Welcome to the to the

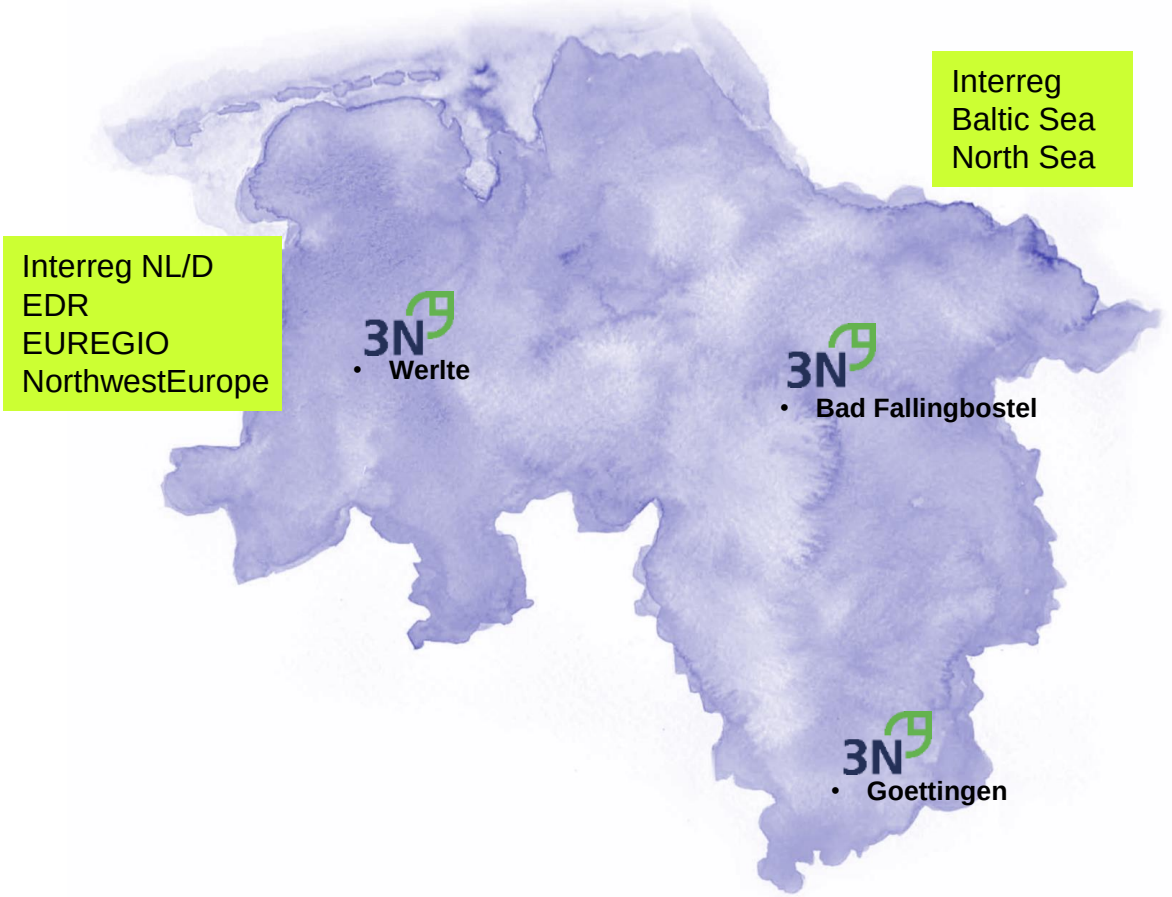
Kompetenzzentrum
Niedersachsen • Netzwerk
Nachwachsende Rohstoffe
und Bioökonomie e.V.

3N

Agenda

- **Introduction 3N - Centre of Competence**
- **3N´s role in circular economy**
- **Activities / What we can do together ?**

3N Competence Center e.V.



- in Werlte since 2003
- since 2006 nationwide
- 2007 - Foundation of 3N GmbH
- **since 2010 as 3N. e.V**
- Since 2017 also a competence center for paludiculture

Office in Werlte: 5 research assistants employees, 1 secretary
Accompanying projects: 3 employees and 2 research assistants Employees Competence Center Paludiculture
Office in Göttingen: 3 research assistants employees
Office in Heidekreis: 1 scient. Employee LK HK

Members of 3N e.V.

