



# The bio-based economy in Northeast Netherlands

Final report presentation

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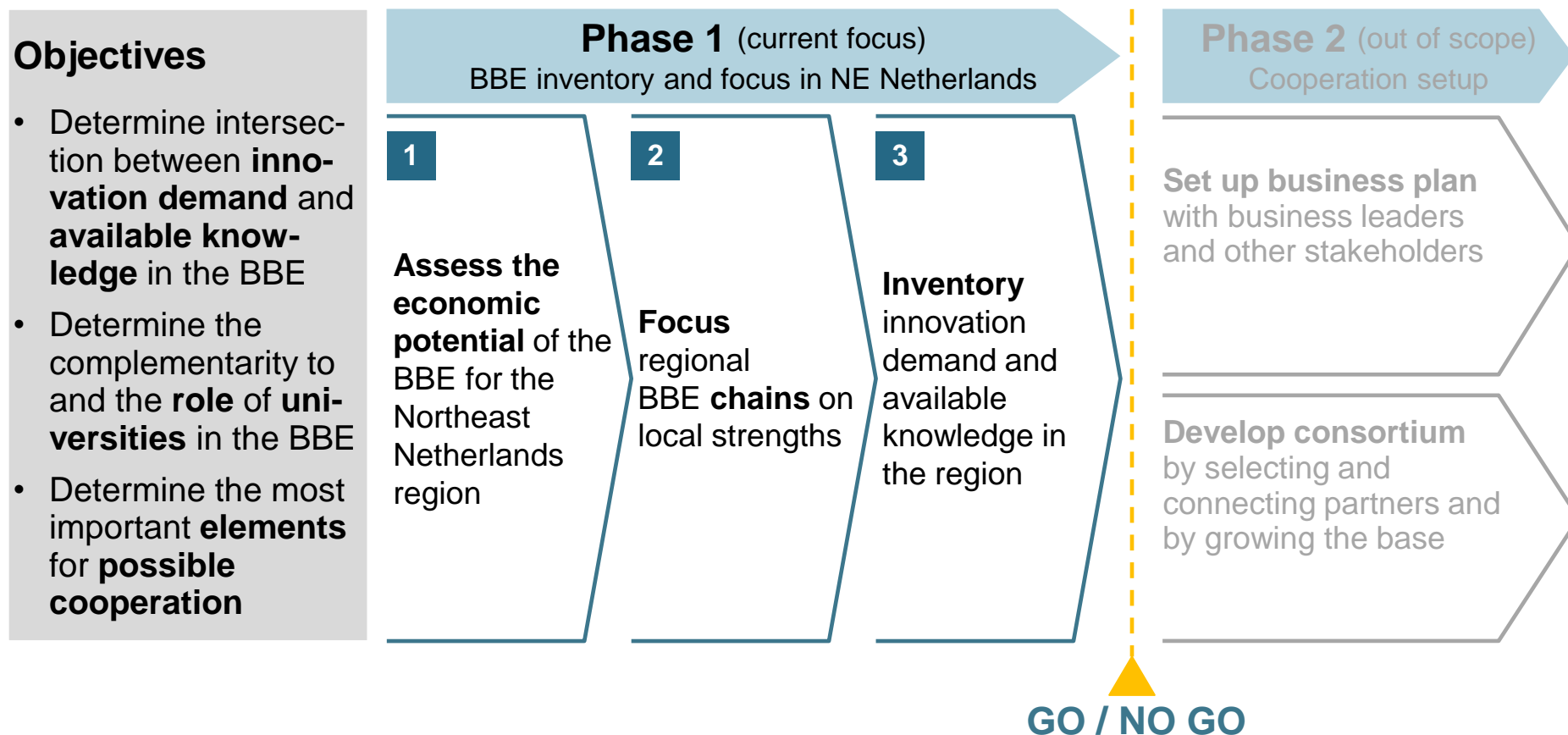
UNIVERSITEIT TWENTE.



Amsterdam, 2013

# This phase inventories economic potential, local strengths, innovation demand and the available knowledge in BBE in Northeast Netherlands

## Project objectives and approach



# Industry, research institutes and government in the region are heavily represented in this study

## Research participants and sources

### ONLINE QUESTIONNAIRE AND INTERVIEWS

#### INDUSTRY



#### RESEARCH INSTITUTES



#### GOVERNMENT



### PARTNERSHIPS



- Online questionnaire of 150+ companies active in the BBE in the region
- Online questionnaire of 60+ university and college departments in the region
- More than 35 interviews with companies, professors/lecturers and public stakeholders

### DESK RESEARCH

#### DATABASES AND MONITORS

- CBS – Statline
- BBE magazine
- BvDEP, Reach, Amadeus
- Biobased chemicals – IEA
- Eurostat
- LISA

