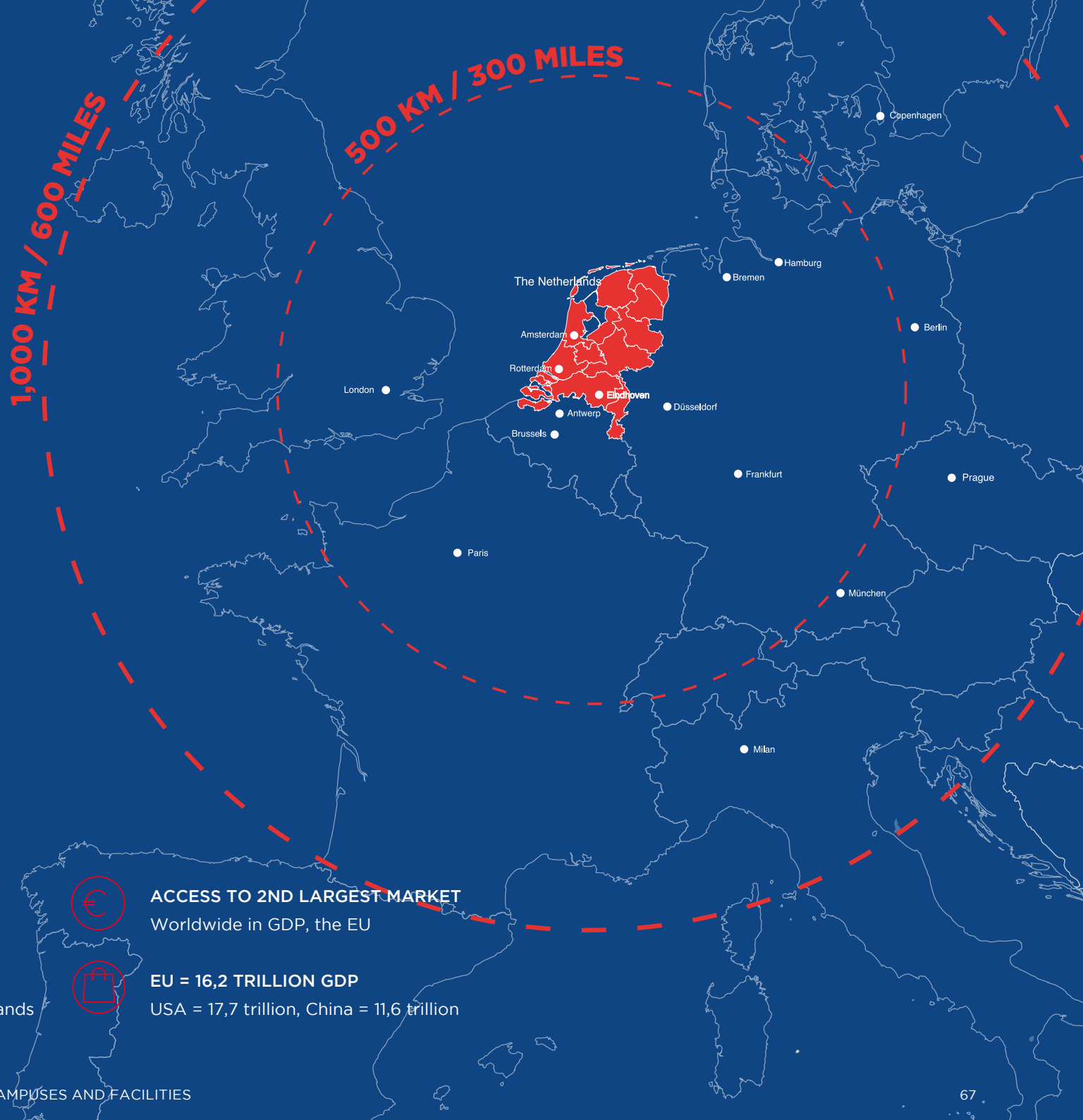
#1 ENTRY POINT
In Europe for overseas products

500 km proximiy to European markets
170 MILLION CONSUMERS

World class & competitive business environment
NO VAT PAYMENT AT IMPORT

2. BRABANT, THE NETHERLANDS: ACCESS TO THE SECOND LARGEST MARKET IN THE WORLD

Within a radius of 500 kilometres, businesses can reach 170 million consumers in Western Europe, and if that circle is extended to a radius of 1,000 kilometres (600 miles) – still within easy and rapid reach – this figure grows to 250 million people. The largest European economies – Germany, France, the United Kingdom and the Benelux region – are all within a day's reach. The rest of the European Union (the second largest market in the world in GDP terms) is just as accessible from Brabant, with an additional 24 to 36 hours in transit time.



170 MILLION CONSUMERS
Within a 500 km / 300 mile radius

250 MILLION CONSUMERS
Within a 1,000 km / 600 mile radius

PERFECT SPRINGBOARD
into European market

MAJOR EUROPEAN ECONOMIES
are within a day's reach of the Netherlands

ACCESS TO 2ND LARGEST MARKET
Worldwide in GDP, the EU

EU = 16,2 TRILLION GDP
USA = 17,7 trillion, China = 11,6 trillion

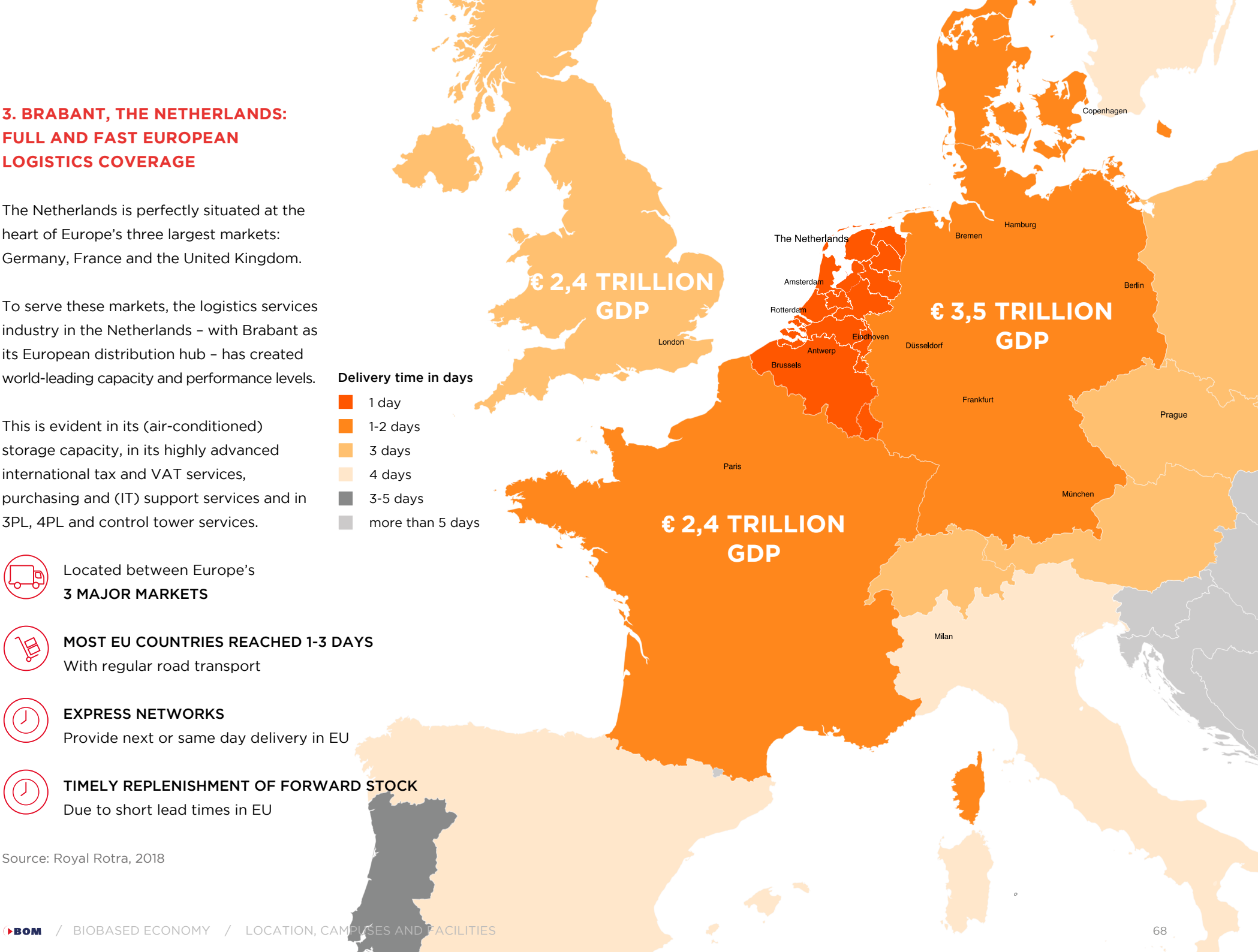
Source: Invest in Holland, 2018

3. BRABANT, THE NETHERLANDS: FULL AND FAST EUROPEAN LOGISTICS COVERAGE

The Netherlands is perfectly situated at the heart of Europe's three largest markets: Germany, France and the United Kingdom.