Founding members

Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz

Niedersächsisches Ministerium für Umwelt, Energie, Bauen und Klimaschutz

Emsland

Landwirtschaftskammer Niedersachsen

HAWK Hochschule für angewandte Wissenschaft und Kunst Hildesheim/Holzminden/Göttingen

Niedersächsische Landesforsten

Samtgemeinde Werlte

Stadt Werlte

Members

Nordzucker

Heidekreis

Holzbau Deutschland Verband Niedersächsischer Zimmermeister im Baugewerbe-Verband Niedersachsen

wood stock / stock wood – Holz schafft Werte – www.stock-wood.de

Holzbau Janssen – Bauen mit Holz – www.holzbau-janssen.de

Deula Nienburg

we make it grow – www.klasmann-deilmann.com

EMSLAND GROUP using nature to create

Nordwest Gruppe Solar + Neue Energien

WELTEC BIOPOWER

Wachstumsregion HANSALINIE

HEBRICO Naturdünger

GRAMOFLOR qualität von anfang an!

corntec ENERGIE Gesellschaft für nachwachsende Rohstoffe

Stallkamp

KWS

fair versichert VGH

NAWARO

RAIFFEISEN EMSLAND-SÜD

Klosterforsten

ZUKUNFT SÄEN SEIT 1856

SBK Stiftung Braunschweigischer Kulturbesitz

VOLKSWAGEN Aktiengesellschaft

Texas BioEnergie

GeLa Energie GmbH

Regenis Bioenergie Technologie

Waldbesitzerverband Niedersachsen

biogas service tarmstedt – Mit Erfahrung in die Zukunft

Landkreis Rotenburg (Wümme)