#### STUDIES AND RESEARCH FROM ORGANIZATIONS

- IEA
- Wageningen University
- SER, SER Noord
- PGG/BBP
- Rathenau
- NOM

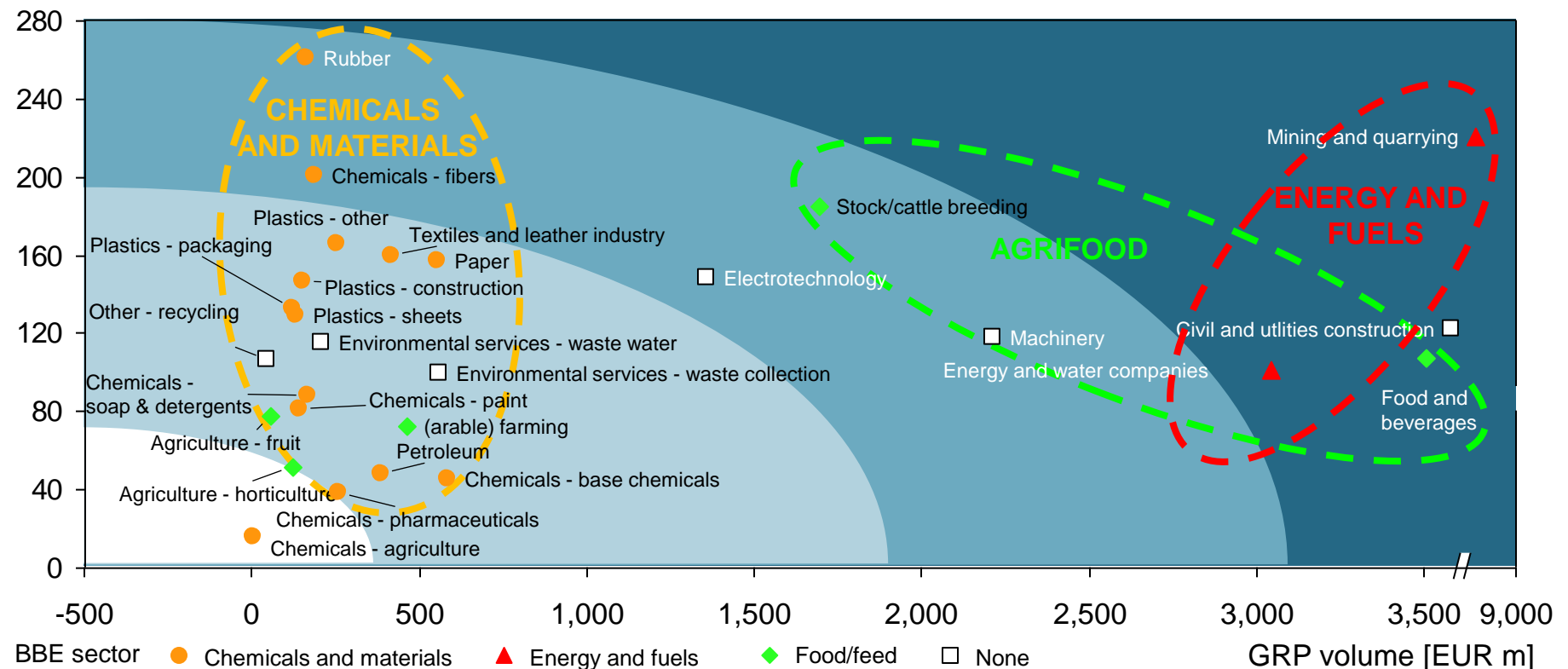
#### VISIONS AND AGENDAS

- 'BBE in Noord-oost NL – Chemie ontmoet Agro'
- 'BBE in de energietransitie – Overheid'
- 'Punt op de horizon – Topsector Chemie'
- 'Agrifood en BBE Noord-Nederland – NOM'
- 'Green Deal KvK NO-NL'

# In the sectors energy and fuels, chemicals and materials, and agrifood, Northeast Netherlands holds a strong national position

## Economic strengths of major BBE sectors, Northeast Netherlands, 2011

Contribution to GRP<sup>1)</sup> relative to national sector [Index 100 = sector contribution in the rest of Netherlands]





