

## **A Dutch research institute is looking for technologies to convert biomass waste (lignin) into value-add materials, chemicals or products**

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A Dutch research institute is looking for a technology able to convert lignin into green products or materials that improve the economic performance of biorefineries without worsening the carbon footprint. SMEs or start-ups are sought to participate in an open innovation challenge where the winning solution will be invited to provide a proof of concept of low TRL technologies to be integrated in existing or future lignocellulosic biorefineries. A research and development agreement is envisioned.

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### **Full description**

A Dutch research institute is partner of an international consortium, creating an open innovation platform and network in which large enterprises can set out technical challenges for SMEs and start-ups to propose innovative solutions to. One of these technology challenges concerns the conversion of lignin biomass waste into added value products or chemicals, that increase the economic performance of biorefineries without reducing the carbon footprint.

There are no restrictions on the nature of the solution proposed, but it needs to be consistent with the following process requirements:

- Technology and lignin application to be applied at 50-100 kt lignin/year scale plants
- Technology applicable to lignin from different raw materials (herbaceous, softwood, hardwood)
- Low carbon footprint process (lower than lignin burning for heat and electricity)

Solutions are expected to have been validated in laboratory environment (TRL 4) but may need further development to achieve commercial viability or to full fit with technical requirements. Technology development and scaling can be done on a collaborative basis with terms to be negotiated.

SMEs or start-ups are sought via a research and development cooperation agreement.

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### **Advantages and innovation**

One of the solutions for transport decarbonization is the use of advanced biofuels, including cellulosic ethanol. In biorefineries converting lignocellulosic biomass to ethanol, the cellulose and hemicellulose fraction is converted to ethanol by fermentation. The main by-product is lignin, a fraction of aromatic and rather recalcitrant composition, which is currently valorised into energy for the operation of the process.

Current solutions have important drawbacks: energy valorisation emits GHG. If the biorefinery is integrated into an industrial environment where waste heat and renewable electricity are available, energy recovery may not be the best solution for lignin. As a chemically valuable and complex material, alternatives are sought to convert lignin into green products or materials that improve the economic performance of the biorefinery without worsening the carbon footprint.

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## Technical Specification or Expertise Sought

Expertise is sought in green chemistry or bio-based chemistry to convert lignin to value-add materials. There are no specific restraints on the area of innovation; it could propose alternative:

- Type of product (monomers, complex materials, other chemicals...)
- Technology to be used (biochemical, catalytic, thermal...)
- Type of feedstock (grass, hardwood, softwood with different coumaryl, conyferyl synapyl composition)
- Type of crop (natural preferred, but GMO can be accepted)

Proposed solutions will be assessed on:

- Economic value per ton of product
- Market size of the product
- Current raw materials used for the product
- TRL of the process proposed
- Potential synergies with the current ethanol production
- Integrated carbon, water footprint and energy balance of the plant

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Stage of development

Available for demonstration

Sustainable Development Goals

Goal 13: Climate Action

Goal 15: Life on Land

Goal 12: Responsible Consumption and Production

Goal 9: Industry, Innovation and Infrastructure

Goal 7: Affordable and Clean Energy

IPR status

No IPR applied

## Partner sought

Expected role of the partner

SMEs and start-ups are sought to participate in an open innovation challenge where the winning solution will be invited to provide a proof of concept of low TRL technologies to be integrated in existing or future lignocellulosic biorefineries.

This technology request is part of an innovation challenge and is published on an open innovation platform from 7 March and will close on 19 April. If an organization does express interest, it will be guided through this open innovation platform, where it can engage with the challenge owner and propose a solution. Mind that posts on this platform are not confidential.

Shortlisted proposers will have an opportunity to pitch their proposal directly to the challenge owner, who will then select the SME with whom it would like to cooperate in the development of the solution. Once the challenge is closed, the profile will be closed and EOIs will be replied to.

The partner is expected to propose a solution to the challenge, including a plan for technical and/or commercial development. The winning partner will be invited to

develop their solution together with the challenge owner (and – if required – with the support of a technology centre or centres of their choice). The collaborative project is expected to last up to 6 months; there is no limit to the size of the project but the winning partner will receive €10k to cover costs of the project (plus innovation vouchers to spend on support from the technology centre(s)).

The challenge owner is considering using the winning solution (if feasible and viable) in a future cellulosic ethanol biorefineries (typical size: 50 kt/year ethanol, to be built in the coming 5-10 years) and will consider an appropriate on-going (technical and/or commercial) collaboration with the winning partner.

#### Type of Partnership

Research and development cooperation agreement

#### Type and size of the partner

SME 50 - 249

SME 11-49

SME <=10

## Dissemination

#### Market keywords - (up to 5)

06003009 - Biomass and Biofuels

08001019 - Speciality/performance chemicals

08001023 - Other chemicals and materials (not elsewhere classified)

#### Technology keywords - (up to 5)

02007020 - Biobased materials

06002001 - Biochemistry / Biophysics

#### Targeted countries

All countries