To serve these markets, the logistics services industry in the Netherlands – with Brabant as its European distribution hub – has created world-leading capacity and performance levels.

This is evident in its (air-conditioned) storage capacity, in its highly advanced international tax and VAT services, purchasing and (IT) support services and in 3PL, 4PL and control tower services.



Located between Europe's
3 MAJOR MARKETS

MOST EU COUNTRIES REACHED 1-3 DAYS
With regular road transport

EXPRESS NETWORKS
Provide next or same day delivery in EU

TIMELY REPLENISHMENT OF FORWARD STOCK
Due to short lead times in EU

Source: Royal Rotra, 2018

ARRRA CLUSTER

The ARRRA-cluster is well-connected and state-of-the-art

- Brabant is situated right in the heart of the Antwerp Rotterdam Rhine Ruhr Area (ARRRA). The ARRRA is home to the most competitive, fully integrated and technologically advanced chemical cluster in the world.

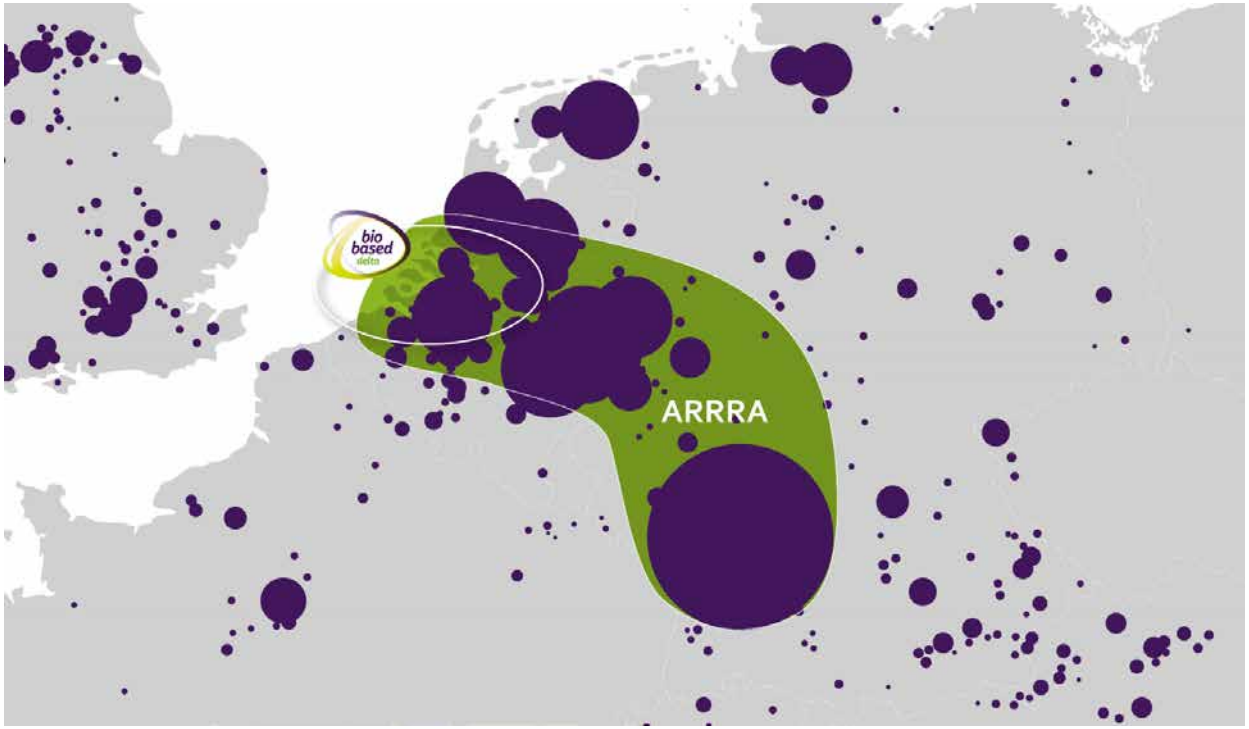
- Major sub-clusters include the ports of Rotterdam and Antwerp, and the inland regions of North Rhine-Westphalia and Ludwigshafen-Mannheim-Karlsruhe. This local clustering allows for shared utilities, which implies cost and energy efficiency.

- The ARRRA is well-connected. Transport from the ports of Rotterdam and Antwerp to the major chemical sub-clusters is ensured by an extensive network of roads, railways, pipelines and inland waterways. This ensures efficient transport and supply chain management.

- Moreover, Brabant has a prominent position as a location for the chemicals industry within the Netherlands. The region is also home to global players in the agrifood industry. In fact, agri-food, high tech and chemistry, the most important economic drivers in Brabant, all come together here. Brabant is fully committed to the bio-based economy.

The ARRRA-cluster offers huge market opportunities:

- Being part of the ARRRA offers market access. Chemical companies such as AkzoNobel, BASF, Bayer, Dow Chemical and DSM, and 'brand owners' like Unilever, Coca-Cola, KLM and Procter & Gamble are all located here and searching for 'greenification' and flexibility in feedstock.
- Chemical production facilities in the ARRRA are also looking ahead by differentiating through sustainability. New value chains are being designed based on sugars, lignin and industrial streams such as CO_2, CH_4, and syngas. This is driven by affluent and green-minded customers and supported by ambitious governments.
- Sugar beets provide the ARRRA, and West-Brabant in particular, with a proven cost competitive feedstock position for the biobased chemical industry.



INTERNATIONAL ACCESSIBILITY

Waterway
Major waterways connect the Netherlands to the European market

Road
Dutch ports have the most dense short sea network for containers and bulk

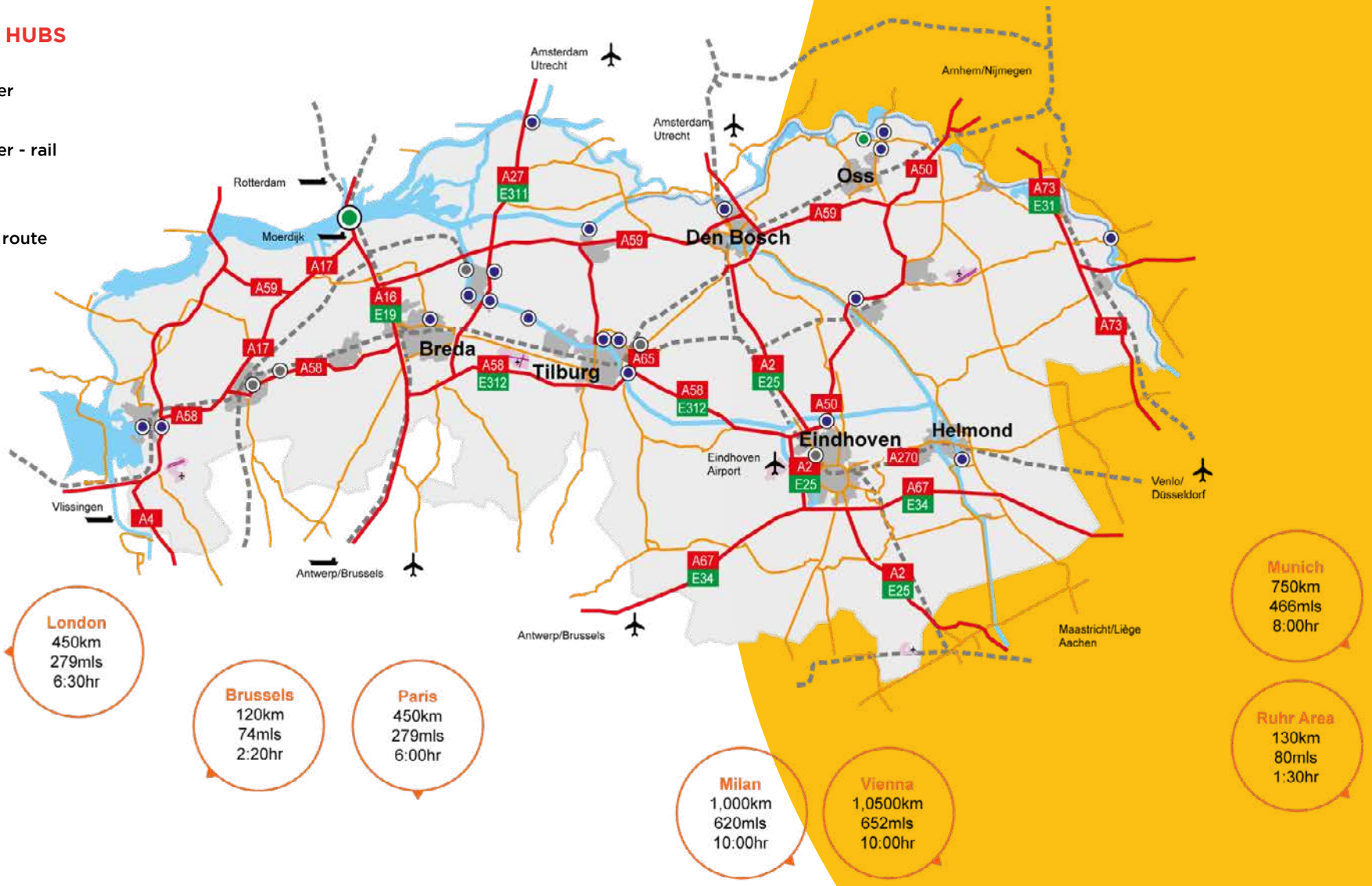
Short sea
Road networks allow swift, fine-meshed distribution

