



welcomes you

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Netherlands Foreign Investment Agency NFIA  
Holland Innovation Network

***Netherlands Foreign  
Investment Agency***

John van den Heuvel  
Rein Coster

# Invest In Holland

## YOUR EUROPEAN BIOECONOMY HUB

Welcome to Breakfast with the Dutch  
At WCIB2016 San Diego



## Invest In Holland

### How can we assist you?

- Comprehensive general background information
- Personalized insight and data for your project
- Intensive personal guidance on tax, labor and permits
- Introductions to a variety of Dutch networks
- Customized fact-finding trips
- Advocacy towards national and EU governments
- Our services are free of charge and confidential



**Make the most  
of your Dutch home base**

**Find us on the web at  
[INVESTINHOLLAND.COM](http://INVESTINHOLLAND.COM)**



## Holland Innovation Network

### The Holland Innovation Network

- Is your liaison for international R&D collaboration with the Netherlands
- Aims to strengthen the Dutch knowledgebase and our innovation ambitions abroad
- Performs customized technology matchmaking
- Networks with research institutes and universities , and companies
- Conducts S&T trend scouting
- Organizes workshops to facilitate knowledge exchange and the development of joint US-NL research projects

Offices in Washington DC, Boston and San Francisco

Contact: [karin@nost-sv.org](mailto:karin@nost-sv.org)



Luuk van der Wielen  
Sandra Ransdorp

## Building our biobased economy together:

Pre-competitive fundamental and applied RD&I (public/private cooperation)

12 Flagships/research areas

> 50 Partners

> 80 Research projects

> 500 Members

Strong international focus (eg Vietnam and Brazil: joint Brazil office with TUD)

### Environmental and industrial biotechnology

Integral, sustainable biobased solutions applying cascading and integral biorefinery concepts.



