EERA
European Energy Research Alliance
BIOENERGY

SP2 Thermochemical Processing

Activities overview

Webinar Boosting the R&D&I collaboration with Eastern European countries
9th June 2021

Jaap Kiel (TNO)
SPC Thermochemical Processing

SP2: Thermochemical processing of biomass into advanced biofuels and bio-based products

To increase the efficiency, sustainability and cost-competitive production of advanced biofuels and bioenergy carriers from biomass through thermochemical processing.

RA 1 & Research Priorities	RA 2 & Research Priorities	RA 3 & Research Priorities

SP2

MC 1: To develop advanced liquid and gaseous biofuels through thermochemical processing of sustainable biomass with improved net process efficiency, reduced costs and higher GHG savings

MC 2: To develop solid, liquid and gaseous intermediate bioenergy carriers through thermochemical conversion from sustainable biomass, with improved net process efficiency, reduced costs and high GHG savings

The two main challenges of SP2 are addressed through cross-cutting Research Areas and Research Priorities

Main directions in thermochemical biofuels processing R&D

- Process simplification and intensification
  - Significant cost dimension (CAPEX, OPEX and plant availability, reliability and higher net plant efficiency)
  - Consider smaller scale? (easier financing, more integration options, use of local biomass)
- Increasing feedstock flexibility and allowing application of (cheaper) biomass low-quality feedstock
  - Mainly aiming at cost reduction
- Co-production of chemicals/materials
  - Energy-driven biorefinery; to boost the business case for energy products (with higher added value for chemicals/materials)
- Combining thermochemical and biochemical processing
  - E.g. , thermochemical conversion of residues of biochemical processing (e.g., lignin gasification), biochemical product gas cleaning, syngas fermentation
- Maximizing resource efficiency
  - E.g. by combining biomass processing with other sources like renewable hydrogen produced from solar and wind
- Creating negative GHG emissions
  - Involving concepts like BioEnergy + Carbon Capture & Storage (BECCS) and biochar co-production
- Coupling with other industrial activities (sector coupling)
  - Industrial symbiosis, e.g. exchange of utilities and residues/feedstock, heat integration

SP2: Thermochemical processing of biomass into advanced biofuels and bio-based products

SP 2: TERMOCHEMICAL PLATFORM

Research Areas

Primary thermochemical conversion processes	Downstream processing (product cleaning, conditioning and upgrading)	Value chain design (integral pathways for biomass conversion into biofuels and intermediate bioenergy carriers)
Gasification	Gas cleaning processes	Gasification-based production of advanced biofuels
Pyrolysis (gast and slow)	Conditioning and upgrading of clean gas and product recovery	Pyrolysis-based production of pyrolysis oil and advanced biofuels
Torrefaction (and steam treatment/seam explosion)	Cleaning, conditioning and upgrading of biocrude	Heat/steam-treatment based production of solid bioenergy carriers
Hydrothermal processing (HTC, HTL, HTG)	Solid product conditioning and upgrading	Advanced biofuels and intermediate bioenergy carrier production based on hydrothermal processing

Research Priorities

SP2 main activities

- (EU) Agenda setting activities, e.g.:
  - Strategic Research & Innovation Agenda (SRIA)
  - European Common Research and Innovation Agenda (ECRIA) as part of H2020 project AMBITION
- Collaborative (EU R&D) project generation
  - Workshops/webinars dedicated to specific EU calls (Horizon Europe, BBI, …)
- Workshops/webinars
  - Dedicated (joint) subtopic-oriented workshops
  - Workshops focused on cross-cutting research themes (organised jointly with other SPs)
- Communication
  - EERA Bioenergy website
  - EERA Bioenergy meetings (networking, e.g. Steering Committee meetings)
- Alignment with, input to other relevant stakeholder organisations (e.g. ETIP bioenergy)

SP2 Actions – workshops, webinars (examples)

- Dedicated (joint) subtopic oriented workshops
  - Joint Ambition-EERA Bioenergy ECRIA workshop on June 28th, aim for continued alignment concerning ECRIA development
  - Joint Ambition-BRISK2-EERA Bioenergy workshop "Early stage techno-economic assessment" on September 17th

