

BBI Innovation Action LigniOx – Lignin oxidation technology for versatile lignin dispersants

General presentation

This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 745246.

Background – Sustainable products and new business opportunities from lignin

- **Lignocellulosic biorefineries** are looking for opportunities to valorise the lignin by-products in high-value products instead of direct energy production to improve cost-competitiveness.
- **Chemical industry** is looking for sustainable, low cost raw materials for replacement of oil-based products.
- Technically, economically and sustainably viable lignin upgrading process technologies that are adaptable to lignin side-streams originating from different processes and raw materials need to be urgently commercialised.

Lignin is the most important by-product from lignocellulosic biorefineries

LigniOx technology for versatile lignin dispersants

- LigniOx technology based on alkali- O_2 oxidation is cost-efficient and environmentally friendly way to convert lignin into versatile dispersants
- Wide range of application possibilities with high market volumes (over 10 MMT/a)
- LigniOx concrete plasticizers provide:
 - Higher performance compared to lignosulfonate admixtures
 - Comparable performance with synthetic superplasticizers at higher dosage
- Good performance also as gypsum plasticizer and dispersant of various inorganic pigments and fillers (e.g. for paints and coatings)
- Safe and low-cost bulk chemicals (O_2 , NaOH) used, enabling integration into biorefineries



Patents:
 FI20135986, US9676667 (granted)
 WO2015/049424 (pending)
 WO2017/077198 A1 (pending)

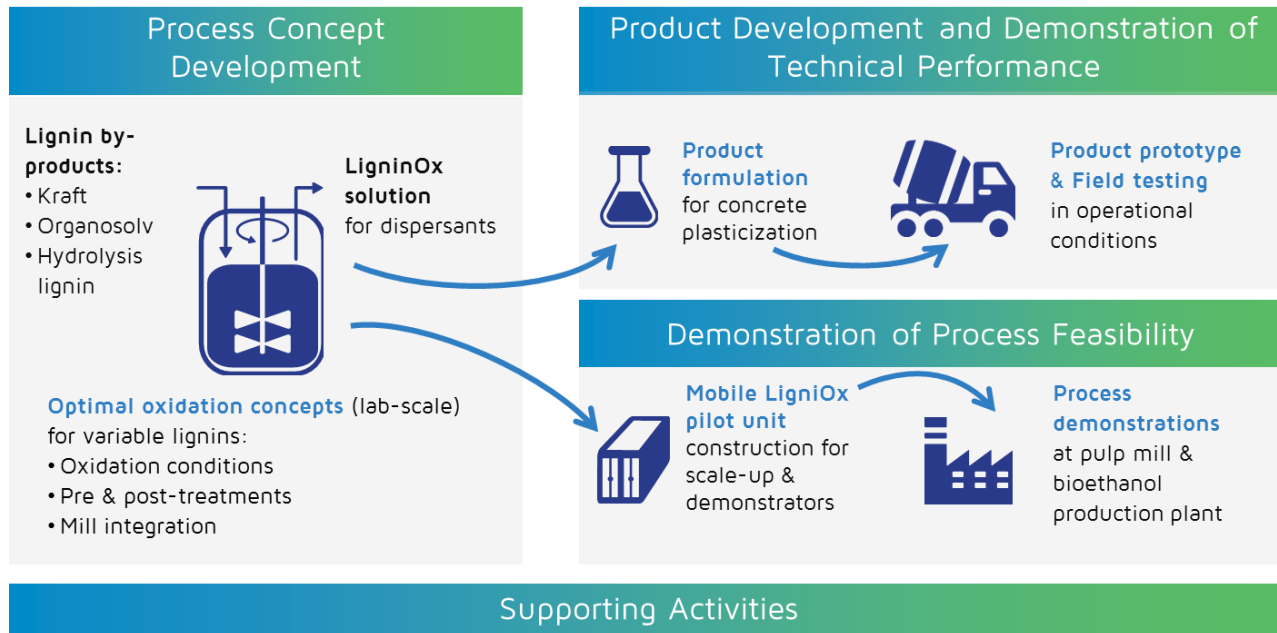
Main objectives of LigniOx

To demonstrate the techno-economic viability of alkali-O₂ oxidation technology (LigniOx) for the conversion of variable lignin-rich side-streams into versatile dispersants, especially high-performance concrete and mortar plasticizers

- Demonstrate both the oxidation technology and the end-product performance at operational conditions
- Enable industrial process installations integrated into the lignocellulosic biorefineries or stand-alone units operated by chemical industry
- Enable market entry of novel lignin based concrete and mortar plasticizers to replace the current synthetic superplasticizers and lignosulphonate products
- Create new business opportunities for the lignocellulosic biorefineries, technology providers and chemical industry



Main activities



Process Modeling & Conceptual Design for Integration



Techno-economy, Business Models & Market up-take



Sustainability Assessment



Socio-economic Assessment & Regulations

Expected results and impacts



AFTER THE PROJECT

Techno-economically viable & environmentally friendly lignin upgrading technology ready for commercial scale installations

1-3 YEARS AFTER THE PROJECT

Sustainable and cost-competitive lignin based high-performance concrete plasticizer on the market

Versatile high-performance LignioX dispersants for wide range of applications

LigniOx Consortium



LigniOx in figures

- **Duration:** 4 years (May 2017– April 2021).
- **Funding:** 4.3 M€ BBI–JU
- **Partners:** 10 partners (5 large companies; 3 SMEs; 2 RTOs).
- **From:** 6 EU member countries (Finland, Germany, UK, Italy, France and Belgium).
- **Programme:** H2020 BBI–2016–D03: Valorization of lignin and other side-streams to increase efficiency of biorefineries and increase sustainability of the whole value chain.
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