Borderless opportunities

EUROPEAN UNION
European Regional Development Fund

HIGHBIO2 2011-2013
Biomass to Energy and Chemicals

Gränslösa möjligheter
EUROPEISKA UNIONEN
Europeiska regionala utvecklingsfonden
INTERREG IV|A|NORD

BIOMASS TO ENERGY AND CHEMICALS

HighBio2

(2011-2013)

UNIVERSITY OF JYVÄSKYLÄ
KOKKOLA UNIVERSITY CONSORTIUM CHYDENIUS

UNIVERSITY of OULU
OULUN YLIOPISTO

CENTRIA
RESEARCH & DEVELOPMENT

LULEÅ UNIVERSITY OF TECHNOLOGY

CENTRAL OSTROBOTHNIA UNIVERSITY OF APPLIED SCIENCES

Overview

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Biomass to Energy and Chemicals

- The project is co-financed by the EU Interreg IV A North Program
- The budget of the project is approx. 1.2 M€
- From June 2011 to December 2013

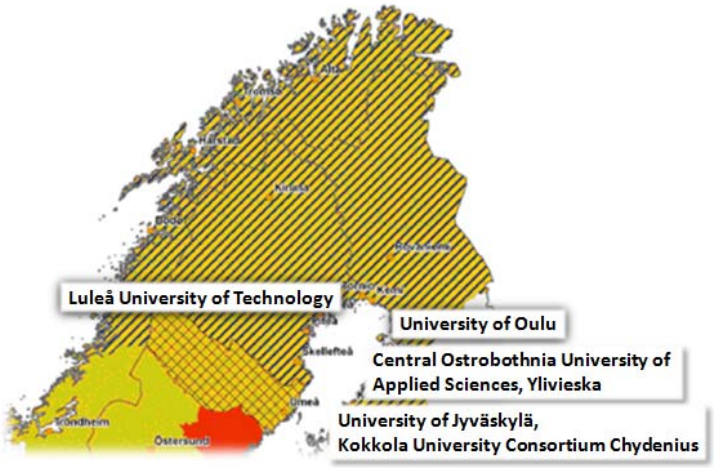
Persons:

Project coordinator:

- Bodil Wikman (Chydenius)

Persons responsible:

- Prof. Ulla Lassi (Chydenius, OY)
- Prof. Jukka Konttinen (JY)
- Ass. Prof. Xiaoyan Ji (LTU)
- Lic. Sc. Kari Pieniniemi (Centria)



Aims of the project

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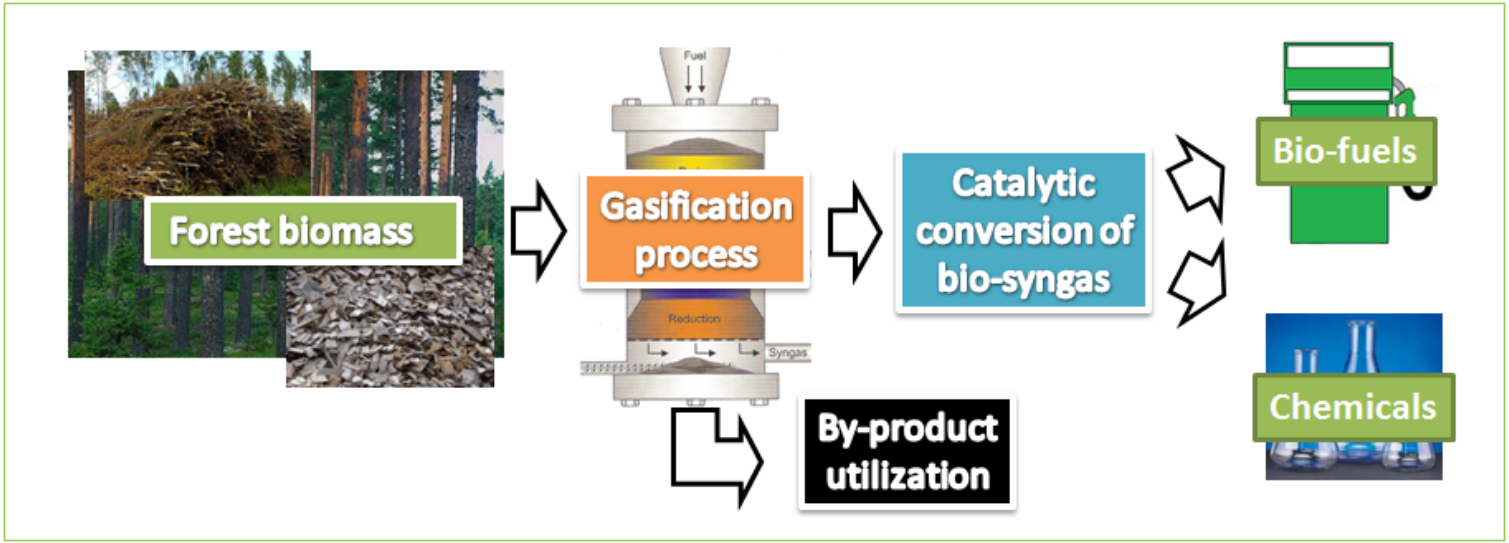
- Based on distributed energy production model
- Utilization of renewable forest biomass
- Development of the gasification process
  - Optimization of gasification process
  - Purification of product gas (syngas)
- Production of biomass-based end products (fuels and chemicals)
- Utilization of by-products of gasification (CO_2, bioash)



