



IEA Bioenergy
Technology Collaboration Programme

Task 42
Biorefining in a circular economy



The Netherlands - update

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Technology Collaboration Programme

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Innovation Fund (1) - Financing programme European Commission



INNOVATION FUND
First call for large-scale projects

GRANTS
EUR 1 billion + EUR 8 million for project development assistance

TWO STAGE APPLICATION
First stage deadline - 29 October 2020
Second stage deadline - 23 June 2021

OPEN TO LARGE-SCALE PROJECTS
(above EUR 7.5 million capital costs)
FROM ALL ELIGIBLE SECTORS

- Renewable energy
- Energy-intensive industries, including CCUS
- Energy storage
- Substitute products and cross-cutting projects

BENEFICIARIES
single applicants (companies) or consortia

FORM OF SUPPORT
Grant, maximum size per project of up to 60% of the additional costs linked to the innovative low-carbon technology applied

https://ec.europa.eu/clima/policies/innovation-fund_en

Comprehensive Selection Criteria:

- Greenhouse gas emissions avoidance
- Degree of innovation
- Project maturity
- Scalability
- Cost efficiency

Dutch National Growth Fund

- Several hundreds M€s public-private initiatives submitted and in preparation
- Total budget **20 billion €** for 5 years
- Minimum 30 million € per project
- Investments in knowledge development, R&D and innovation and infrastructure
- Including circular biomass to food and non-food programs



Nationaal Groeifonds

Waarom een groeifonds?
Nederland is een goed land om in te leven. Maar we hebben te maken met uitdagingen. In de eerste plaats de gevolgen van de coronacrisis. En er speelt meer. Nederland vergrijsst en het klimaat verandert. Om de welvaart op lange termijn te behouden moet de economie harder en anders groeien. Het kabinet stelt 20 miljard euro beschikbaar voor investeringen die daaraan bijdragen.

Voor investeringen in

- Kennisontwikkeling
- R&D en innovatie
- Infrastructuur

Budget
€ 20 miljard

- Voor de komende 5 jaar
- Minimaal € 30 miljoen per project

CHAPLIN Project (1)

- Collaboration in asphalt Applications with Lignin in the Netherlands
- Primary objective: development of lignin-based asphalt technology to TRL 6/7 making use of existing test roads and novel test products
- Secondary objectives:
 - 1) evaluation of lignin, which is produced in The Netherlands, in asphalt applications
 - 2) evaluation of modified lignin for stone mastic asphalt (SMA)/porous asphalt (ZOAB) application
 - 3) monitoring of the current demonstration roads and novel demonstration roads of selected lignins to evaluate the life time expectancy, emissions, safety and maintenance



Worlds 1st 3-layer lignin based asphalt road made by H4A

CHAPLIN (2) - Deliverables

- Selected lignins (from the Netherlands) with potential for use in asphalt
- Evaluated blended modified lignin-bitumen binders; testing of lab scale produced asphalt on strength before and after aging
- Detailed evaluation of asphalt application at pug mill scale regarding process conditions, health and safety aspects and recycling aspects
- Selected lignins which will be used for large scale production of lignin-based asphalt for demonstration
- Assessed lignin-based asphalt performance under real life conditions by monitoring old and new road test sections with impact analysis on performance, health and safety
- Performed LCA / TEA & Exploitation aspects



Plastics Recycling Plant / Pyrolysis oil

- The British company Itero will build an innovative demonstration plant on the Brightlands Chemelot Campus in **Sittard-Geleen** for the chemical recycling of plastic waste by means of **pyrolysis**
- The total investment amounts to **€ 25 million**
- Editorial office / Geleen
- The plant should be operational in **2023**
- Itero will annually process **27 kilotons** of plastic waste into a raw material for new plastics