westerkamp Modern Material Milling

ProTes Co Ihr Partner in Sachen Umwelttechnik

AKRA Karner Düngerproduktion

Bio Energie Sieringhoek GmbH & Co KG

DELPHIN water systems

Our tasks

Central information point for Lower Saxony

Projects

Innovations

Subsidies

Public relations

3N network

Interreg Germany Netherlands

German-Dutch
Co-operations since 2004

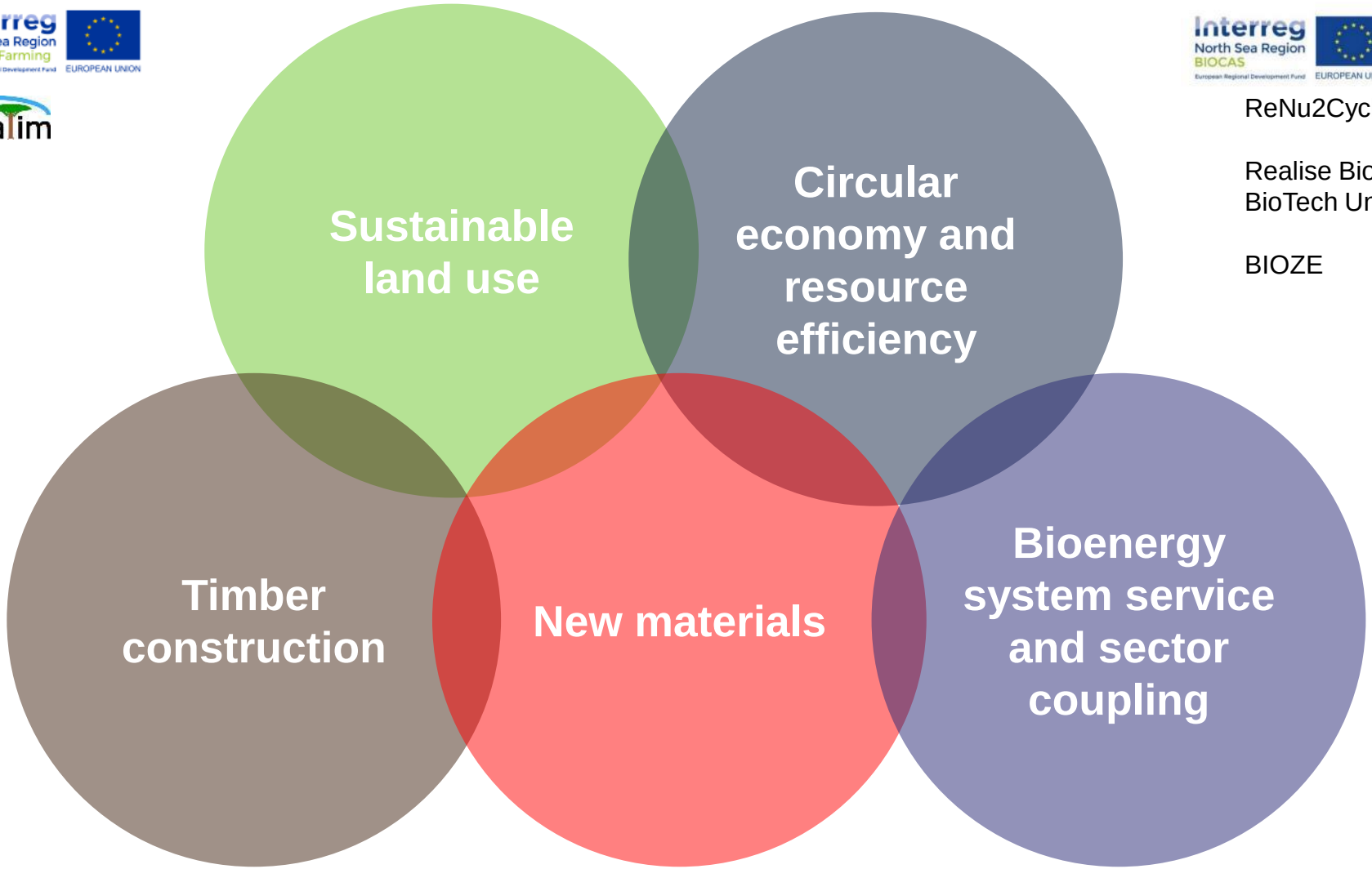
for innovations
Climate protection and sustainability

Network projects

*
Green across the border, H2 Chance, Farming in the Rain, Bioeconomy learning centre - school projects

Field trials
Sustainable cultivation systems

Subject areas Role of 3N in circular economy



ReNu2Cycle

Realise Bio
BioTech Unlocked

BIOZE

EU - Climate targets

More sustainable production of food and biomass

More sustainable use of food and biomass

- Bioenergy with carbon capture and storage (BECCS)
- Fibre crops for bio-plastics, packaging, clothes
- Wood-based construction products

Source: Holzleitner DG Climate

European Commission

Carbon farming examples

Permanent crops

Agroforestry systems

Waterlogging of peat soils
Paludicultures

Sustainable land use concepts

Establishment and evaluation of a sustainable **agroforestry land use concept for ecological enhancement and production-integrated compensation**
Project organiser: Joint municipality of Spelle
Project partners: University of Hanover, 3N
Project duration: 2017-2019

Testing and establishing new cultures
Sida hermaphrodita and timber production
Testing new nettle clones/FNR joint project

Climate-friendly fertiliser systems in crop rotations

Reduction of mineral fertiliser, total N -20%
Project partners: LK ROW, 3N. Farmers, companies, LWK Nds:

Carbon farming
Development of business models for carbon enrichment
D Project partners: Thünen Institute, 3N
+ International project partners