Aims of the project

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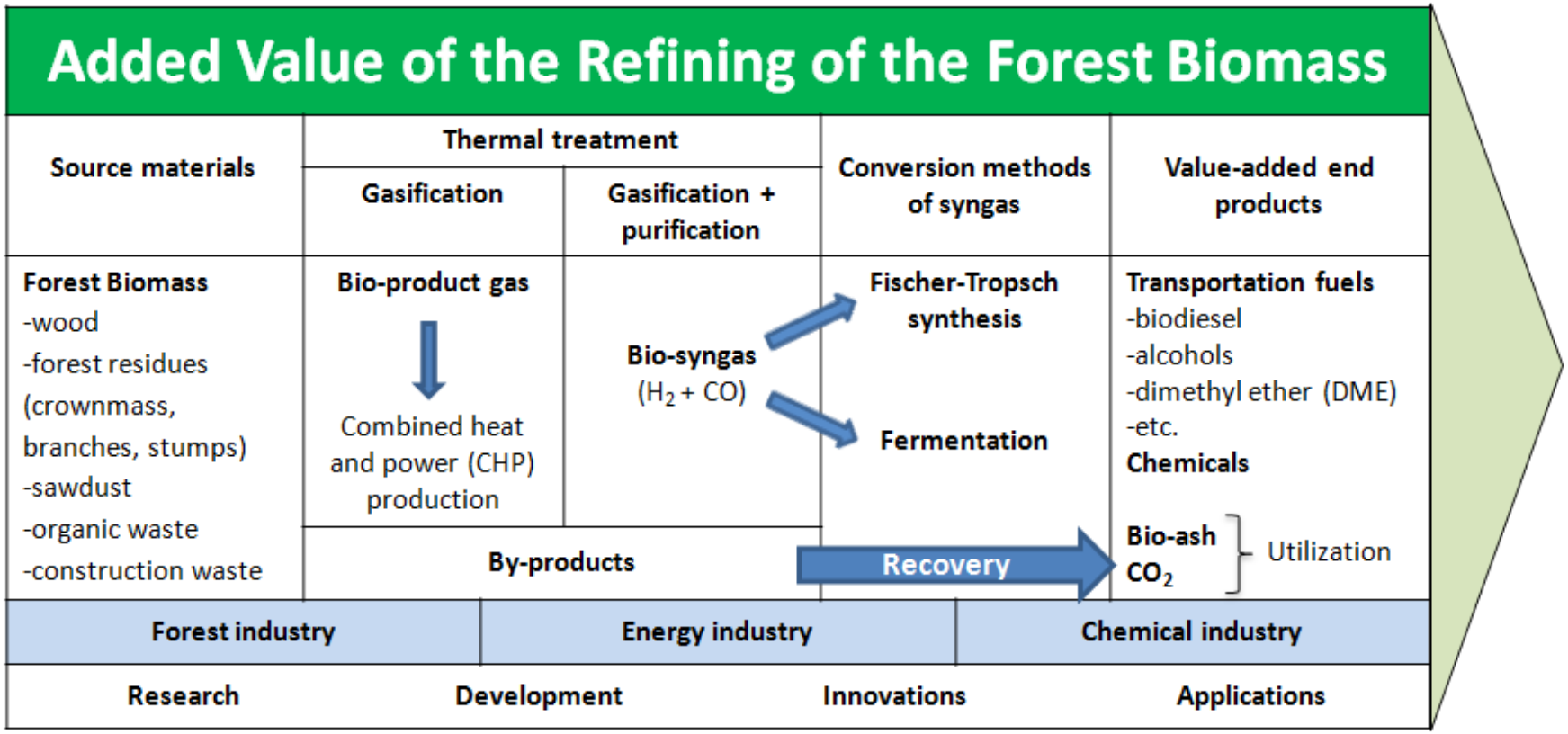

Research activities

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- **WP1 – Optimization of the gasification process**
- **WP2 – Purification of syngas**
- **WP3 – Utilization of purified syngas and gasification by-products**
- **WP4 –Information distribution**