Obor(One Belt, One Road)
Rail connection China Nederland (Rotterdam)

Railway
Dense railway network connects the Netherlands to all European markets.

MULTIMODAL HUBS

- road - water
- road - rail
- road - water - rail
- rail
- highway
- secondary route
- water

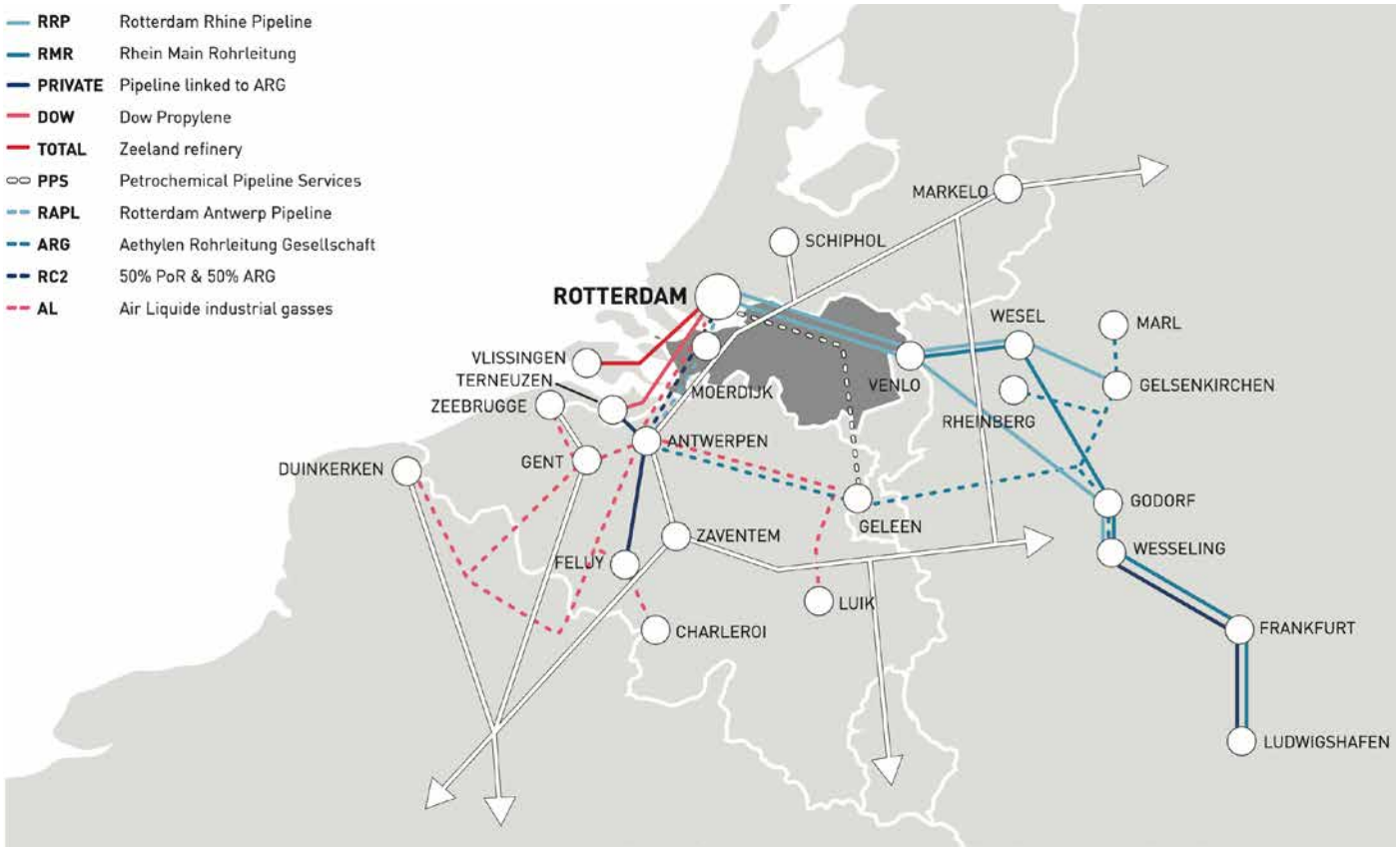


PIPELINE INFRASTRUCTURE

Brabant plays a considerable role in the distribution of oil, gas and chemical products, largely because its excellent position between:

- The Ports of Rotterdam and Antwerp
- The German Ruhr area
- The large chemical clusters in the southern part of the Netherlands (DSM Limburg, Dow Chemical Zeeland).

PIPELINE NETWORK, SOUTHERN NETHERLANDS-BELGIUM-GERMANY



Source: Port of Rotterdam, edited by BOM

B. Campuses and facilities

1. Green Chemistry Campus

- At the Green Chemistry Campus in Bergen op Zoom, businesses, public agencies and knowledge institutions work together to scale-up new and sustainable materials and chemicals for the construction materials and packaging industries. Renewable raw materials such as elephant grass, organic municipal waste and wood residuals form the basis for this goal.

- The campus offers members of the Green Chemistry Campus Community access to facilities such as laboratories, a demonstration site and office space and also provides support in the form of financing, marketing and technology.

- Companies on the Campus have already demonstrated that their concept for a biobased product works on a small scale, and they now aim to expand the concept and show that the product can also be produced on a larger scale with a consistent quality.

- The Green Chemistry Campus is located on a large industrial estate with SABIC Innovative Plastics and Cargill manufacturing plants situated right next door. Both these companies support a variety of projects being conducted on the Green Chemistry Campus.

2. Nieuw Prinsenland

The Nieuw Prinsenland business park offers ample space for modern enterprises operating in, or linked to, the agro-food sector, the bio-based economy, value added logistics, services, research and development. There are flexible lot sizes for companies ranging from SMEs to multinationals. Through clustering and shared facilities, the site offers numerous opportunities for sustainable and profitable cooperation. The combination of the perfect location, variable lots and an excellent price/quality ratio, makes the Nieuw Prinsenland business park an interesting and sustainable business location.
Business park Nieuw Prinsenland is a hub for the bio-based economy.

The site is located right next to a related park that is dedicated to greenhouse horticulture. Several links have been established between the sites for sharing heating, water and/or CO2. Generating green gases and wind energy and the exchange of residual heat can form the basis of a profitable partnership.

Site details:

- 50 hectares of net issuable lots
- Lot sizes range from 0.5 hectares to more than 10 hectares
- Lots are 70-90 meters long or 120-150 meters and longer
- Construction height of up to 40 meters
- The ground level is +1 m NAP (Normal Amsterdam Level)

3. Port of Moerdijk

The Port and Industrial complex Moerdijk is strategically situated in the Netherlands, between the international ports of Rotterdam and Antwerp. It is the most inland seaport in the Netherlands with five harbour bassins. This strategic location offers many business opportunities for transporting goods from the entire world to the Netherlands.

The industrial estate is characterised by a diversity of industrial activities and excellent shared facilities. The total area comprises 2,345 hectares. Currently more than 400 companies are based here, ranging from industrial companies, commercial service providers and stevedores, through to logistic service providers and transporters. The Port of Moerdijk's industrial complex is a platform for business-to- business contacts and relations. The established companies provide important value for companies that do or intent to do business on the Port of Moerdijk's industrial complex.