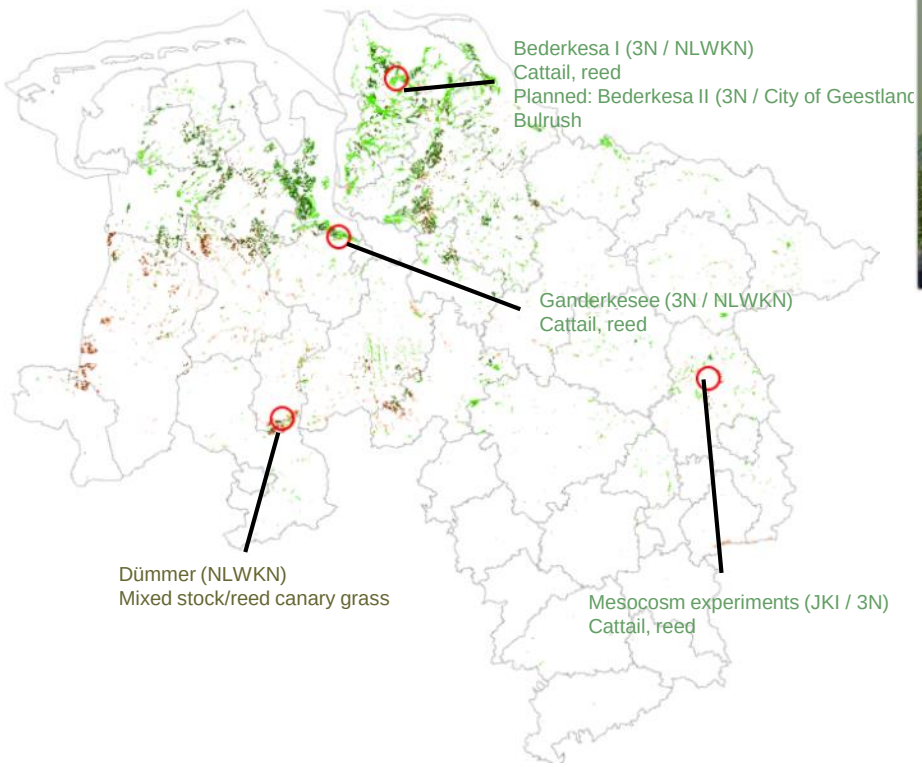
Interreg North Sea Region Carbon Farming European Regional Development Fund EUROPEAN UNION

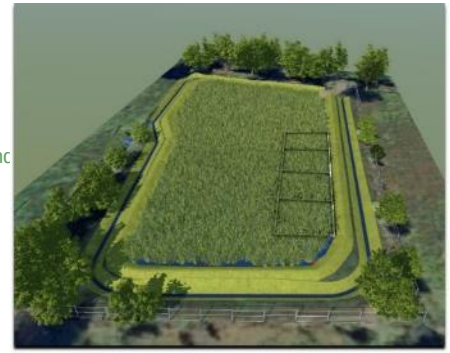
Interreg North Sea Region BIOCAS European Regional Development Fund EUROPEAN UNION

Development of the cultivation concept in Lower Saxony

Competence centre in the 3N

First fenland research polder in Lower Saxony





First GHG monitoring in Lower Saxony and further studies on ecosystem services:

www.paludikultur-niedersachsen.de Information platform

Networking with Interreg project "Paludi Market"

Innovations in the region

BIO ECONOMIE ÖKONOMIE

54 participating companies and scientific institutions

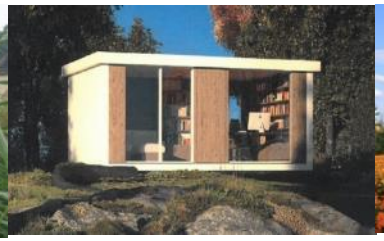
Funding period: 06.2015 - 07.2018

BIO ECONOMIE ÖKONOMIE
GROENE CHEMIE GRÜNE CHEMIE

53 participating companies and scientific institutions

Funding period: 07/2018 - 5/2022






Supported by /
Mede mogelijk gemaakt door:

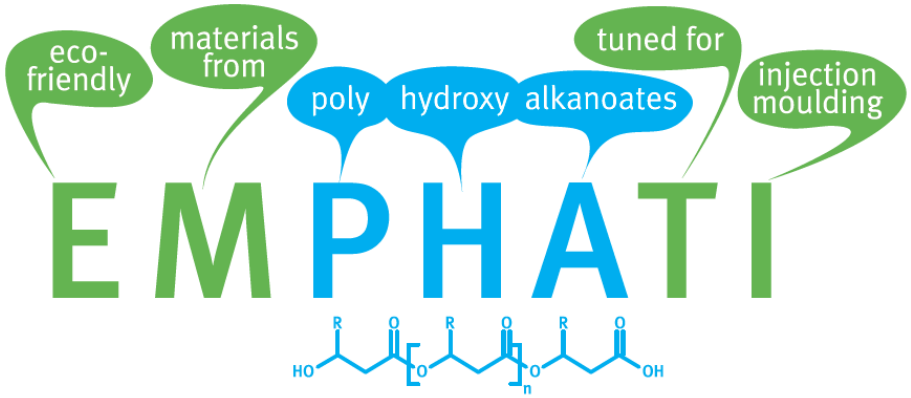
Realisation examples

Biosubstrates

Organic seed coating

3D printing with biopolymers

Biodegradable yarns Bio-based cycle path



Interreg
Deutschland – Nederland

Programme: Interreg VI A
Priority: 1 (Innovation)
Start: 01.10.2022
Duration: 3 years

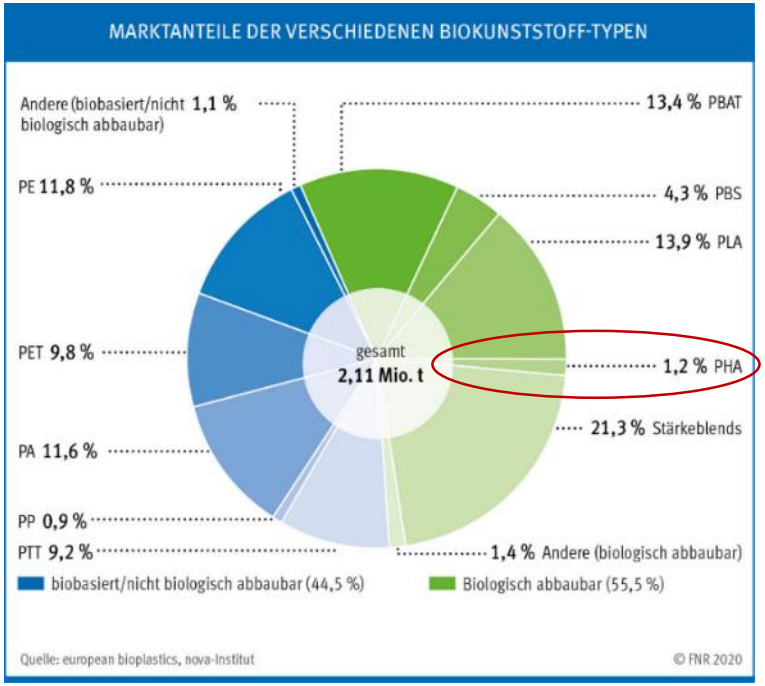
30.09.2025

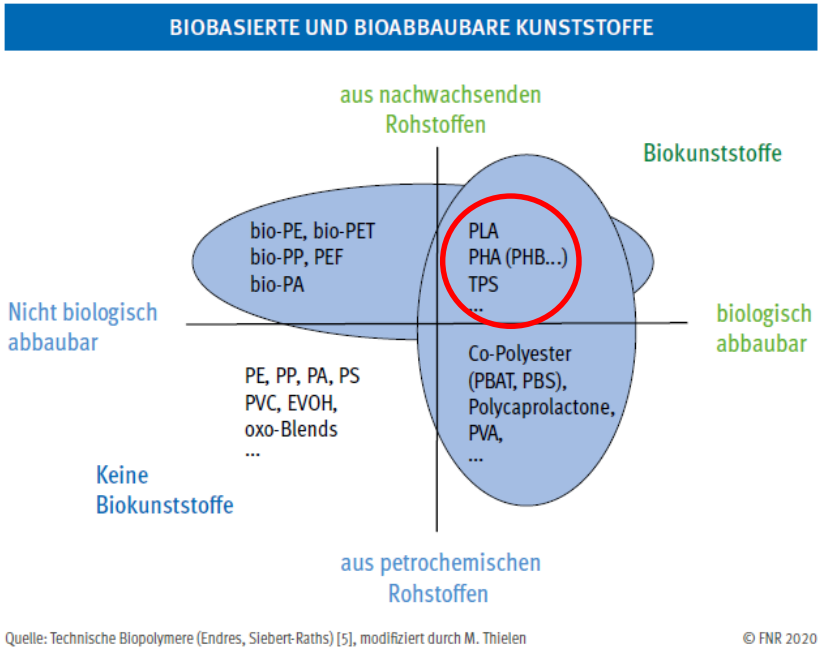
Budget: € 3,364,531.08
Type: partially open
Status: approved/active