Expertise of partners

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- Centria: Small scale gasification for combined heat and power production (gasifier pilot plant)
- University of Jyväskylä: Mathematic models for gasification
- LTU: Recovery of CO_2, Simulation programmes (Aspen Plus)
- Chydenius: Catalytic conversion of biomass-based syngas, analysis of tar compounds
- University of Oulu: Characterization of by-products

WP1

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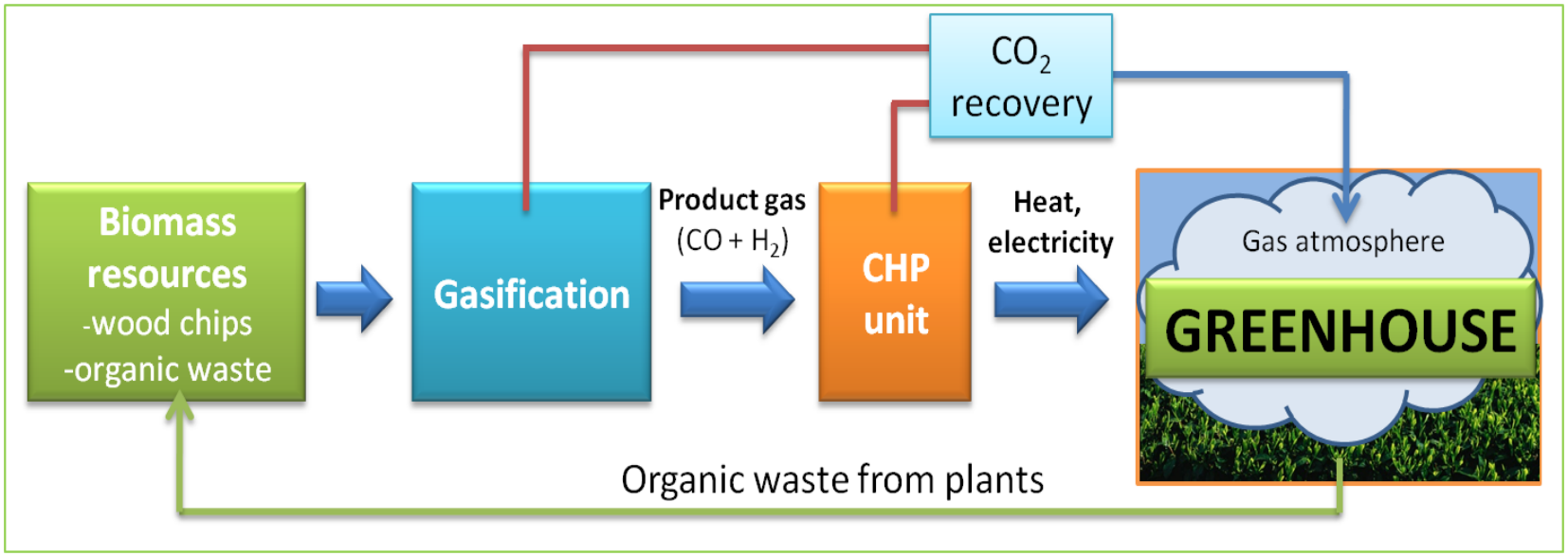
- **Optimization of the gasification process**
  - Improved control of the gasification process
    - temperature, source material, feed rate, etc.
  - Analysis of syngas quality
    - On-line monitoring of gases
    - Tar collection and analysis
  - Evaluation of material and energy balances
  - Experimental data
  - Mathematical models

WP2

- **Purification of syngas**
  - Analysis of syngas and impurities
    - syngas consists primarily of hydrogen (H_2) and carbon monoxide (CO)
    - impurities: particles, metals, halogens, hydrocarbons (tars), etc.
    - even low amounts of impurities may have unfavourable effects e.g. for catalysts
  - Improved purification process
    - scrubbers, fixed-bed adsorbents, catalytic cracking
  - Tar (sampling and) analysis
  - Recovery of CO_2
    - economical reasons
    - amines, ionic liquids

Greenhouse 2011-2013

Possibilities - Example of energy and material integration in the greenhouse



WP3

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- **Utilization of purified syngas and gasification by-products**
  - Production of value-added products
  - Fischer-Tropsch synthesis
    - a catalytic reaction that converts syngas into hydrocarbons
    - selective and active catalysts based of Co and Fe
    - end products: synthetic diesel, other hydrocarbons
  - Optimization of reaction conditions
    - temperature, pressure, gas flow
  - Other catalytic routes
    - mixed alcohol synthesis
    - higher alcohols (e.g. butanol)
  - Utilization of by-products
    - CO_2, bioash

WP4

- **Information distribution**
  - National and international information distribution
  - INFO sheets in HighBio web page
  - Scientific publications
  - Seminars

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Thank You!

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LAPIN LIITTO

KOSEK

KAUSTISEN seutukunta

NIHAK

YLIVIESKAN SEUTUKUNTA

More information:
www.chydenius.fi/yksikot/soveltava-kemia