Pyrolysis for processing waste plastic into new raw materials

Itero builds demonstration factory in Geleen

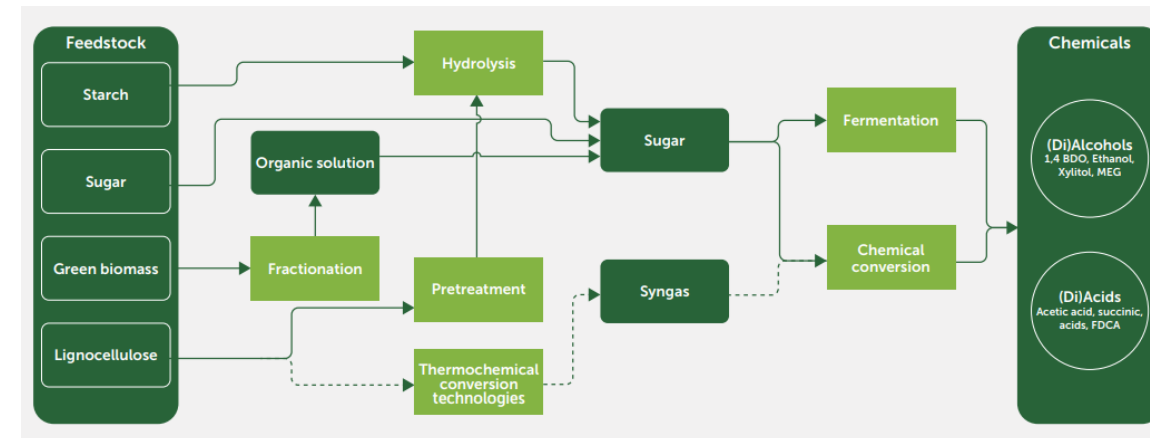


Saccharide Agenda (1)



Saccharide Agenda

- **Saccharides** are a valuable and readily available source of renewable carbon and therefore a suitable **platform for chemicals**
- Evaluation of typical saccharide-based value-chains by industry experts reveals **unique opportunities** to produce renewable intermediate chemicals and polymers from regionally available agricultural products and imported feedstock in the period up to 2050
- Changes and **improvements** in agricultural production and **investments** in production facilities and infrastructure are necessary
- Industry, government and other stakeholders have to overcome a number of **challenges** in order to realize a prominent role in a bio-based economy for the region

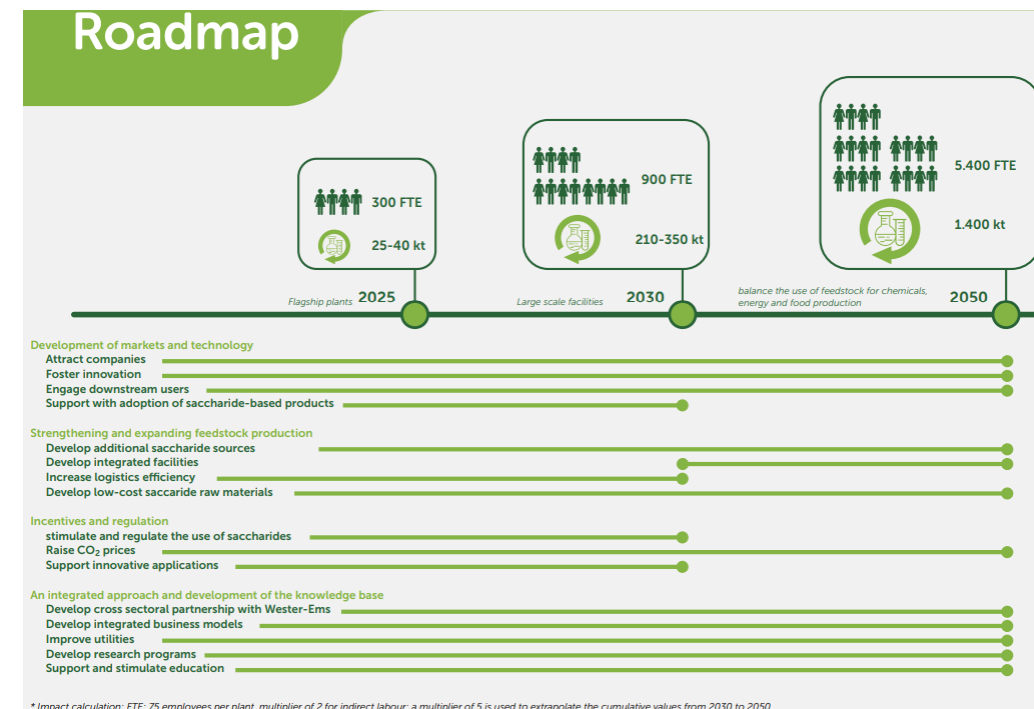


Saccharide Agenda (2)



Saccharide Agenda

- A **saccharide roadmap** was developed to work towards realizing a future of the **Chemport Europe region** as a major producer of saccharide-based chemicals in the period 2020-2050
- Important **focus areas** of the roadmap are:
 - 1) development of technologies and markets
 - 2) strengthening and expanding feedstock production
 - 3) development of incentives and regulations
 - 4) further development of an integrated approach, cooperation and improvement of the knowledge base
- The Agenda can be downloaded from:
<https://www.chemport.eu/downloads/>