Partner As

Project EMPHATI @Interreg Monitoring Committee

Introduction | Bioplastics





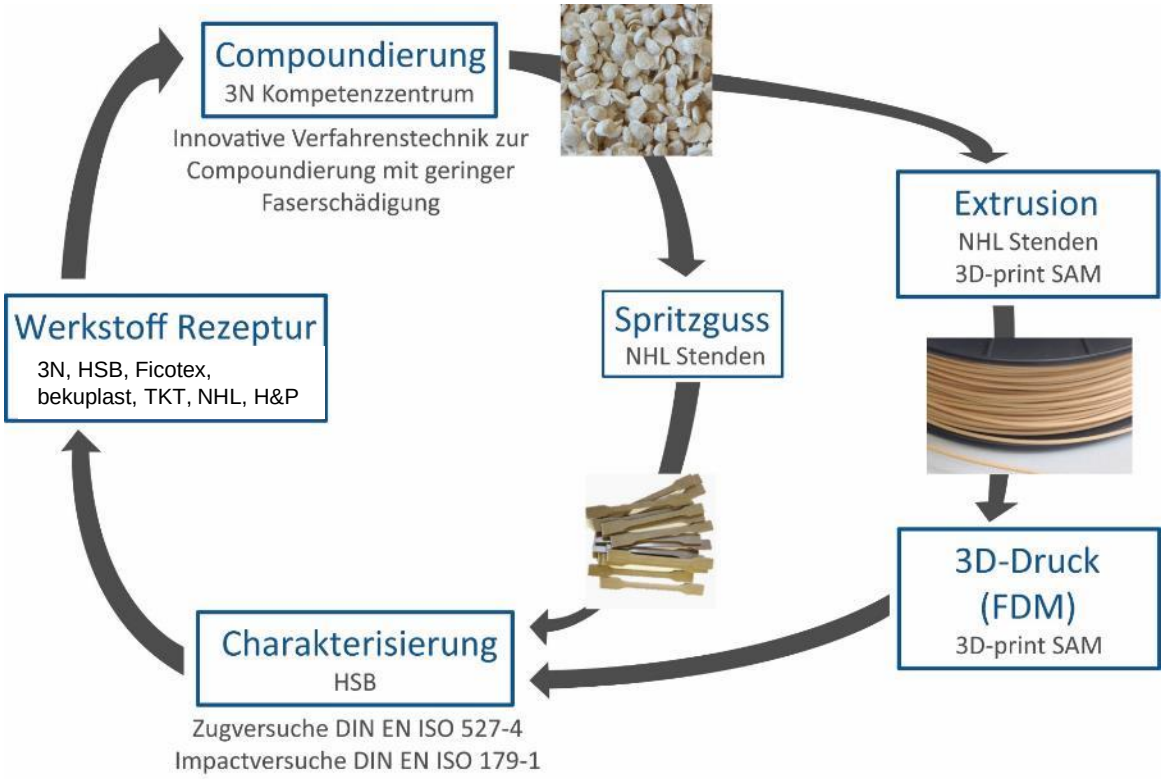
- Home compostability vs. industrial compostability?
- Raw materials (maize, sugar cane) are foodstuffs? → Tank-plate debate?