The Port of Moerdijk has a strong and extensive chemicals cluster. Via the pipeline system, it is directly connected with the chemicals clusters in Antwerp, Rotterdam, Zeeland, Limburg and the Ruhr area, transporting (petro-)chemical products and gases. In Moerdijk, chemical and petrochemical companies have plenty of space for growth and for greening. Also chemical and chemical related companies make use of each other's raw materials and residual streams and thus close the chains.

An area of 120 hectares in the port and industrial estate is currently available for chemical and chemical related business in the heaviest environmental category.

4. Food Tech park

Food Tech Brainport is an eco-system offering food grade test facilities, production locations, networks, and access to research and educational institutes for food processing companies and technology providers. The objective of Food Tech Brainport is to feed more people and to use the earth's resources more sparingly. This requires smart technologies that are both more sustainable and affordable. Food Tech Brainport brings together technology providers, food processing companies, and talent. This way they accelerate innovation and manufacture products with longer shelf life without compromising on taste or nutritional value, reduce food waste, and lower energy consumption.

Food Tech Brainport:

1. Accelerates innovation for food processing companies time to market, lower investment and reduce risk;
2. Brings technology to the market (TRL 6-8 to 9) with technology providers and research institutes;
3. Develops professionals being able to implement innovative technology to the marketplace.

Food Tech Brainport has several food grade (test and scaling-up) Fieldlabs, allowing them to contribute to healthier circular food systems, in the fields of:

- Mild separation;
- Mild preservation;
- Total use – no waste; Utilising all the raw materials derived from a product
- Smart food processing; Cobots, vision, sensoring, AI, etc.

Food Tech Park Brainport welcomes startups, SMEs and multinational companies. Innovative products and applications can be tested and manufactured in an open field lab environment, bringing them to market at an accelerated pace. Food Tech Brainport provides support for the entire process, from product development through to production and market introduction.

6. COOPERATION IN BRABANT AND NETWORKS (BUSINESS, SCIENCE, GOVERNMENT)

INTRODUCTION

Brabant has a distinctly strong culture, history, and tradition of informal constructive partnerships that are based on trust and "open innovation'. This is particularly evident in the following respects, along with numerous others:

- The fact that some of Brabant's largest companies (VION, Cosun/ SuikerUnie, FrieslandCampina) have a history of working together.

- The century-old roots of some of the region's industrial giants and the fact that these companies are completely intertwined with the development of the region, the cities, the universities, the schools, housing, leisure, the football clubs, and so on (Philips in Eindhoven, MSD via Organon in Oss, MSD Animal Health through Akzo/Intervet and Hendrix in Boxmeer).

- The fact that Philips decided, 17 years ago, to open up its originally hermetically-sealed NatLab research site in Eindhoven and began to invest in "open innovation" by inviting other companies to join in. The company invested hundreds of millions of euros in further developing the campus and facilities to optimize joint research, the result being the Philips High Tech Campus. The site, located in the middle of Eindhoven and home to 12,000 researchers from over 200 companies and institutes from around the world, is now owned by a property investor and named the Eindhoven High Tech Campus (HTCE). Key tenants remain Philips Healthcare, Philips Research and Signify (formerly Philips Lighting) as well as NXP, ASML, Holst Centre and Xeltis.

- The concept (joint research, shared facilities, intensive cooperation, and significant outsourcing when it comes to drug discovery and development) and success of the Pivot Park biopharmaceutical campus in Oss. The advantages of this culture are that cooperative ventures, both informal and highly intensive, are ingrained in the area. Many CEOs in the region, mayors and city councilors, and academics will frequently say, "the door is always open, so don't hesitate to drop by", "we make the best decisions sitting at the kitchen table", and "we know each other's mobile phone numbers and we pick up the phone whenever we see a friend is calling".

In short: building partnerships in the region is a quick and fluid process – and faster than anywhere else in the Netherlands. Outsiders who wish to join the club and make an actual contribution will quickly and easily reap the rewards.

CONNECTING GLOBAL GIANTS: BRABANT'S INDUSTRIAL ICONS

In Brabant a number of key ingredients have been fruitfully mixed together for over a century, creating one of the strongest high-tech systems regions in the world:

- Entrepreneurship
- Corporate social responsibility
- Cooperation and open innovation
- Roots in AgriFood and Health
- Strong regional pride and loyalty, but with a focus on a global market

The growth of three remarkable Brabant business families in the past century exemplifies and characterizes how this region developed to attain its current strong position and open approach to working and partnerships. Three extraordinary individuals started businesses here that developed into three connected clusters of companies, consisting of dedicated tier 1 and 2 suppliers, dedicated logistics service providers, and renowned research centers all the way through to certification bodies and a number of global multi-billion dollar OEM companies.

These three individuals were Frederik Philips, Saal van Zwanenberg, and Wim Hendrix.

- Frederik Philips built a modest light bulb factory in 1891 in Eindhoven
- Saal van Zwanenberg founded a slaughterhouse for export in 1887 in Oss
- Wim Hendrix started selling chickens in Boxmeer in 1916

They all started out small, some on their own. But their businesses grew, flourished, diversified, and have been entering new markets ever since. And, in the process, the parent companies have bred hugely successful subsidiaries and spinoffs:

- Frederik founded Philips, today's Royal Philips (Healthcare), a global 18 billion euro-company with 74,000 employees that also gave birth to other icons, such as ASML, FEI Company, Thales, and NXP, all of them still headquartered in the region or with their global research centers based in the province.
- Saal started Zwanenberg, which became Organon and then Chefaro, and is part of today's MSD (Merck) that focuses on human health and specializes in pharmaceutical and biological research and manufacturing, including one of the world's latest cancer treatments, Keytruda (pembrolizumab).
- Wim started selling chickens to farmers, after which his entrepreneurial spirit saw companies born that grew to become Hendrix Genetics, MSD (Merck) Animal Health (formerly Intervet), Nutreco, and Marel Poultry.

All of these companies still have their headquarters and/or significant research and innovation operations in Brabant, employing thousands of highly-trained professionals.

A. Networks for Biobased economy

1. Biobased Delta

WHO WE ARE AND WHAT WE DO?

Biobased Delta is an alliance of Dutch provinces, businesses and knowledge centres in the delta region of North Brabant, Zeeland and South Holland. Together, we are pioneering a sustainable biobased economy. We support initiatives to use biomass as a raw material in the chemical, construction and packaging industries. We are applying natural residual flows from agriculture, forestry and horticulture – such as sugar beet, sweet corn, hemp and timber – to reduce our reliance on fossil raw materials.
We are achieving this by:

- linking up innovative startups with established companies;
- helping sustainable investors develop cast-iron business cases;
- attracting investors;
- strengthening cooperation between the authorities, businesses and knowledge centres;
- lobbying at local authorities, the government and Brussels;
- organising events to put partners inside and outside the region in touch with each other.

WHY WE DO WHAT WE DO?

Our economy must become much more sustainable if we are to continue living and working in a vulnerable region. Biobased Delta is strengthened by the goals set in international and national agreements such as the Paris Climate Agreement and the National Raw Materials Agreement in the Netherlands. The biobased transition is an opportunity that must not be missed. The green economy of the future has enormous commercial potential for businesses in our region. For the businesses and knowledge centres cooperating in Biobased Delta, the transition is a creative challenge, a chance to work together to develop more sustainable, better and more attractive products.

MISSION: INCREASING THE ECONOMIC VALUE OF CARBOHYDRATES IN THE CIRCULAR BIOBASED DELTA.