# The power of these sectors is also demonstrated by the numerous companies active in the region

Selection of companies by size and per sector, Northeast Netherlands

← LARGE — COMPANY SIZE — SMALL →

## Agrifood



## Chemicals and materials

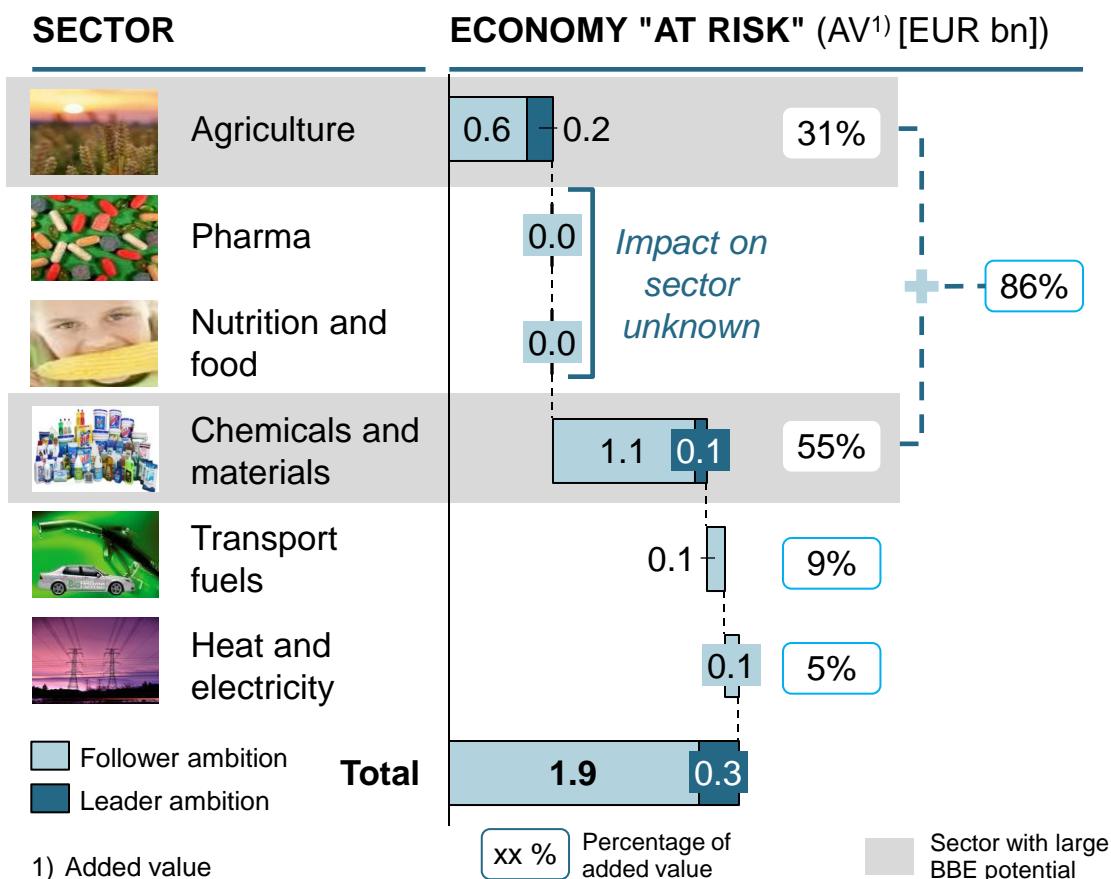


## Energy and fuels

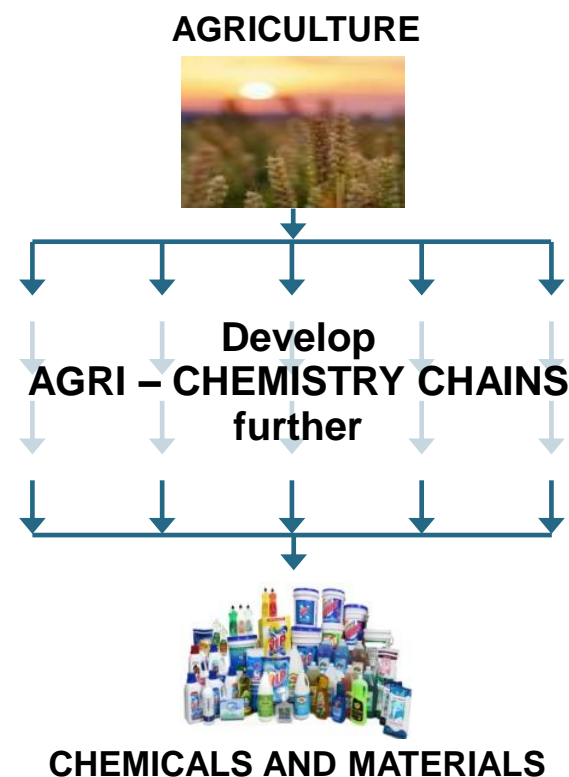


# Developing the value chain between agriculture and chemicals will realize the economic potential of the region

Focus on sectors with most economic potential



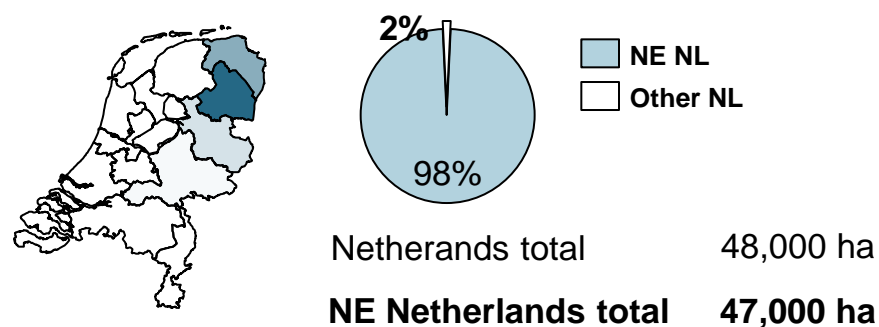
## FOCUS ON AGRI-CHEMISTRY CHAINS



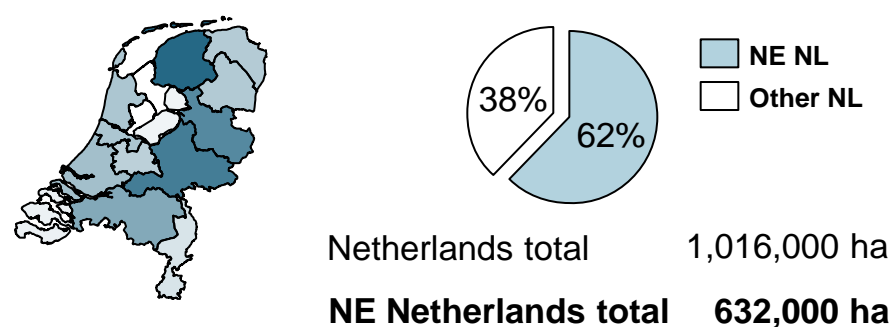
# Northeast Netherlands is a major source of biomass, particularly potatoes, sugar beets, grass and wood