Intention to build a new PLA bioplastics plant in Europe

- **Corbion** (with its Headquarters in Amsterdam, The Netherlands) and **Total** announced their intention to build a new PLA bioplastics plant in Europe
- The plant is expected to have a capacity of **100,000 tons per year**, being the first world-scale PLA production facility in Europe
- The Total Corbion PLA joint venture already owns large PLA factories in **Thailand**
- The new plant is planned to be located in **Grandpuits, France** where Total already owns a refinery
- It will be operational in **2024**
- The plant construction is expected to require capital expenditures of approximately **€ 200 million**
- **Corbion** will continue to be the **supplier of lactic acid** to the Total Corbion PLA joint venture



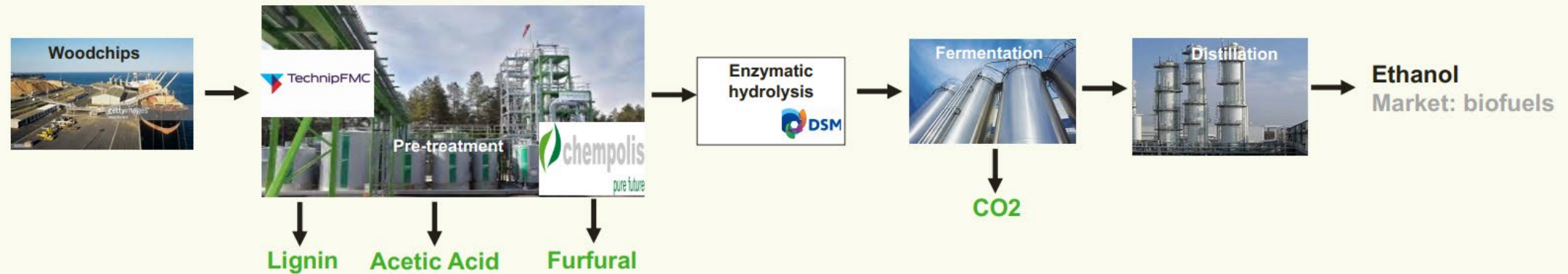
View of the site in Grandpuits, France where Total Corbion PLA intends to build its second Luminy PLA plant

<https://www.total-corbion.com/news/total-corbion-pla-announces-the-first-world-scale-pla-plant-in-europe/>

BIONDOIL (1) - Advanced fuels and chemicals from lignocellulosic feedstock

Biondoil: Base scenario 1.0 for biorefinery

Green biobased chemistry + production of drop-in bioethanol



Results from Feasibility study

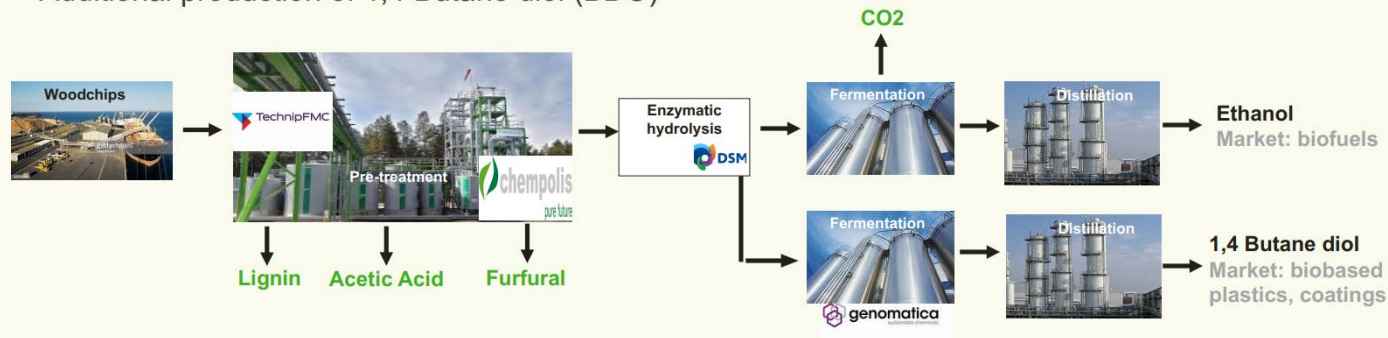
- Sustainable business case
- LCA (RED2 definitions) > 80% CO2 reduction
- Lignin valorisation scenario's in place
- Ethanol contains 20% of the biomass carbon
- Other products contains 80% of the biomass carbon