CIRCULAIR BIOBASED DELTA - UNIQUE & EXPANDING

TOP LOCATIONS

1. Biobased Campus Delft
2. Yes! Delft Incubator
3. Green Chemistry Campus (COCI)
4. Bioprocess Pilot Facility (BPF)
5. Bio Base Europe Pilot Plant
6. Plant One Rotterdam
7. iLab Green Chemistry Campus
8. Greenport Westholland

APPLICATION CENTERS & OPEN LABS

9. Natuurvezel Applicatiecentrum (NAC)
10. Kleuren Applicatiecentrum (KLAC)
11. Biopolymeer Applicatiecentrum (BAC)
12. Biobased Innovations Garden Rusthoeve (AIKC)
13. Kunststoffen Applicatie & Training Centrum (KATC)
14. Biorizon Lignine Applicatiecentrum (BLAC)
15. Valorisatielab (VARTA)

KNOWLEDGE & EDUCATIONAL INSTITUTIONS

16. HZ university of applied sciences Centre of Expertise Biobased Economy
17. Avans Hogeschool Centre of Expertise Biobased Economy
18. Curio Biobased Economy
19. technische Universiteit TU Delft
20. Bio Base Europe Training Center Terneuzen

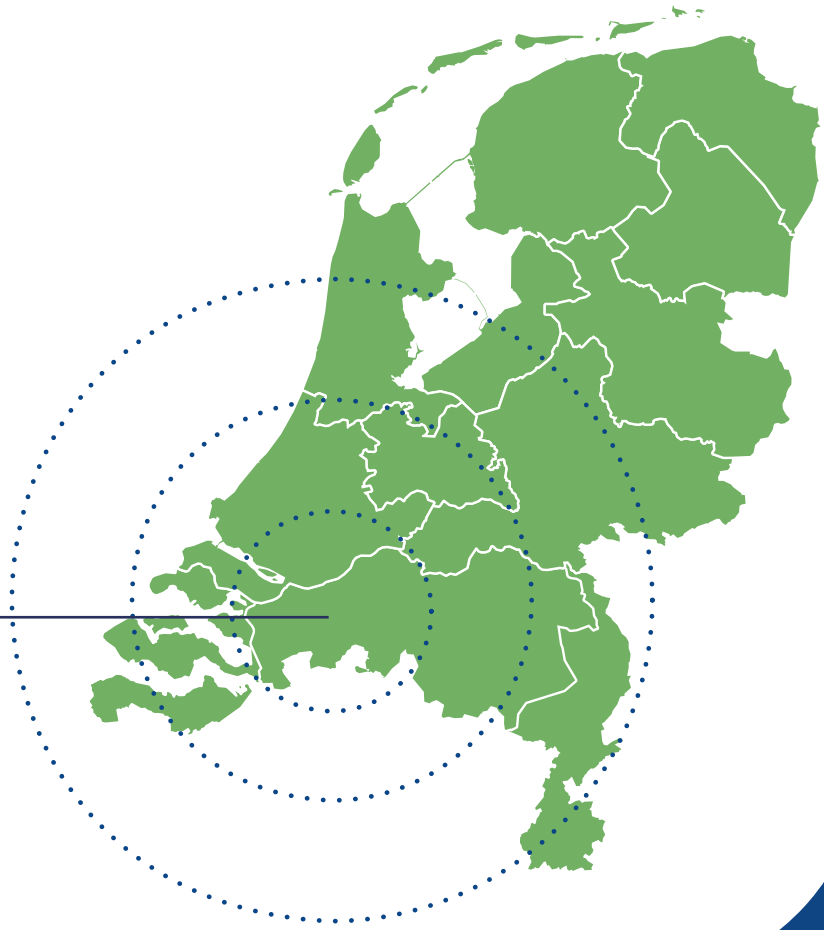
SEAPORTS

21. Port of Rotterdam
22. Port of Moerdijk
23. North Sea Ports

INNOVATIVE INDUSTRY PARKS

24. Nieuw Prinsenland
25. Biopark Terneuzen
26. Port of Moerdijk
27. SABIC, Bergen op Zoom

BIOBASED DELTA IS A THRIVING BIOBASED NETWORK OF SMES, INDUSTRIES, KNOWLEDGE AND FACILITIES



2. PyroCHEM Park

CRACKERFEED FROM PLASTIC WASTE: PYROLYSIS (MOERDIJK)

The objective of this project is to produce cracker feed from plastic waste. Recently, 14 companies, educational and research institutions and local authorities co-operated. These parties are now forming corsortia to scale up. Several pilot installations have proven to be able to produce good quality pyrolysis oil. A number of these installations are located on the Pyrolysis Proeftuin Zuid-Nederland on Moerdijk. Moerdijk has been chosen as the location because of the presence of the modes of transport water, road and rail, as well as of various waste and residual flows.

The next step is the PyroCHEM Park initiative. Several parties will be working on commercial pyrolysis activities here. A site of 30 hectares is available. The participants are: Port of Moerdijk, Avans Hogeschool, Waste4Me, BOM, Green Chemistry Campus and Van de Kooy.

Waste4Me is also going to build a 35 kt plant in Moerdijk with four pyrolysis units linked in parallel for mixed waste plastics. The ambition thereafter is to grow further to a capacity of 1 million tonnes.

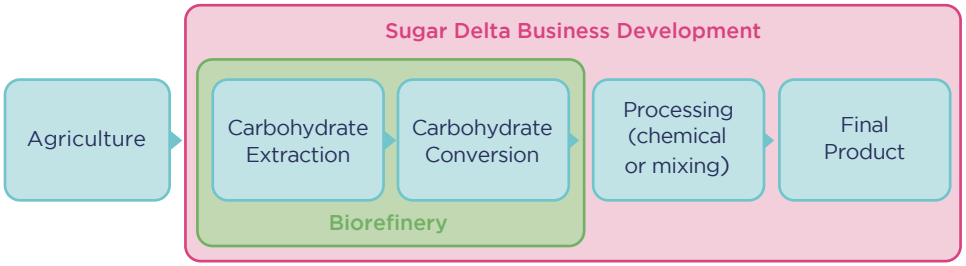
3. Sugar Delta

SUGAR DELTA – INCREASING THE ECONOMIC VALUE OF SUGAR THROUGH BIOREFINING

In 2015 a project organisation was created that aims at designing, developing and realizing an integrated biorefinery industrial cluster around transforming sugar and side streams (beet pulp, rest stream wheat processing, lignocellulose, alga) into high-end chemicals and materials. By doing this the economic value of carbohydrates produced in the southwestern part of the Netherlands will be increased significantly.

This biorefinery will be established by setting-up partnerships along value chains to align supply and demand; by matching market demands for sustainable solutions with products that can provide these solutions; and by creating and enabling the right conditions for investment in these value chains.

Partners Sugar Delta: Cargill, COSUN/ Suikerunie and Province of Noord-Brabant, BOM, REWIN West-Brabant (support).



4. Biovoice

BIOVOICE – INNOVATION & BUSINESS BOOSTER

- BioVoice is a platform for biobased business innovation. The platform connects supply and demand by linking the demand for a biobased innovation from a large company to innovative ideas from SMEs and start-ups.

- BioVoice is an innovation programme for SMEs and start-ups that can come up with a solution for one of the biobased/circular innovation issues with an innovative idea or product, or with specific knowledge and an extensive network. The programme is intended to make business more sustainable on the one hand and to bring organisations and knowledge together on the other hand and to offer SMEs/start-ups the opportunity to develop an idea with expert help.

- The programme begins with a large corporate requesting a bio-based/circular solution to an existing problem. Next, the shortlisted SMEs and corporates will be guided through a process in which they can work up a pilot and flesh out the details of their incipient partnership.

- BioVoice works with annual eight-week calls. During these calls, SMEs and start-ups can submit their pitches for challenges: innovation issues that require a bio-based or circular solution.

- BioVoice offers permanent process support, even after the match has been established, access to test facilities, innovators and large companies in the Southwest Netherlands region and vouchers of €10,000 to be spent in the regional ecosystem.

7. GOVERNMENT SUPPORT

A. Government support structure

On a national level, the Dutch national and regional authorities work together through the Invest in Holland consortium to help foreign companies establish themselves in the Netherlands. The national investment agencies NFIA (the Netherlands Foreign Investment Agency), HIDC (the Holland International Distribution Council), and all Dutch provinces, regions, and metropolitan areas work together under the Invest in Holland brand.

In the province of Brabant, a broad support structure has been developed by regional and local governments for Life Sciences & Health companies. The provincial government and the municipal authorities of all the larger Brabant cities generally have a positive, practical, and supportive attitude towards the industry and want to see it prosper in the region. Teams of professionals exist in many organizations for providing operational and strategic support to LS&H, including BOM, Brainport Development, REWIN, team Pivot Park, team High Tech Campus Eindhoven, team TU/e, and many others.

Five operational government agencies in Brabant have been specifically established to support industry:

- **BOM - Brabant Development Agency**
- **Brainport Development Eindhoven**
- **REWIN West Brabant**
- **AgriFood Capital**
- **Midpoint Brabant**

1. Invest in Holland/NFIA

Under the name Invest in Holland (IiH), the Netherlands Foreign Investment Agency (NFIA), the operational branch of the Ministry of Economic Affairs, has joined forces with the Ministry of Foreign Affairs and several regional partners in the Netherlands. The network represents and showcases the Netherlands in other countries as an attractive location to invest in or to establish a business. It supports interested foreign companies in setting up or expanding their international activities in the Netherlands.