Biomass availability in the Netherlands by (farm) acreage<sup>1)</sup>

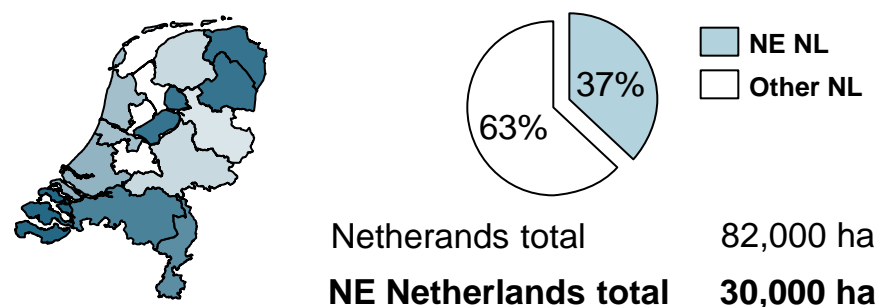
## High-starch potatoes



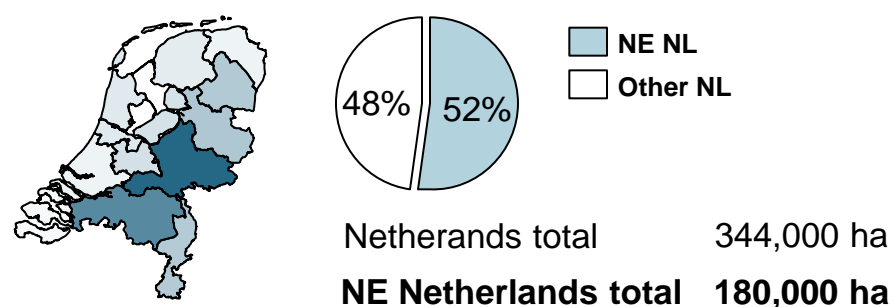
## Grassland



## Sugar beets

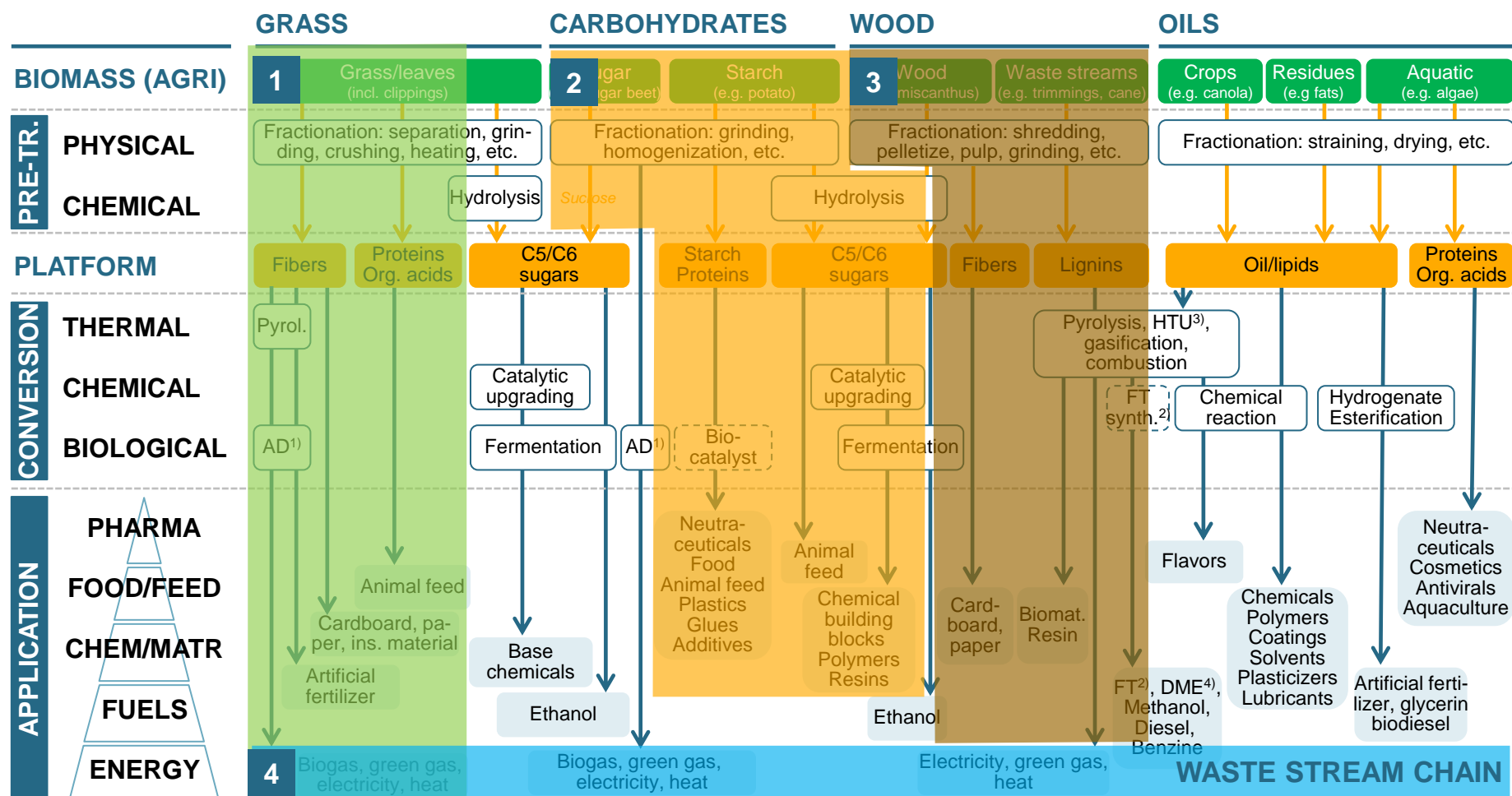


## Wood (forests)



1) Shading indicates feedstock acreage; a dark blue province indicates lots of acreage, a white province indicates none

# Four chains fit well with the biomass, knowledge and business activity in Northeast Netherlands





























# The region is already home to a large number of companies in each chain – This offers a basis for further BBE development

Illustration of business activity by chain, Northeast Netherlands


















## Grass chain

KEY SECTOR	SELECTION OF COMPANIES	COLLABORATIONS
AGRICULTURE AND DAIRY SECTOR	   	  
FOOD/FEED INDUSTRY	    	
PAPER AND FIBER INDUSTRY	    	
GAS INDUSTRY	    	





















## Carbohydrate chain

KEY SECTOR	SELECTION OF COMPANIES	COLLABORATIONS
AGRICULTURE AND DAIRY SECTOR	   	       
FOOD/FEED INDUSTRY	    	
CHEMICAL INDUSTRY	    	
FIBER INDUSTRY	   	