BIONDOIL (2) - Advanced fuels and chemicals from lignocellulosic feedstock

Assessing new business case opportunities

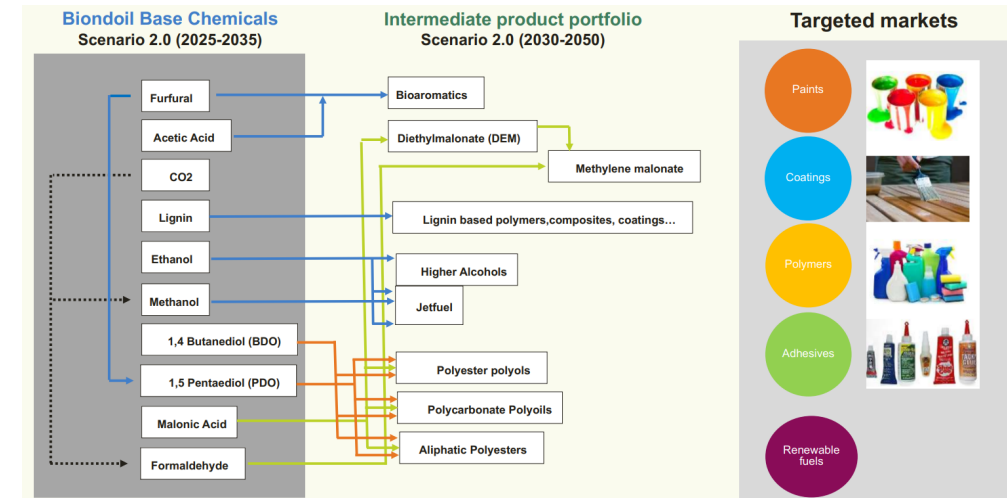
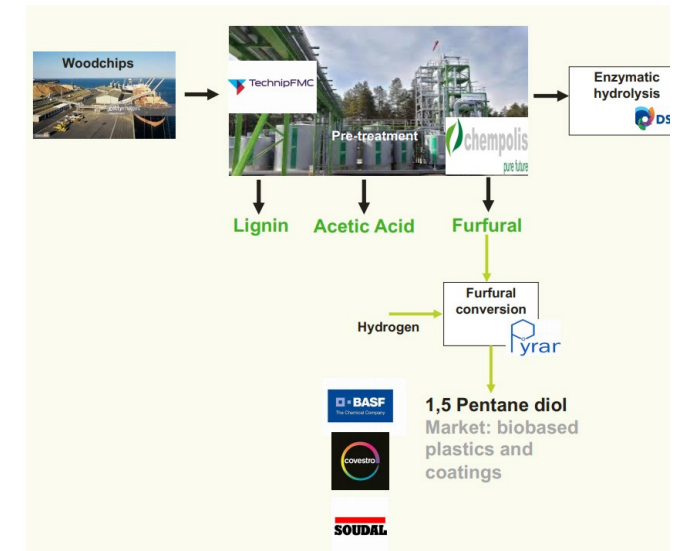
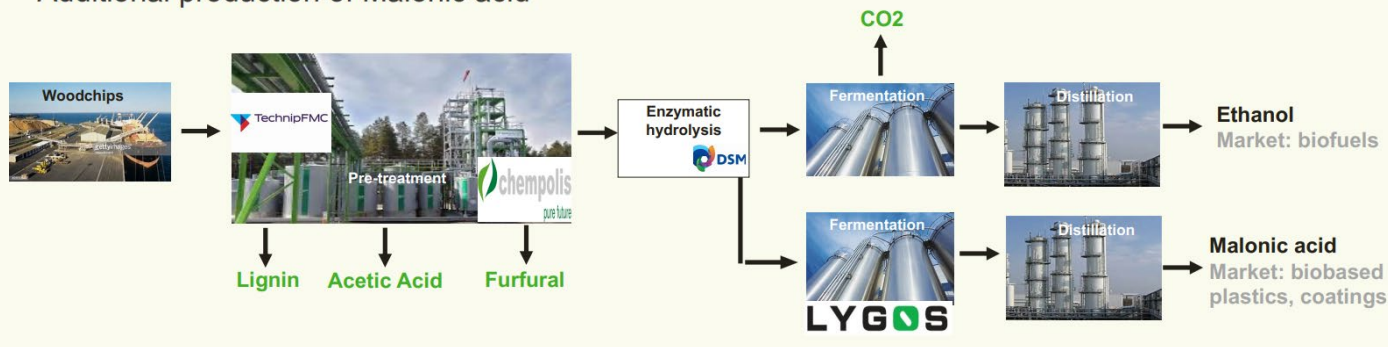
Optimization green chemistry portfolio (1)