SERVICES

- The NFIA provides information, practical assistance and advice to foreign companies
- It was founded 40 years ago as an operational unit of the Dutch Ministry of Economic Affairs
- It is responsible for identifying and attracting direct investments (green field or expansion) from companies that could be made in various countries, including the Netherlands
- It provides access to a broad network of business partners and government agencies
- It is headquartered in The Hague and has a staff of 35
- NFIA initial support is provided abroad through its 27 offices and representatives around the world, staffed by around 75 people
- The NFIA works closely with embassies, consulates and other organisations that represent the Dutch government around the world, as well as with a broad network of partners in the Netherlands

Source and more info: https://investinholland.com/

2. BOM -
The Brabant Development Agency

SERVICES

When companies are in the process of relocating, setting-up a new subsidiary or expanding their operations, they need the essentials to be taken care of quickly and comprehensively. BOM Foreign Investments was established to be the industry's partner for every one of those steps, providing a wide range of services and support that save on both time and money. BOM has a local team of experts available that provide free support for a wide range of matters – whether it be issues with building permits, finding new premises or sites for development, questions on employment law, understanding tax incentives, or help with business development and networking, and creating consortiums for joint research and innovation.

Based in Tilburg, BOM Foreign Investments is part of the Brabant Development Agency (BOM), which is staffed by 85 highly specialized professionals. In order to facilitate foreign investment in Brabant, the team combines its services with the unique expertise and support of their colleagues working in complementary fields within BOM, expertise that includes managing R&D programs, initiating innovative industrial cooperative projects and venture capital funding.

1. Support for foreign companies – the strength of Brabant; a world-class economy
Located centrally in one of the world's largest markets and with a supply industry and a world-class knowledge economy, Brabant is an attractive location for many foreign companies. BOM Foreign Investments highlights the strengths that Brabant offers and assists newcomers and established foreign companies alike to fully utilize the province's opportunities as a business location.

BOM always works closely with the Netherlands Foreign Investment Agency (NFIA) and the Holland International Distribution Council (NDL), the country's logistics agency, in order to provide potential investors with the following essentials:

- Information: national and regional regulations are demystified by BOM's team of experts, and they provide information on taxes and the business climate in the investor's industry.
- Network: a business and supply-chain network and talent acquisition are key to a company's success and often prove to make all the difference. BOM and partners introduce newcomers to Brabant (or companies looking to expand) to their extensive network of contacts in industry, academia, and government, ensuring that investors immediately have the best possible contacts.
- Location and site selection: where and when – both crucial decisions in the investment process. BOM can function as a potential investor's guide and advisor from start to finish and help look for suitable sites until a perfect fit has been found.

2. Doing business abroad
BOM International Trade offers those businesses that have outgrown their Dutch roots hands-on support for growing successfully in foreign markets. BOM establishes relevant business and government contacts abroad and provides targeted information on markets and available funding. The International Trade team focuses on three of Brabant's priority industries: High Tech Systems & Materials, Life Sciences & Health, and AgriFood.

BOM is a public agency that brings companies, knowledge institutes, and public agencies together. As BOM has no commercial interests, its independent standing opens doors that often remain closed to commercial ventures. In this respect, BOM's goal is to help to create a strong Brabant economy and guarantee that Brabant businesses play a leading role on the world stage. Current target markets for BOM International Trade include China (Jiangsu region), southern Germany (Baden-Württemberg and Bavaria regions), and the United States (Midwest and Texas). BOM International Trade works closely with partners such as the Netherlands Enterprise Agency, the Chamber of Commerce, and embassies and consulates around the globe.

3. Doing business in Brabant - expertise and risk capital for startups and scaleups
As a growth accelerator with over 35 years of experience, BOM Brabant Ventures helps ambitious Brabant companies to grow in a future-proof manner. Through its knowledge, experience and venture capital, the Brabant Ventures focuses on startups and scaleups in Brabant's Priority Industries: High Tech Systems & Materials, AgriFood, the Biobased Economy, Life Sciences & MedTech, and Maintenance & Supply Chain.

4. Helping industrial clusters and business ecosystems in Brabant grow
BOM Ecosystems Development assists in bringing the right companies and institutions and the right people together to accelerate innovation and generate new business for your company. This could entail the expansion of an existing business, moving in a new strategic direction, integrating sustainability in your core activities, and/or developing a new business model. Partnerships can be formed in Brabant or across the Netherlands as well as on an international scale, working together with BOM Foreign Investments & Trade.

Because innovation requires time, effort, knowledge, facilities, and financial resources, BOM Ecosystem Development believes that small and medium sized enterprises (SMEs) can accelerate the market launch of innovative products by working together. Partnerships can be forged with other SMEs and/or large companies and by joining forces with knowledge institutes and public agencies. The BOM team will help your company find these partners and set up the cooperative venture.

5. Creating energy projects - contributing to energy transition in Brabant
BOM Renewable Energy facilitates energy conservation and sustainable energy generation. The team works with businesses, property owners, and citizens' initiatives to create sustainable energy projects. BOM Renewable Energy encourages energy conservation in the property market and industry and provides advice and assistance for cost-effective solutions that will help make Brabant energy-neutral.

BOM Renewable Energy advises on project organization and structuring and can also invest in these projects and use its network to kick-start projects. The team's focus is on major projects, such as wind farms and solar parks, and on connecting and bringing smaller projects together. Smaller projects are supported through BOM's ESCO (energy service company) partners, who are active in specific markets, such as solar panel manufacturing or social housing and energy conservation for SMEs.

Source and more info: https://brabantisbright.nl/ and bom.nl

3. Brainport Development Eindhoven

SERVICES

As part of Brainport Eindhoven, Brainport Development helps with innovation and economic development. Brainport Development is helping the region to grow economically by attracting international high-tech and manufacturing companies and by providing them with local support. From startups and scaleups to large multinationals, Brainport is sharing knowledge, providing advice on issues such as funding, and putting them in touch with other companies and (international) talent. It is also responsible for creating the economic strategy defined by the Brainport Foundation. In order to deliver that strategy, Brainport Development works together with companies, knowledge institutes, and public agencies as an independent party.

The region's philosophy is "we can grow faster when we grow together" and that businesses only require occasional guidance or additional assistance. And this is what Brainport Development offers to both foreign and local companies. In reality, it is an economic development association and is funded by all 21 municipalities within the Brainport region.

Brainport Development

Source and more info: https://brainporteindhoven.com/en/

4. REWIN West-Brabant

REWIN West-Brabant, the regional development agency for the western region of Brabant province, works to boost the regional economy by encouraging business investment. REWIN provides support for establishing and/or relocating both branch offices and entire companies, and it has a special interest in the following key industries: logistics, maintenance, AgriFood/ biobased economy, and creative services.

SERVICES

REWIN provides help and guidance on a wide range of topics, including:

- Advice on availability and the pricing of business locations in the western part of Brabant, including advice on locations and viewing properties together with you
- Support for legal and tax issues, such as incorporating a business or appealing a tax assessment
- Information on the regional business climate, labor market and residence and work permits
- Guidance on the availability of financial assistance, grants, venture capital and private investment opportunities
- Assistance with grant and permit applications
- Information on staff recruitment and training, current labor, and salary conditions

REWIN will assist newcomers to western Brabant through introductions to its network of local authorities, educational institutions, knowledge networks, technological expertise, and business networks throughout the region. Companies can also participate in a range of business development programs in the key economic industries of logistics, maintenance, and the biobased economy.

Source and more info: www.rewin.nl/en

5. Midpoint Brabant

Midpoint Brabant is the economic cooperation program for the central Brabant (Tilburg) region. Midpoint Brabant acts as a link between industry and business, government, education and science, and social organizations. The program helps to develop new ideas and bring these ideas to the market, with the objective being to stimulate innovation that makes the economy "smart and strong" and contribute to a future-proof society.

Spearheads of the regional economic development program are:

- Smart industry
- Smart logistics
- Smart leisure
- Smart services

In central Brabant, these industries flourish in a smart society surrounded by a great landscape. The region is already a strong international player in this area and is aiming for further growth. Midpoint does this by actively responding to attractive developments and promoting cross-links between industries. In its program it emphasizes projects that are innovative to the industry, contribute to a circular economy, and have increased employment. Putting knowledge into practice, smart bundling knowledge and skills, is what the region is known for.

Central Brabant has a strong knowledge and education structure, with three senior secondary vocational institutes, two colleges, a leading university, and many associated knowledge institutes. Midpoint Brabant links these institutions to the business world, from concept through to successful implementation. The combination of vocational training with on-the-job experience also ensures that innovations will be applicable in practice.

Midpoint prefers to develop projects within field labs (testing grounds), in which ideas are tested and put into practice. These living lab projects are aided in a well-functioning ecosystem, in which "houses" and campuses that are set up play an important role. Midpoint brings together partners with the right social and technological knowledge and skills and supports them in finding talent, financing, and contributing to SME startups and growth.