## Wood chain

KEY SECTOR	SELECTION OF COMPANIES	COLLABORATIONS
FORESTRY		      
ENERGY AND FUELS	    	
PAPER AND FIBER INDUSTRY	   	
BUILDING AND CONSTRUCTION	  	

## Waste streams

KEY SECTOR	SELECTION OF COMPANIES	COLLABORATIONS
AGRO-FOOD	   	      
WASTE (WATER) DISPOSAL	   	
PAPER AND CHEMICAL INDUSTRY	   	
GAS INDUSTRY	   	

## Each area of Northeast Netherlands has a specific offering and position within the future BBE cluster

### Distribution of business activity by chain, Northeast Netherlands

#### Grass chain



- Current pilot plant in Friesland with support from the North Netherlands region
- Huge potential for grasslands in Gelderland and Overijssel

#### Carbohydrate chain



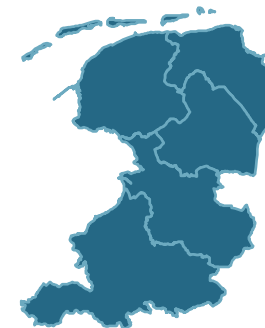
- Strong cluster currently around North Netherlands
- Expansion of application into chemicals and materials means the cluster can expand towards Delfzijl and Drenthe (Emmtec)

#### Wood chain



- Clusters around Delfzijl (e.g. Woodspirit – BioMCN) and around Enschede (e.g. BTG)
- Expansion of application into chemicals and materials means the cluster can expand towards Drenthe (Emmtec)