A European Common Research Agenda for Alternative renewable fuels, Energy storage and Sector coupling – for a future-ready Europe

Brussels – June 28th 2019

Ambition/BRISK2 and EERA Bioenergy Workshop

Early Stage Techno-economic Assessment

September 17, 2019 at Aston University

European Bioenergy Research Institute, Meeting room 145
Aston University, B4, 7ET Aston Triangle,

09:00 – 09:15 Welcome (Anthony V. Bridgwater, Bernd Wittgens)

09:15 - 10:00 Capital cost estimate of novel processes (Anthony V. Bridgwater)

10:00 - 12:30 **Do we need new tools?** (Introduction: Nicolaus Dahmen)
Workshop on methodologies for tools on early stage assessment regarding indicators, sources and treatment of unerctainties in terms of capital & operational costs as well as market expectations.

12:30 - 13:00 Presentation of the new EERA JP Bioenergy sub-program on Sustainability/ Techno-Economic Analysis/Public Acceptance (R.V. D´Oliveira Bouman)

13:00 - 14:00 Networking Lunch

14:00 – 16:00 **What can we learn from case studies?**
Presentation and critical discussion of case studies on biorefinery technologies from AMITION, BRISK2 and other projects in parallel sessions

Introduction to the case studies session (Nicolaus Dahmen)

Session A:
A1: Meta-study on TEA on the bioliq process
(Nicolaus Dahmen, IKFT, KIT)
A2: Experience from TEA of fermentations in the AMBITION project

Session B:
B1: Ambition findings on lignocellulose pre-treatment by organosolv process
(Francisco Girio, LNEG)
B2: Techno-economic evaluation of a lignocellulose biorefinery
(Andreas Rudi, IIP, KIT)

16:00 - 16:15 Wrap-up of the meeting presenting workshop and case study results and concluding on research demand and improvement of methodology

Collaborative Project Generation (H2020)

Internal workshops (restricted to EERA Bioenergy members)

6 internal webinars organised by each SP to work on collaborative project generation:

- SP4 and SP2 webinar for project ideas on the call **LC-SC3-RES-16-2019:** Development of solutions based on renewable sources that provide flexibility to the energy system (*March*) → *11 ideas from 11 participating entities*

- SP4 webinar for project ideas on the call **LC-SC3-EE-1-2019-2020**: Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for buildings renovation (IA) (*March*) → *5 ideas from 5 participating entities*

- SP2 and SP3 webinar for project ideas on the call **LC-SC3-RES-23-2019**: Development of next generation biofuel and alternative renewable fuel technologies for aviation and shipping (*April*) → *13 ideas from 10 participating entities*

- SP2 and SP3 webinar for project ideas on the call **LC-SC3-RES-16-2019**: Development of solutions based on renewable sources that provide flexibility to the energy system (*May*) → *7 ideas from 7 participating entities*

- SP2 and SP3 webinar for project ideas on the call **LC-SC3-RES-27-2020**: Demonstration of advanced biofuels production from aquatic biomass (*July*) → *7 ideas from 7 participating entities*

- EERA Bioenergy (all SPSs) joint webinar for project ideas on the call **LC-SC3-RES-36-2020**: International cooperation with Canada on advanced biofuels and bioenergy (*October*) → *18 ideas from 14 participating entities*

Collaborative Project Generation (HEU)

Internal workshops (restricted to EERA Bioenergy members)

Recent webinars on first HEU calls (with SP2 relevance):