## BE-Basic activities:

Research and development

Societal embedding and education

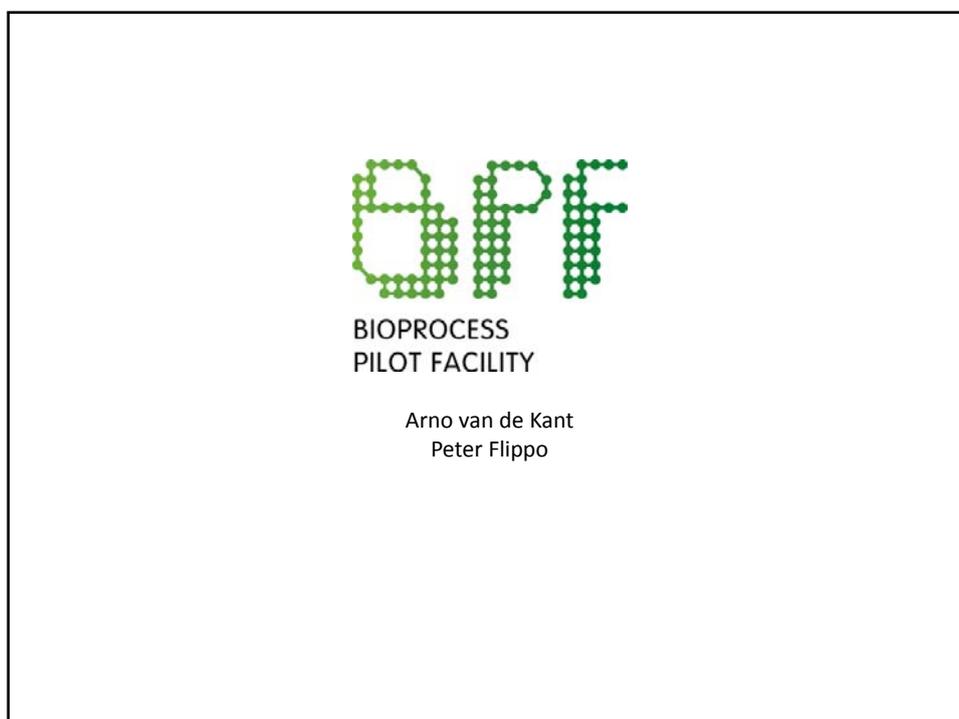
Innovation

International collaboration

Economic impact

### Technology is in place to take the next step!





## Some facts on the Bioprocess Pilot Facility

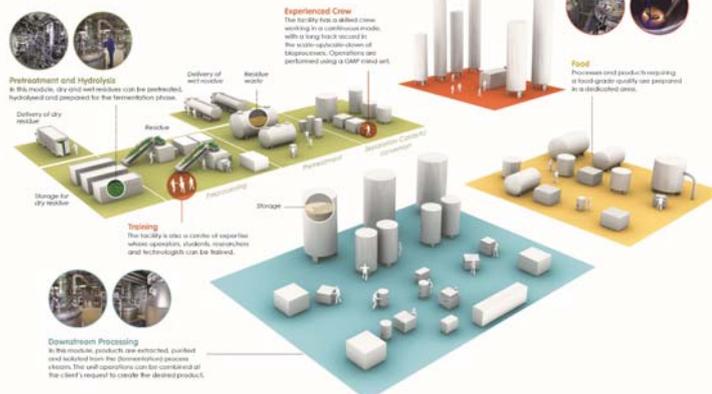
- BPF as a company was established May 2012
- **Location** Biotech Campus Delft, the Netherlands
- **BPF has invested** € 37 mln in modernizing existing assets, and in pretreatment and food grade pilot plant facilities
- **Number of employees:** +/- 35 (Management, technology experts, operators, administration)
- **Longstanding experience** in fermentation and downstream processing
- **Open access**  
**Confidential**  
**Industrial scale-up**



## BPF Facilities – Plug and Play ..... (im)proving the process of the client

### Bioprocess Pilot Facility for innovations in Sustainable Bioprocesses

The Bioprocess Pilot Facility B.V. (BPF), situated at the Biotech Campus Delft, the Netherlands, is a unique open access facility where companies and knowledge institutions can develop new sustainable production processes. These processes serve many purposes, such as converting bio-based residues into useful chemicals or fuels. The facility has been specifically designed to enable the transition from laboratory to industrial scale. BPF allows users to construct complex operations by linking separate process modules like: Pretreatment, Hydrolysis, Fermentation and/or Downstream Processing.



**BPF**  
BIOPROCESS  
PILOT FACILITY

## BPF: Customers

Selection of companies BPF works for:




**BPF**  
BIOPROCESS  
PILOT FACILITY

# Biorizon

*The way to aromatics*

Joop Groen  
Ludo Diels

**Biorizon:** **Biorizon**  
The way to aromatics

- A shared research Program of TNO & VITO at the Green Chemistry Campus

**World Class in Bio Aromatics Technology**  
Our mission: To enable commercial production of bio-aromatics by 2025



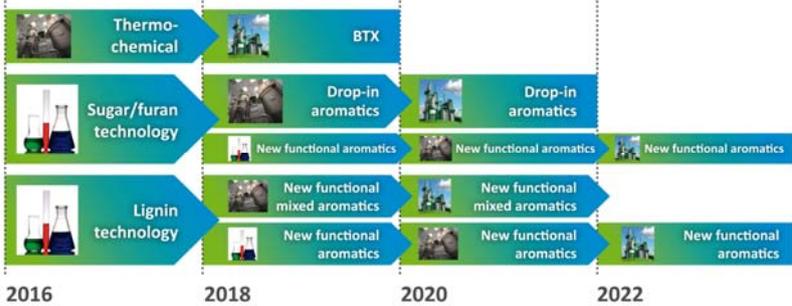
Collaboration with critical mass, focused on renewable **functionalized** aromatic compounds