#### Waste streams



- Potential for valorization of waste streams spans the entire region

# By choosing this clustering of chains, Northeast Netherlands' BBE proposition sets it apart from other Dutch regions

## BBE clusters in the Netherlands



PROFILE		
<div>1</div> <div>ZUID-VLEUGEL</div>	<div>Biomass</div> <div>Conversion</div> <div>Applications</div> <div>Academic links</div>	<div>Import and use of horticultural waste streams (<b>Westland</b>)</div> <div>Focus on <b>fermentation</b> (BE-Basic and BPF) around Delft</div> <div>Use of biobased feedstock in <b>heavy chemicals</b></div> <div>Strong ties with <b>TU Delft</b>; connection with <b>Biobased Delta</b></div>
<div>2</div> <div>BIOBASED DELTA</div>	<div>Biomass</div> <div>Conversion</div> <div>Applications</div> <div>Academic links</div>	<div>Use of <b>local agro</b> products (e.g. sugar beets)</div> <div>Broad focus on <b>product and process development</b></div> <div>e.g. <b>perf. materials, agrochemicals, green coatings</b></div> <div>TU Delft, University of Gent, WUR</div>
<div>3</div> <div>SOUTH HOLLAND (Limburg)</div>	<div>Biomass</div> <div>Conversion</div> <div>Applications</div> <div>Academic links</div>	<div>Via Chemelot Institute focus on <b>later steps in value chain</b></div> <div><b>Process</b> development and <b>technology</b> upscaling</div> <div><b>Biomedical materials</b> and <b>biobased building blocks</b></div> <div><b>University of Maastricht, TU Eindhoven</b></div>
<div>NORTHEAST NETHERLANDS</div>	<div>Biomass</div> <div>Conversion</div> <div>Applications</div> <div>Academic links</div>	<div><b>Local agro products</b> (carbohydrates, grass and wood)</div> <div>Focus on <b>thermal</b> and <b>biocatalytic</b> processes</div> <div>Strong position in <b>food/feed</b> and <b>energy</b></div> <div>Movement towards chemicals</div> <div>University of Twente, University of Groningen, WUR</div>

Differentiating characteristics of Northeast Netherlands

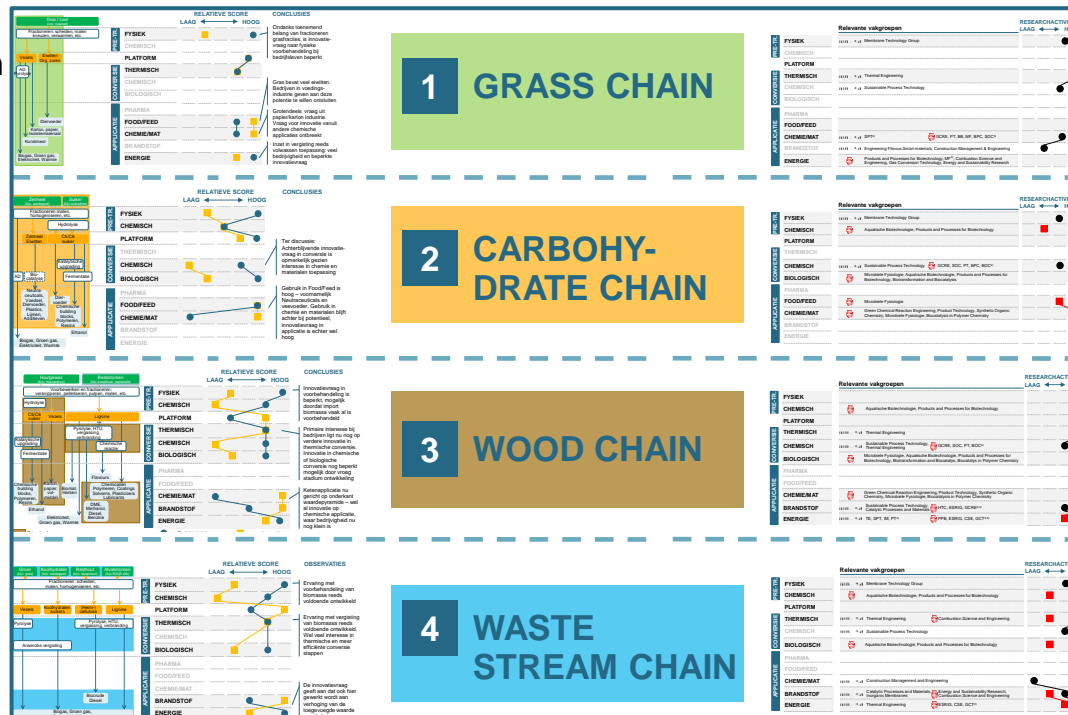
# The innovation demand and the knowledge supply in each chain were compared via an online questionnaire and interviews