Source and more info: www.midpointbrabant.nl/introductie/over-midpoint-brabant/

6. Holland Expat Center South

Holland Expat Center South is a non-profit governmental agency that is a joint initiative of the participating municipalities (almost every municipality in Brabant), the Netherlands' Immigration and Naturalization Services (IND), Brainport Development, and the province of Brabant.

SERVICES

The Holland Expat Center South compiles the procedures and provides information that helps expats and their families to settle into their new living (and working) environment. Expats can obtain information about the region from the Expat Center and learn more about events organized specifically for the expat community. Its main purpose is to help expats feel welcome and at home.

The Expat Center helps companies employing expats and expats themselves to fulfil the formalities required for residing in the Netherlands, such as acquiring the compulsory BSN (Citizen Service Number), help with visa/residence permits, work permits (if required), converting a driver's license, TB testing, etc.

holland
expat center
south

Source and more info: www.hollandexpatcenter.com/

B. Incentives and Grants/Support Programs

1. Highly-skilled Migrant Permit

Highly-skilled migrants do not require an employment permit to work in the Netherlands. The national scheme for highly-skilled migrants is available for employee transfers that do not fall under the scope of the EU's intra-corporate transfers (ICT) directive. This may be the case for employees who, for the duration of their assignment, are placed on the Dutch payroll of the recipient company. Japanese nationals and Turkish nationals do not require an ICT residence permit either; they can apply for a highly-skilled migrant residence permit.

What is a highly-skilled migrant?

A highly-skilled migrant or knowledge migrant (in Dutch, a kenniswerker) is any foreign employee who:

- comes to the Netherlands to work as an employee
- earns at least €4,612.00 (excluding holiday allowances and 13th cheque) gross per month
- or earns at least €3,381.00 (excluding holiday allowances and 13th cheque) gross per month, if under the age of 30

These salary amounts are applicable for 2020. The sums are index-linked annually.

Fixed allowances for housing and a company car may be added to the employee's base salary in order to comply with the above salary criteria, but only if these allowances are agreed to in writing and paid in monthly instalments.

An application for a permit can be declined if the salary is not a competitive one in the industry in question. This income requirement does not apply to scientific researchers and physicians training to become specialists, or to people working for educational or research institutions.

Employers that wish to employ highly-skilled migrants are no longer required to also apply for work permits for these employees, and they now only have to submit an application for admission and residence for the employee and his family to the Immigration and Naturalization Department (IND). The application procedure takes around two to three weeks. A residence permit for highly-skilled migrants will be granted for the duration of the intended employment, up to a maximum of five years.

Professional soccer players and ministers or teachers of religion are not eligible for residency as highly-skilled migrants. Directors and major shareholders cannot apply for the knowledge migrant scheme either if they hold a stake greater than 24% in the company, as they are then liable for any company risks and can influence their own incomes.

The income requirement for highly-skilled migrants will be reviewed on 1 January of every year on the basis of the most recent index figure for negotiated salaries, as published by Statistics Netherlands (CBS). The average yearly increase of the salary criteria has been 2.6% for the past three years. Whenever a highly-skilled migrant submits an application for the extension of his or her residence permit or switches employers, the IND will apply the most recently indexed salary criteria. Thus, if a highly- skilled migrant applies to extend his or her residence permit three years after being admitted for the first time, he or she must take into account that the applicable salary criteria has increased by almost eight percent.

If a highly-skilled migrant under the age of 30 continues working for the same employer after turning 30, the lower salary requirement that was in force when he or she first applied for a permit remains applicable. If the highly-skilled migrant applies for an extension and continues to work for the same employer, the most recently indexed salary criteria for the under-30 age category is applicable. However, if this employee switches employers after turning 30, the most recently indexed salary for those over the age of 30 is applicable.

2. The 30% ruling (tax-free allowance)

The Netherlands has a special tax regime for expatriates, known as the 30% ruling, which exempts them from a substantial portion of their income tax (up to 30%). This is viewed as a reimbursement of the extra costs involved in living abroad, the extraterritorial expenses. Rather than having to specify and prove the extraterritorial expenses incurred by an employee or an employer for its employees each year, the costs are set at a maximum of 30% of the taxable remuneration. In addition, the employer may reimburse certain costs tax-free. This includes international school fees, certain relocation expenses, and a moving allowance up to a given limit.

The part of the income to which the allowance applies

Under the tax rules, the employer may grant the employee a tax-free allowance of up to a maximum of 30% of his or her taxable remuneration package. Incidental and flexible forms of income such as bonus payments and stock options that are paid out during the duration of the 30% ruling are also included. Severance and pension payments, however, are excluded.

Method of calculation

Under the regulation, the taxable and the non-taxable part of the income must be split in the employment contract itself. In other words, the 30% tax-free allowance must be granted as a separate part of the employee's salary. Standard wording is used to state this in either the employment contract or in a separate addendum to the contract. For employees with net salary contracts and irregular payments, it can be difficult to precisely determine the non-taxable part of 30% on a monthly basis, and so in these cases they may determine and pay the exact tax-free reimbursement on an annual basis.

Ruling and pension

An employee cannot accrue a pension under a qualifying plan in the Netherlands (or social security benefits) on the tax-free allowance. This affects employees who have a pensionable base equal to their full gross salary. Employees who may apply the 30% ruling may only accrue pension on the taxable part of their salary. There is way to avoid this, although the employer must fulfil a number of legal formalities and draft special documents for this purpose.

Extraterritorial costs

The 30% ruling is a practical solution for employers wishing to reimburse, tax-free, the additional costs incurred by the employee working in the Netherlands as opposed to their home country, the extraterritorial costs (instead of keeping all receipts of the actual costs claimed by the employee). The Dutch State Secretary passed a special decree that further detailed which costs, allowances, and benefits in kind that are typically paid to expatriates qualify as extraterritorial costs. In the case an employee who was hired or assigned from abroad to work in the Netherlands and was not deemed eligible for the 30% ruling, it is still possible to reimburse the de facto extraterritorial costs to this employee tax-free. In this event, the employer must retain proof of the extraterritorial expenses incurred.

International school fees

Under the 30% ruling, the employee may receive an additional tax-free reimbursement of the fees paid for children to attend an international school. A school is regarded as an international school when a) the education is based on a foreign school system, and b) in principle the school only accepts the children of foreign employees.

Relocation expenses/moving allowance

The costs of moving as well as the costs for transporting household goods as part of the employment or secondment package are not considered extraterritorial costs, which means that these costs can - to a certain extent - be reimbursed tax-free. Actual relocation costs of up to €7,750 (2019) can be reimbursed.

Period of validity of the 30% tax-free allowance

The 30% ruling is available for a period of five years (60 months). The rules stipulate that the tax authorities can demand that the employer demonstrates at all times that the employee still meets the conditions. Where the employee no longer meets the conditions of the 30% ruling, it can no longer be applied. This will result in a retroactive adjustment (when required). If the employee's contract in the Netherlands has ended, the 30% ruling will also simultaneously cease to apply. As such, the 30% ruling cannot be applied to any payments made after that time.

The duration of any previous stay or period of employment in the Netherlands is subtracted from the maximum five-year period. However, this reduction will not occur if the expatriate has not stayed or worked in the Netherlands during the 25 years preceding his or her most recent arrival date in the Netherlands (or has only done so for very brief periods).

Conditions for qualifying

In order to qualify for the 30% ruling, the following conditions must be met:

- The employee (board members and supervisory board members also qualify for the 30% ruling) must be recruited (or assigned) from abroad;
- The employer must be a Dutch wage tax-withholding agent. If the employee has a Dutch resident employer (a Dutch corporation or branch of a foreign corporation) this condition is usually met. If the employee has a foreign based employer which has no taxable presence in the Netherlands, the employer must have one or more employees working in the Netherlands, perform payroll administration in the Netherlands, and be registered as a withholding tax agent with the tax authorities.
- The employee must have lived outside of a 150 km radius from the Dutch borders for at least two-thirds of the 24 months prior to the start of their employment in the Netherlands;
- The employee must have the specific expertise required to perform the function and which is not available or scarce on the Dutch labour market. This is based upon a salary standard that must be met; and
- The 30% ruling must be contractually agreed upon between the employer and employee. This also implies that the employee is aware that the 30% ruling reduces his or her gross salary.

3. Incentives for Research and Development Costs in the Netherlands (WBSO)

Companies established in the Netherlands performing research and development work (Speur- en Ontwikkelingswerk: S&O or R&D) may be eligible for tax relief on wage costs and additional costs. The WBSO R&D scheme is intended to provide entrepreneurs with an incentive to invest in research by means of reducing the R&D wage costs. The WBSO scheme for R&D includes salary and other costs and expenses directly related to R&D activities.