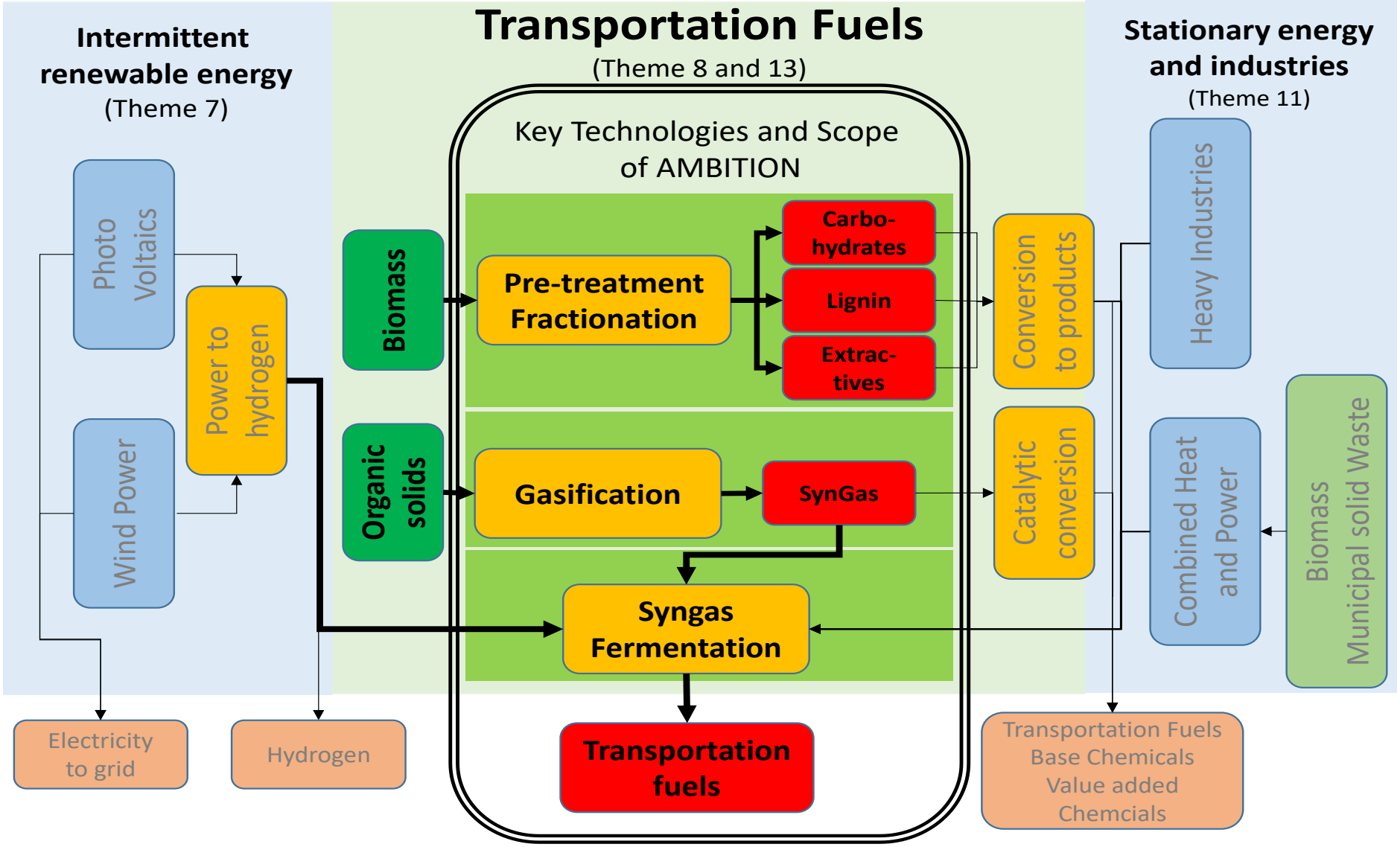
- **CL5-2021-D3-02-03:** Hybrid catalytic conversion of renewable energy to carbon-neutral fuels
  → *Ideas from 15 participating entities*

- **CL5-2021-D3-02-09**: Carbon-negative sustainable biofuel production
  → *Ideas from 21 participating entities*

- **CL5-2021-D3-02-16:** Innovative biomethane production as an energy carrier and a fuel
  → *Ideas from 21 participating entities*

AMBITION Approach

Advanced biofuel production with energy system integration



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AMBITION – Partners

SINTEF

Aston University

DTU Danmarks Tekniske Universitet

TNO

KIT Karlsruhe Institute of Technology

LNEG

ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development

CENER NATIONAL RENEWABLE ENERGY CENTRE

ADItech

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AMBITION

THANK YOU FOR YOUR ATTENTION

jaap.kiel@tno.nl

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