## Innovation demand and knowledge supply

### Innovation demand from companies

150 companies with biobased activities in the region were invited to complete an online questionnaire, and a selection was invited for interviews<sup>1)</sup>

**CUMULATIVE  
BBE-RELATED  
TURNOVER  
(PARTICIPATING  
COMPANIES)  
EUR 1088 M**



### Knowledge supply from universities/colleges

More than 60 departments from universities and colleges were invited to complete an online questionnaire about their research. A selection was invited for interviews<sup>1)</sup>

**RESEARCHERS  
ACTIVE IN "BBE  
RESEARCH"  
(PARTICIPATING  
GROUPS)  
112 FTE**

1) More than 35 interviews were conducted with companies, research institutes and public stakeholders

# The complementary expertise from the two universities can support innovation across the chain, a good match for the demand

## Division of expertise and matching innovation demand and knowledge supply

### INNO- VATION DEMAND<sup>1)</sup>

- Development of **applications** with **high added value** for chemicals and materials
- Development of **applications** with **high added value** for agrifood
- Advancement of **applications** with **lower added value** such as energy and fuels

- Organization of the **entire chain** (biomass to application) and division of returns and risks
- Creation of **laws and regulations** that are **clear**, which **permit** the desired innovations and **stimulate** the sector where necessary

### EXPER- TISE<sup>2)</sup>

*Bio-&chemo  
catalytic*

*Thermal*



UNIVERSITEIT TWENTE.

*Fundamental*

UNIVERSITEIT TWENTE.



*Technical/engineering*



rijksuniversiteit  
 groningen

UNIVERSITEIT TWENTE.

*Social*

### KNOWLED- GE SUPPLY

- The **University of Twente** plays a leading role<sup>3)</sup> in research into **thermal conversion**, **synthetic fibers** and **energy applications**
- The **University of Groningen** plays a leading role in research into **bio- & chemocatalytic conversion** (including **carbohydrates**) and the development of applications in **chemicals and materials**

- The University of Groningen has a leading position in social research with the **Groningen Energy and Sustainability Program**
- Multiple groups are active at the University of Twente

1) Formulated as actions; 2) Generalized division; 3) Leading role is based on the amount of research activity (measure for amount of researchers involved)



# Together, businesses and universities can develop high-value applications and advance existing techniques

Summary of technical innovation demands to develop the BBE

## TECHNICAL INNOVATION DEMAND

**1** Development of **applications** with **high added value** for chemicals and materials

**2** Development of **applications** with **high added value** for agro-food

**3** Advancement of **applications** with **lower added value** such as energy and fuels

## UNIVERSITY KNOWLEDGE SUPPLY

- The University of Twente plays a leading role in research into thermal conversion and synthetic fibers
- The University of Groningen plays a leading role in biological conversion for the development of applications with high added value

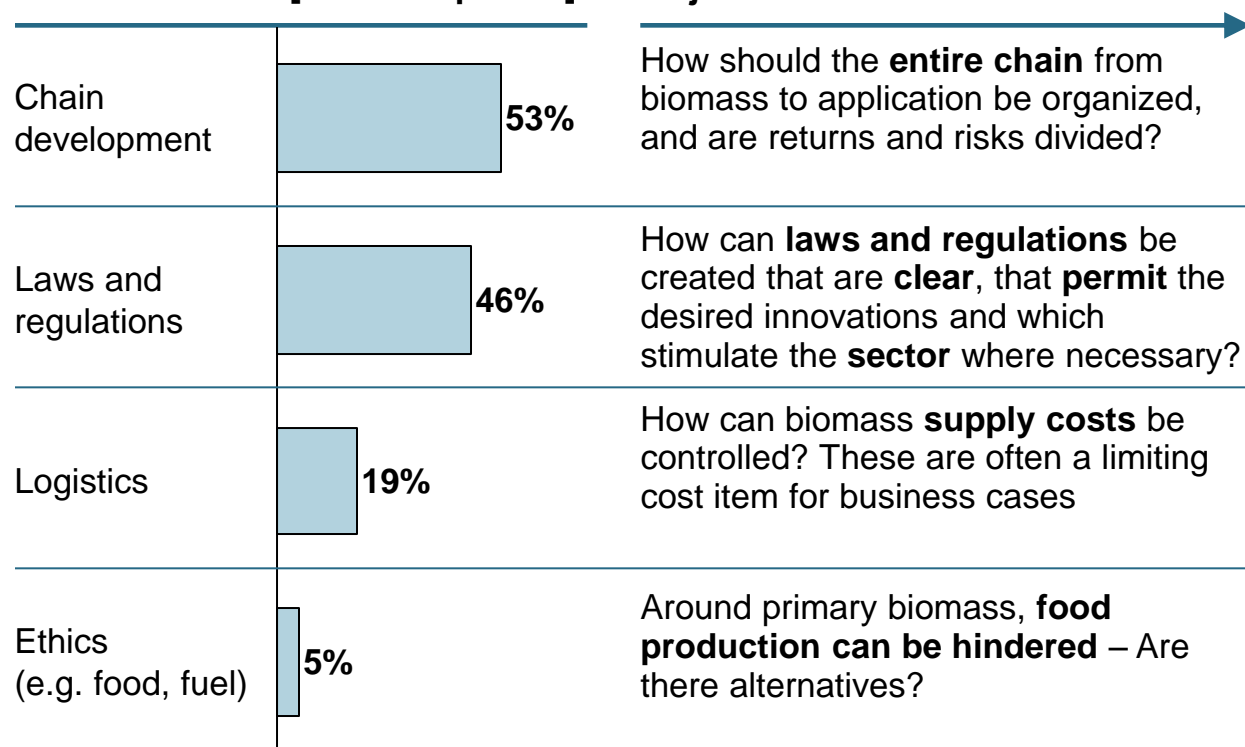
- The University of Groningen plays a leading role in research into carbohydrate conversion
- *Further involvement of the University of Wageningen seems appropriate given its focus*