The benefit amounts to 32% of the first €350,000 of R&D costs (both salary and other costs and expenses) and 16% for R&D expenses above €350,000. For startups, the percentage for the first bracket is higher, at 40% instead of 32%. The WBSO does not have an upper limit, although the maximum benefit may not exceed the wage sum.

Contribution

The R&D allowance takes the form of a reduction in wage taxes and social security contributions. The WBSO can be applied to costs and expenditure directly allocable to the company's R&D activities, whereby:
1) costs must be incurred exclusively (for 100%) for R&D;
2) expenditure must serve R&D (can also be partly allocable).

When applying for the WBSO one can choose between a lump-sum application (based on the number of R&D hours; no R&D expenditure will be subsidised) or an estimate of the actual amount of costs and expenditure incurred.

Actual costs and expenditures

Only costs and expenditure directly allocable to R&D and which serve R&D purposes can be taken into account. In this respect, note that not all activities related to R&D projects can be recognised as R&D work. For example, administrative and organisational costs are excluded.

As far as the costs are concerned, it is only those costs that are borne by the taxpaying company itself). When it comes to expenditure, the allowance only applies to newly manufactured business assets insofar as:

- these assets have not been previously used;
- they have not been included in previous R&D declarations (subsidy applications);
- these assets fall under own R&D activities;
- expenses are borne by the taxpaying company payer (or a group company of an affiliation, in tax terms, that the taxpaying company is a part of)

Conditions

The R&D project must meet the following conditions before one can apply for the R&D allowance:

- the proposed R&D activities take place within your own company
- the technological development is new to your company
- the development brings with it technical issues
- the R&D work has yet to be undertaken (which means you must always submit a WBSO application in advance).

R&D work is defined as a systematically organised activity, related directly and exclusively to:

- technical scientific research
- the development of:
  - (Parts of) physical products
  - (Parts of) physical production processes
  - Software (technically new (parts of) software)
  - Software components (technically new)

WBSO support is explicitly NOT intended to support feasibility studies, software upgrading, software modifications for different hardware or software platforms, developing services, routine activities, market research, organizational or administrative work, policy and strategy studies, the adaptation or deployment of purchased goods, quality control and assurance, the adaptation or implementation of existing technology, pilot plants, and related products on a production scale with commercial value.

4. Innovation Box

Companies can benefit from an effective tax rate of just 7% for income from intangible assets created by their Dutch taxpaying entity. The effective tax rate of 7% will increase to 9% in 2021. Patented intangible assets as well as intangible assets that have been created by the Dutch taxpaying entity and for which an R&D declaration (an approved WBSO application) was obtained, may qualify for the Innovation Box. In practice, this means that technological innovations developed in-house qualify.

The reduced tax rate of 7% is claimed in the corporate income tax return filed by the Dutch taxpaying company. In reality, this tax rate qualifies as an exemption for a substantial part (72%) of the profits that can be allocated to the Innovation Box. By applying the general Dutch corporate income tax rate of 25%, this gives an effective rate of approximately 7%.

The Innovation Box does apply:

- in situations where the period between an application for a patent and the granting of the patent is unusually long. Subject to certain conditions, profits that are attributable to the relevant patented asset may, during the period from the year in which the patent was applied for up to the year preceding the year in which the patent was granted, also be brought within the scope of the Innovation Box.

The Innovation Box does not apply:

- to marketing intangibles such as trademarks and logos
- to intangible assets for which a patent was obtained if the asset was already in existence before 1 January 2007
- to intangible assets for which an WBSO R&D declaration was obtained if the asset was already in existence before 1 January 2008

As a result of EU talks on favorable EU IP regimes and the introduction of minimum rules for preferential IP regimes (OECD BEPS project), as of 2017 the Netherlands has altered the Innovation Box regime in order to be compliant with the new requirements. The changes relate to the entry tickets to the Innovation Box (you now require a WBSO R&D declaration) and allocation of income that qualifies for the special tax rate.

Originally, there was no cap on the amount of profits that could be allocated to the Innovation Box, although a taxpayer had to be able to prove that the profit was related to the qualifying intangible assets. As of 2017, restrictions have been introduced (the modified nexus approach). It is recommended that an agreement be reached in advance with the Dutch tax authorities on which method to apply – they will do this on request. At present, the Innovation Box regime has the following relevant features:

R&D Activities (entry ticket)

Originally, the Patent Box regime could only be applied to income generated from registered patents, but this has now been extended to include income from R&D projects for which a WBSO R&D declaration has been obtained. Henceforth, a distinction is drawn between small and other taxpaying companies.

Small taxpayers are companies with worldwide net group sales of under €50 million per year and a gross benefit from IP not exceeding a total of €37.5 million in five consecutive years (an average of €7.5 million per year). For small taxpaying companies the WBSO R&D declaration suffices as an entry ticket to the Innovation Box.

Larger taxpaying companies not only need to obtain a WBSO R&D declaration but must also have a recognized legal access ticket. For larger taxpaying companies, only income from patents, utility models, software, plant breeders' rights, and pharmaceutical certifications qualify for the Innovation Box regime. This category of taxpayers will thus be subject to a twofold test. A small taxpaying company can also include unprotected IP in the Innovation Box regime.

Maximum revenues (allocation of income)

A restriction is in place with respect to the level of income that can be allocated to the Innovation Box (the modified nexus approach). It is now more important whether or not R&D will be performed in-house and how R&D costs are divided between the parties involved. This implies that the more R&D activities are outsourced to related parties, the lower the profits that can be allocated to the intangibles resulting from such R&D activities.

5. Innovation credit

The Netherlands Enterprise Agency (RVO) can assist companies with promising but high-risk projects that banks and other investors decline to invest in. This facility is available for companies with an innovative concept, that see opportunities for a new product in the market, and that have the knowledge, the vision, and the ambition, but lack the financial clout. The Netherlands Enterprise Agency can grant these companies a direct loan that enables them to finance a part of the project costs. This loan is known as an Innovation Credit. All companies, whether startups or an established one, can apply for the Innovation Credit. Innovation Credit will help companies become more innovative and help the Dutch economy to become more sustainable.

When applying to the Innovation Credit scheme several conditions must be met. The RVO recommends that a quick scan be performed before applying.

Source and more info: https://english.rvo.nl/subsidies-programmes/innovation-credit

8. SUMMARY OF BRABANT'S BIOBASED STRENGTHS

A SUMMARY OF BRABANT'S BIOBASED STRENGHTS

1. Brabant is an integral part of the biggest chemical cluster in the world (ARRRA) offering European market accessability, including a growing market of green chemistry within Western-Europe, and utilities and physical infrastructure for the biobased industry;

2. A competitive feedstock position: feedstock is widely available within the region and deliverable in time ('guaranteed stock delivery') due to well organized transport by truck, train, shortsea and barge;

3. A vibrant biobased ecosystem consisting of corporations, research institutes and test facilities. Brabant is rich in agrifood, horticulture and chemical companies. Fertile grounds combined with experience and knowledge of plants, plant breeding and its waste streams usage have made Brabant one of the most innovative agro-industrial regions in the world;

4. Availability of a well-educated and flexible workforce, graduates and students and access to several (technical) universities within a 150 km radius;

5. Various, well interconnected locations that include possibilities for co-siting, shared utilities and co-operation;

6. Strong co-operation: the authorities, businesses and knowledge centres work closely together and benefit from each other's strengths. They are all driven by the economic potential of the biobased economy, the will to innovate, connect and the need to make the economy more sustainable through biobased innovations. This includes introductions for your business into a network of finance, capital funds and business development.

BRABANT DEVELOPMENT AGENCY (BOM):
READY TO CONNECT YOU!

Based in Tilburg, BOM Foreign Investments & International Trade is part of the Brabant Development Agency (BOM). Our BOM Foreign Investments team assists new and existing foreign companies to make optimal use of the opportunities offered by Brabant as a business location. We can offer you our support when it comes to finding sites or real estate, building and environmental permits, labor market analysis, talent acquisition, matchmaking for logistics, employment regulations, fact-finding missions, incentives, and relevant networks in the regional private and public sector.

Our BOM International Trade specialists provide hands-on support to companies in Brabant in growing their business abroad. We offer valuable contacts in foreign countries and provide targeted information on markets and available funding. Our international trade specialists also promote the successful economy of Brabant and its thriving ecosystems to foreign companies around the world.

We offer a range of free services and support designed to provide you with the information and network you need to explore new (business) opportunities.

CONTACT US NOW!

WEBSITE
brabantisbright.nl
Mail
info@brabantisbright.nl

BRABANT
IS BRIGHT.nl

This is Brabant

51°32’37.1”N / 5°03’48.1”E