**Biorizon**  
The way to aromatics

Powered by TNO, VITO & Green Chemistry Campus  
4/23/2016 15

**Biorizon roadmap based focus**  
To enable commercial production of bio-aromatics by 2025



Year	Technology	Product
2016	Thermo-chemical	BTX
2018	Sugar/furan technology	Drop-in aromatics
2018	Lignin technology	New functional aromatics
2020	Sugar/furan technology	Drop-in aromatics
2020	Lignin technology	New functional mixed aromatics
2020	Sugar/furan technology	New functional aromatics
2022	Lignin technology	New functional aromatics

Want to find out more?  
Join our community on [Biorizon.eu](http://Biorizon.eu)  
Check our website and contact us:  
[joop.groen@tno.nl](mailto:joop.groen@tno.nl)

**Biorizon**  
The way to aromatics

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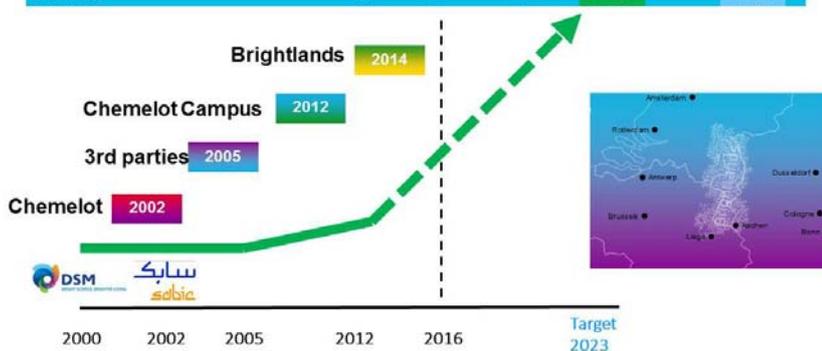
# Brightlands

Knowledge crossing borders

Bart van As

## Growth of Chemelot Campus

Companies	2	4	40	65	100+
Knowledge Institutes and/Universities	0	0	1	5	
FTE	900	900	1200	1600	2900
Students	0	0	0	200	1000



Brightlands



**DAB** *Delft Advanced Biorenewables*

Kirsten Steinbusch

## Come and develop your (bio)process @ Delft, NL

### We welcome you:

- to develop/intensify your biotechnological production process
- to quantify or optimize your fermentation
- to up-scale your production by down-scaling

### Unique facilities and location:

- New laboratory @ YES Delft Labs
- Excellent research & education @ TU Delft
- Experienced upscaling @ BPF
- Close to port of Rotterdam

### You are offered:

- Testing capacity from laboratory to pilot incl. pre-treatment, fermentation, chemical conversion and DSP.
- LCA and feasibility/engineering studies
- Track record, successful industrial applications, IP portfolio, over 250 PhD students