- The University of Twente plays a leading role in research into energy and fuel applications
- The University of Groningen plays a leading role in research into energy generation in the grass chain

# The non-technical innovation demand from companies mainly encompasses chain development and regulation

Other major innovation demands to develop the BBE

## Priority of non-technical innovation demands [% of companies]



## Knowledge supply

### University of Groningen

- The Groningen Energy and Sustainability Program<sup>1)</sup> themes:
  - Energy markets and regulation
  - Social dynamics of sustainability
  - Gas innovation and smart systems
  - Energy transition

### University of Twente

- Legal and economic governance studies
- Philosophy
- Twente Centre for Studies in Technology and Sustainable Development

1) Comprises more than 15 research groups

# The region's strengths in the selected chains form the foundation for the successful development of the region's BBE

## Regional strengths for further BBE development

### ACCESS TO BIOMASS

- Northeast Netherlands has large quantities of its **own biomass** available for the economic development of the chains
- The region has **good logistics and access points** for biomass supply/import

- Solid **initiatives** have been undertaken in the region to actively promote the **development of the chains**
- Developed initiatives are broadly **supported by all stakeholders** in the chains, including regional **government**

### ACTIVE CLUSTER

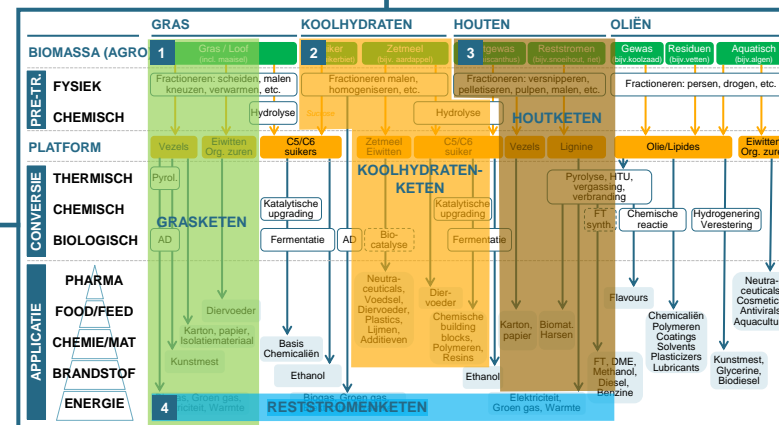
### STRONG BUSINESS ACTIVITY

- Northeast Netherlands has a relatively **large economic sector** in the selected chains
- Companies actively seek and are **involved in biobased innovation** in the chains

- Research institutions are **accessible** to companies and are **active in valorization**

- Northeast Netherlands has an **active and first-rate knowledge base** involved in the further development of the chains

### EXCELLENT KNOWLEDGE



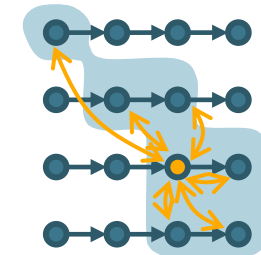
# A public-private partnership can remove the remaining bottlenecks in the regional BBE's current development

Bottlenecks in the further development of the biobased economy

Bottleneck	Description
<b>1 Lack of shared vision</b>	Companies indicate that neither chain partners nor social partners share a vision
<b>2 Lack of transparency in the chains</b>	53% of companies name chain development as an innovation demand. With no business case worked out for the entire chain, it is a risk to start to grow
<b>3 Lack of resources</b>	56% of companies have insufficient means or capacity in their R&D departments – The fragmentation of subsidies has hampered the building of critical mass  51% of companies indicate that laws and regulations hold back innovation
<b>4 Lack of profile as BBE region</b>	Companies indicate that current BBE initiatives are a "hodgepodge" – The region has too low of a profile, which stands in the way of forming a successful cluster

## Public-private partnership

### CHAIN COORDINATION



### COMMUNITY COORDINATION