Additional production of 1,4 Butane diol (BDO)



Optimization green chemistry portfolio (2)

Additional production of Malonic acid



Source: Henny Zirkzee, Biondoil, webinar PDB, 10-01-2021

Biorefinery Outlook Project

Consortium partners



The project aim is:

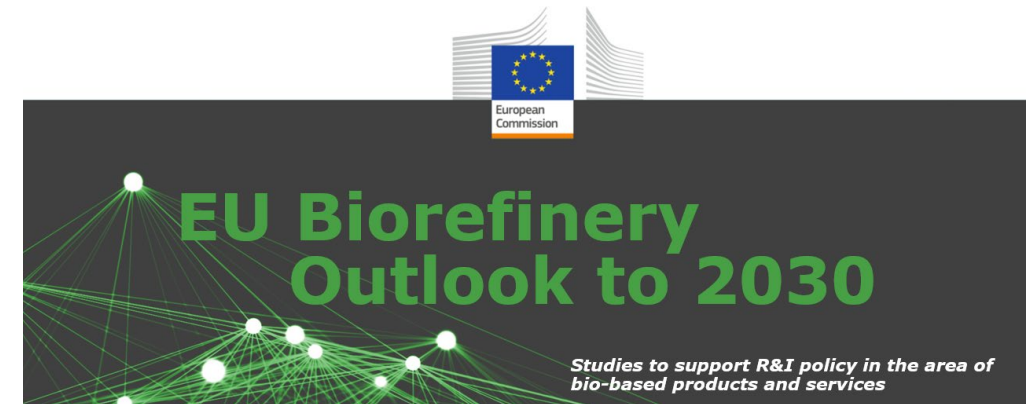
To provide an **outlook for integrated chemical and material biorefineries** enabling **stakeholders** such as the scientific community, industry (primary producers and manufacturers), investors, policymakers, and NGOs to take the present-day **decisions** necessary **to shape the future** sustainable bioeconomy.

The focus of the study is on chemical and material driven biorefineries

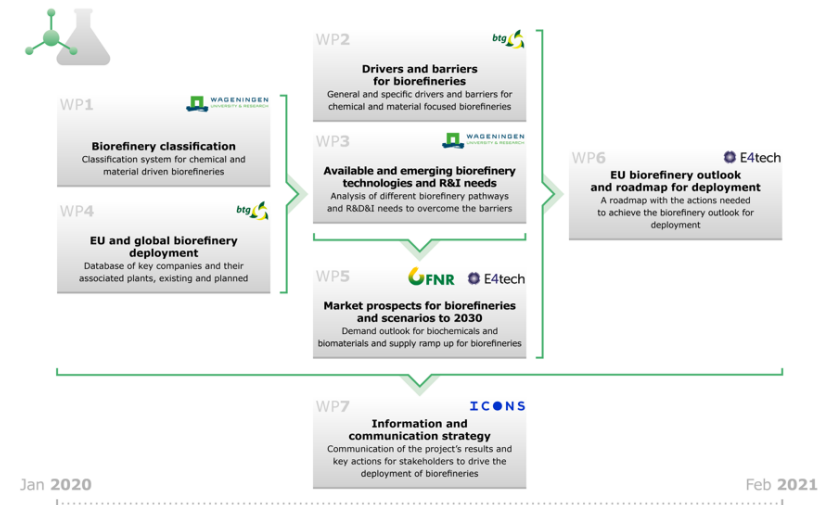
Biorefining can be broadly defined as the sustainable processing of biomass into a portfolio of marketable bio-based products, which could include co-production of food and feed, materials and chemicals and bioenergy (power, heat/cold, fuels)

The **focus** of the current study are **chemical and material driven biorefineries** which include the production of **innovative high value bio-based products**.

....it does not include traditional biobased products (e.g. paper and board) or biofuel focused biorefineries



IEA Bioenergy Task42 definition on biorefining and classification system taken as starting point - further elaborated with focus on chemical and material based biorefineries



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Task 42

Biorefining in a circular economy

www.ieabioenergy.com
<http://task42.ieabioenergy.com>