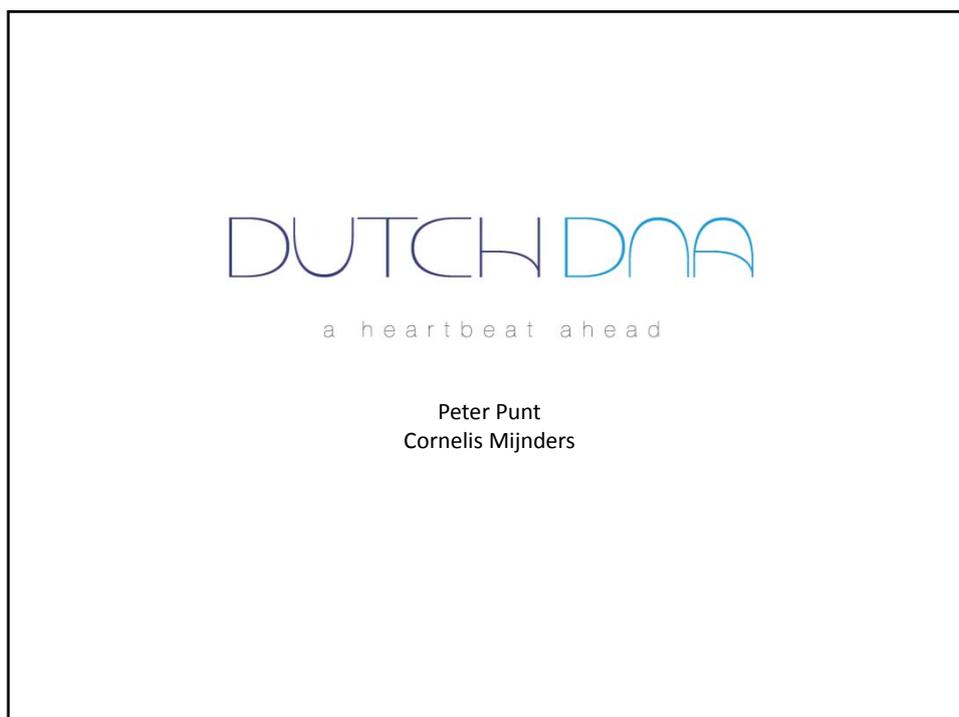


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## Delft Advanced Biorenewables

Visit us at [www.delftab.com](http://www.delftab.com) or contact Kirsten Steinbusch  
Tel. +31 6 55118744 or by [steinbusch@DelftAB.com](mailto:steinbusch@DelftAB.com)

• Quantitative fermentation • Innovative process technologies



### Dutch DNA Biotech

- Creating new business by introduction of state-of-the-art biotechnology
- Focus on **Fungal** Biotechnology
- Established track record as management buyout from TNO (Dutch National Research & Technology Organization)



### Strategic Focus

1. **Development of industrial fungal production systems**
2. **Novel / enhanced enzyme activities**
3. **Production of biochemicals and biopharmaceuticals**



Henri Kats

**CHEMPORT DELFZIJL**

Economic Growth Green



**GRONINGEN SEAPORTS** | **Henri Kats**  
Business Manager Chemicals

CHEMICALS BIO BASED ECONOMY  
GREEN CHEMISTRY PROGRAMS  
FRAMENORUM CHEMICALS  
CHEMISTRY BIOPOLYESTERS  
FRAMENORUM CHEMICALS  
BIO BASED ECONOMY UTILITY

**GRONINGEN SEAPORTS** | **CHEMPORT DELFZIJL** *the biobased location of Northwest Europe*

**LOCATION**



**WHY DELFZIJL?**

Economic Growth Green



- Strong agrocluster (Avebe | Suikerunie | Friesland Campina)
- Large-scale storage possibilities in salt caverns
- Availability of green energy (steam | power)
- Strong chlorine cluster
- Multimodal accessibility

 **CHEMPORT DELFZIJL** *the biobased location of Northwest Europe*



**Innovation Quarter** /

Loek Becker Hoff

Innovation Quarter / About InnovationQuarter  31

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## Who we are and what we do

**We are** the regional development agency for West Holland (The Netherlands) and the regional partner of the Netherlands Foreign Investment Agency

**We assist** foreign enterprises with relocating there business in West Holland.

**We organize** co-operation between innovative companies and with knowledge institutions and government.

**We fund** cutting-edge and fast-growing businesses with our own investment fund.

**Our ambition** is to develop West Holland into one of the most innovative regions in Europe.



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## Shareholders

- the Dutch Ministry of Economic Affairs and the Province of South-Holland
 



- the municipalities of Delft, The Hague, Drechtsteden, Leiden, Rotterdam, Westland & Zoetermeer
 








- the universities of Delft, Leiden & Rotterdam and the academic medical centers Erasmus MC & LUMC
 









**Innovation Quarter** / About InnovationQuarter 

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**3 tasks:** 33

**Capital**

- Venture Capital Fund
- initially €28 mln > now €80 mln > €100 mln

**Business Development**

- building innovative ecosystems & consortia
- open innovation & triple helix
- cross-overs