PHA: Advantages & challenges

- **Fully biodegradable** biopolyester (better than PLA)
- Natural renewable raw material
- Can be produced by many bacterial strains
- Structural diversity for customised products
  - PHB; P3HB; PHV ...
- Manufacture of products with variable **properties/growing market**
- **Utilisation of more favourable C sources from residual materials (feasibility**)

- Glucose as a conventional raw material is expensive (40-50% of production costs)
- Thermal stability
- Different qualities
- Production capacities still low
- Different properties depending on the manufacturer
- So far more expensive than conventional plastics
- Isolation/extraction (solvent)

Organisational matters:
Experiments Laboratory->Industry

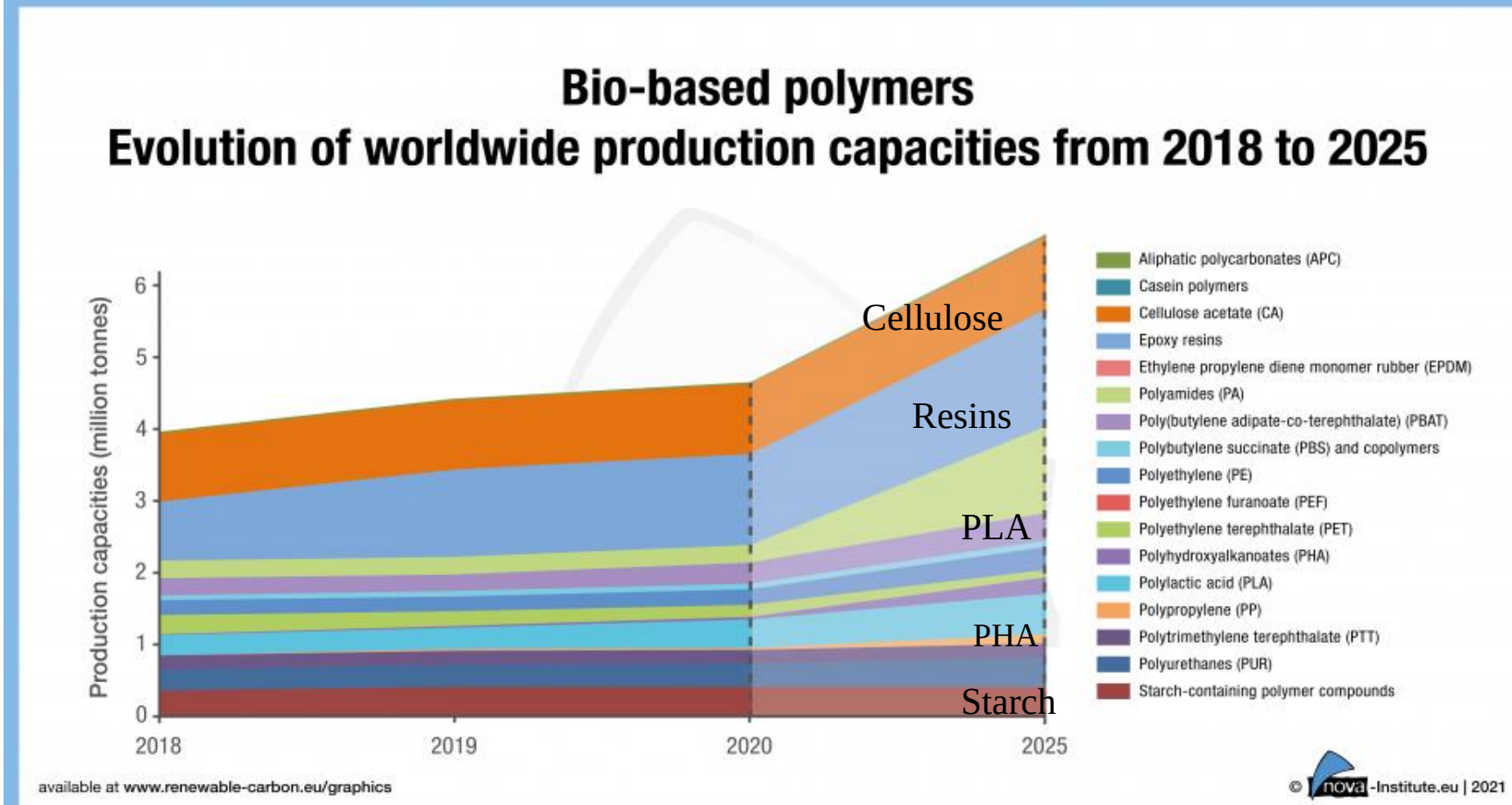


- Scale-up for which recipe?
- Criteria?
- How does PHA behave on systems?
- Influence of fibre?
- Which requirements for injection moulding and which for 3D printing?