**Foreign Investments**

- Attracting & assisting new foreign companies
- Investor Relations program



























Ross Gordon

## CO<sub>2</sub> from an issue to a valuable product, powered by the sun



- 4<sup>th</sup> gen biochemical technology
- CO<sub>2</sub> capture
  - Tested with steel flue gas
- No supply chain volatility
- No food for chemicals issues
- Fermentation powered by the sun



- 17 compound portfolio
- Pilot reactor running for 4 years
- JDV for bulk chemical with AkzoNobel



19/04/2016

Photanol Public Presentation

2

## Lactic acid: ready for the prime time



### Our value proposition

- Broad product portfolio with focus on:
  - Organic Acids
  - Polyol Sugars
  - Terpenes
  - Ethanol
- Production at below market prices
  - L-lactic acid at 12% lower production cost (100kt/yr scale)
  - D-lactic acid at 17% lower production cost (20kt/yr scale)
- Drop in to existing downstream processes

### Seeking partners: product and CO<sub>2</sub>

- DEMO project to prove industrialisation by 2018
- Project cost : €3-5M
  - design, build and 1.5 year run



19/04/2016

Photanol Confidential

3



Stijn Effting

## 1 Introduction Rotterdam's industrial cluster



## 2 BioPort Rotterdam

One of the world's largest renewable industry clusters

### Global Import & Export Hub:

- 8 mln ton/yr vegetable oil
- 3,5 mln ton/yr bio fuels
- 10 mln ton/yr agribulk
- 1 mln ton/yr ligno cellulosic biomass

### World Scale Production Cluster:

- 4 world scale vegoil refineries: 2,3 mln ton/yr
- 2 bio based chemical plants: 500.000 ton/yr
- 4 world scale bio-fuel facilities : 2 mln ton/yr
- 3 bio mass co-fired power plants: 1 mln ton/yr



Corn off loading

2 | 19 april 2016



Erik van Hellemond  
Frank van Noord

**SUIKER UNIE**  
A ROYAL COSUN COMPANY

**CULTIVATION** → **BIOREFINERY** → **SALES MARKETS**

**CULTIVATION:** Sugarbeet, Potatoes, Chicory, Fruits and vegetables

**BIOREFINERY:** Suiker Unie, SVZ, Aviko, Sansus, Druyrie-groep, Cosun Biobased Products

**SALES MARKETS:** Food industry, Homecare and retail, Livestock farming, Chemicals, Energy

- HQ in Dinteloord (Greater Rotterdam Area)
- Revenues: € 1 billion, 850 employees
- 3 sugar factories (2 NL, 1 Germany), 2 specialties factories (NL)
- 1 Limako sugar trading company with ED&F Man

- Sugar beets processing: 6-8 million ton/year
- Campaign length: 130-140 days/year
- Capacity: 28 kt beet/factory/day (Germany: 15 kt/day)
- Output: 4 kt sugar/factory/day

- Sugar: >1,3 million ton/campaign (abolishment of quota in 2017)
- Thick juice (fermentables): > 240,000 m<sup>3</sup> stored
- Bioethanol: > 600,000 hl; Biomethane: > 30 million nm<sup>3</sup> /year
- Beet pulp: > 325,000 ton (dm)

**SUIKER UNIE** A ROYAL COSUN COMPANY *we sweeten life*

**SUGAR YIELD IN THE NETHERLANDS (ton/ha)**

Year	Yield (ton/ha)
1984	8.0
1985	7.5
1986	9.5
1987	8.5
1988	10.0
1989	10.5
1990	9.5
1991	10.5
1992	10.0
1993	9.0
1994	9.5
1995	9.5
1996	8.5
1997	9.5
1998	10.5
1999	10.5
2000	10.0
2001	9.5
2002	10.5
2003	10.5
2004	11.0
2005	11.0
2006	11.5
2007	12.5
2008	14.0
2009	13.0
2010	13.5
2011	13.0
2012	15.0

**SUIKER UNIE IN THE BIOBASED ECONOMY:**

- From sugar factory to Biorefinery Cluster
- Agro meets chemistry
- Sustainable cooperation

**Product innovation – From Pulp**

**Betafib® MCF**  
(Micro cellulose fiber)

- Rheology modification
  - Oil & gas
  - Paints & coatings
  - Detergents
  - Personal care
- Fiber reinforcement
  - Construction
  - Composite materials
  - Paints & coatings

**Can replace micro plastics in detergents!**

**BEAT THE MICRO BEAD** 100% microplastics with 100% natural fibers  
SIGN THE PETITION

On site Biomethane production, largest in the Netherlands!

**SUIKER UNIE** A ROYAL COSUN COMPANY *we sweeten life*



Jeroen Hugenholtz

## Wageningen UR: From Trash to Ca\$h

Food



Infrastructure



Energy



Transportation



Chemicals



Diagnostics



## Wageningen UR: From Trash to Ca\$h

### Food

Use nature (plants, bacteria, fungi) to produce novel and natural preservatives



### Infrastructure

Biobased conversion of lignin and chitin to (construction) materials



### Energy

ABE fermentation of local industrial and municipal waste to produce jetfuel



### Transportation

New sources (Guayule, Russian dandelion, microbial PHA) and new extraction methods for natural rubbers



### Chemicals

Efficient, anaerobic, production of biobased long-chain fatty acids



### Diagnostics

"Pregnancy test" for timely detection and identification of microorganisms in food and non-food processing



*Jeroen.hugenholtz@wur.nl*

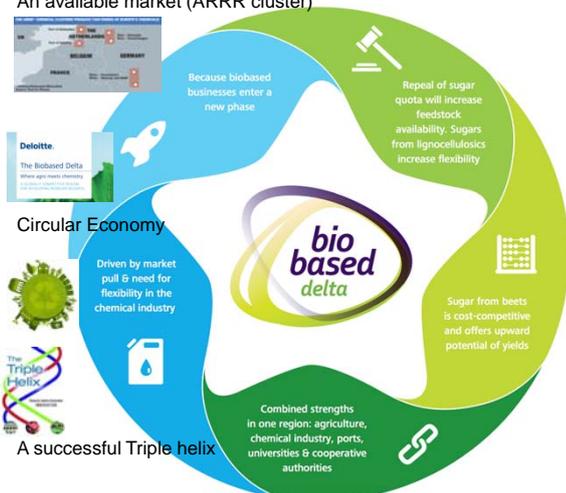


Willem Sederel

## Biobased Delta Eco-system



- An available market (ARRR cluster)
  - Because biobased businesses enter a new phase
  - Repeal of sugar quota will increase feedstock availability. Sugars from lignocellulosics increase flexibility
- World class agro & chemical industry
  - Biotechnology & green chemistry
  - A feedstock position
  - Local biomass & imports
  - Best in class infrastructure
- Circular Economy
  - Driven by market pull is need for flexibility in the chemical industry
  - Sugar from beets is cost-competitive and offers upward potential of yields
  - Combined strengths in one region: agriculture, chemical industry, ports, universities & cooperative authorities
- A successful Triple helix



## International Collaboration



<ul style="list-style-type: none"> <li>• Netherlands- Flanders                     <ul style="list-style-type: none"> <li></li> <li></li> <li></li> <li></li> <li></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• BIG-C                     <ul style="list-style-type: none"> <li></li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• 3BI Intercluster                     <ul style="list-style-type: none"> <li></li> <li></li> <li></li> <li></li> <li></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Bio Industrial Innovation Canada                     <ul style="list-style-type: none"> <li></li> <li>Focus: lignin valorization</li> <li></li> </ul> </li> </ul>

- Living Labs Brasil 



**Visit the Holland Biotech Pavilion!**