Why EMPHATI ?

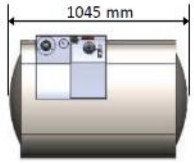
- **Sustainability** and **climate protection** through the development of innovative PHA products
- **Expansion** of **research and innovation** in the Germany-Nederland Interreg programme area on the basis of natural fibre-reinforced and fully biodegradable PHA compounds through the **development of series products** (e.g. containers/bekuplast; dispensers for adhesive tape/TKT) by the participating companies (4)
- Use of various PHA compounds in injection moulding and 3D printing
- **Increasing** the **sustainable growth** and **competitiveness** of SMEs through business development and cluster formation along the PHA production chain as well as knowledge transfer including the jointly developed project results (virtual PHA Academy).
- Promoting the transition to a **resource-efficient circular economy** by analysing the entire life cycle (LCA) of PHA according to the cradle-to-cradle principle

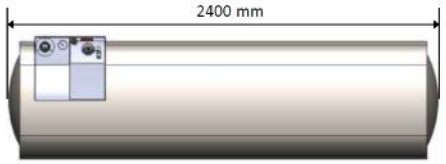
The market for bio-based polymers grew by 8 per cent in 2020



Innovations in the project:

- Development and testing of a new **LNG tank** for the storage of cryogenic (bio)LNG (*KryoLite/ Low8/ALE*)





- Integration of alternative fuels in existing petrol stations and development of new **petrol station concepts** (*Green Planet, press*)

- Development and testing of a **robotic refuelling system** for the automatic refuelling of (bio)LNG at filling stations

- Development of a **mobile liquefaction plant** (LNG Pilots follow-up project)

- 3N potential study for NDS

Electrolysis: Electrodes in the fermenter, B.E.S. GmbH (Bad Bentheim, Germany)

Test facility:

- 4 electrolysis electrodes installed in the pump pipe of the 1800 m^3 fermenter

Experimental plan:

A. Zero measurement with silage maize and cattle slurry feeding **(4 weeks)**
B. After: Activation of 4 electrolysis probes in the pump tube **(4 weeks, started at the beginning of March 2022)**
C. Second zero measurement: more or less slurry
D. Subsequently: Activation of the electrolysis probes **(4 weeks)**
E. Until June: Deactivation of the electrolysis probes **(4 weeks)**

Measurement plan

- Gas quality: CH_4 ,CO_2 , H_2 , O_2 , H_2 S (daily)
- Gas quantity (daily)
- OTS content, FOS/TAC and pH fermentation residues (weekly)

Pictures: Electrolysis electrodes in the feed pipe of the post-digester at partner B.E.S.

Function of bioenergy as a system service provider in the future energy system

Electricity

- Balancing volatile energy **sources/green energy storage**
- Consumer-oriented generation with relief for the electricity grids

Heat

- Generation of high-temperature heat
- **Demand-orientated heat generation in combined heat and power generation**

Mobility

- Production of **fuels for heavy goods transport**, shipping and aviation
- Energy sources: biodiesel, ethanol, **biogas (CNG/LNG),** biokerosene, **H^+**

Input materials

- **Farm fertiliser, organic waste**
- Residual materials and by-products (e.g. from food or wood processing)

Bioeconomy education projects

Mobile learning programme bioeconomy on site

Completion of teacher's guide

School dates

Bioökonomie vor Ort
unser mobiles Angebot für Schulen in Niedersachsen:
Nachhaltigkeit erleben, erkunden, begreifen

Digital learning programme on bioeconomy and climate protecti

Scripts, software preparation and modular structure

Programming has been running since Dec. 2020

Thank you for your attention!