Pulp and paper industry waste to fuel

PULP & FUEL

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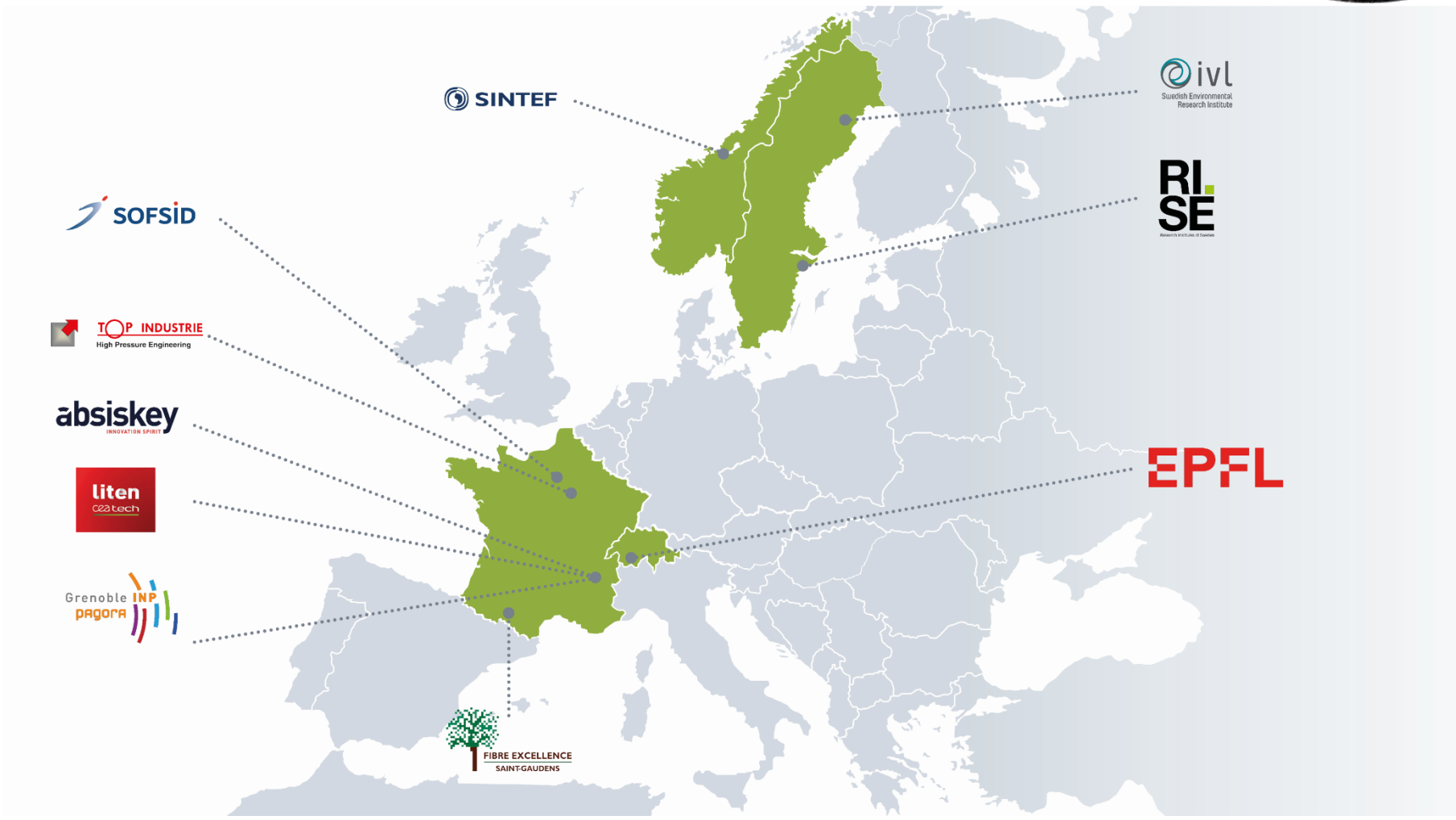
PROJECT IDENTITY

- **Funded by the EU H2020 under the call** LC-SC3-RES-21-2018 - Development of next generation biofuels and alternative renewable fuel technologies for road transport (02/2018)
- **10 Partners** from 4 countries
- **Project duration :** October 2018 - September 2022
- **Budget :** 4.9 M€
- **Coordinator** CEA - Geert HAARLEMMER

FROM RESEARCH TO INDUSTRY
cea

PARTNERS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BACKGROUND - CHALLENGES BIOFUELS

Biofuels promising but :

- Limitations in biomass availability
  - Quality issues
  - Wastes complex and diffuse
  - Residues

- Technological pathways to biofuels
  - Direct conversion (Pyrolysis and HTL) and upgrading
  - Gasification and synthesis
  - Biotechnology
  - Always complex

- Potential operators
  - Waste operators
  - Refiners
  - Pulp and Paper industry →

TECHNOLOGICAL APPROACH & EXPECTED IMPACTS

- **Integration** of **gasification** & **fuel synthesis** technologies into the **pulp industry**
- Show how biofuels can be a **side product of the paper industry** => **synergy** with the **existing process**
- Show how with modern technologies the paper industry can deliver **2nd generation biofuels** at a **competitive cost**
- Prepare the ground for a **demonstration plant**

5 AMBITIOUS SPECIFIC OBJECTIVES

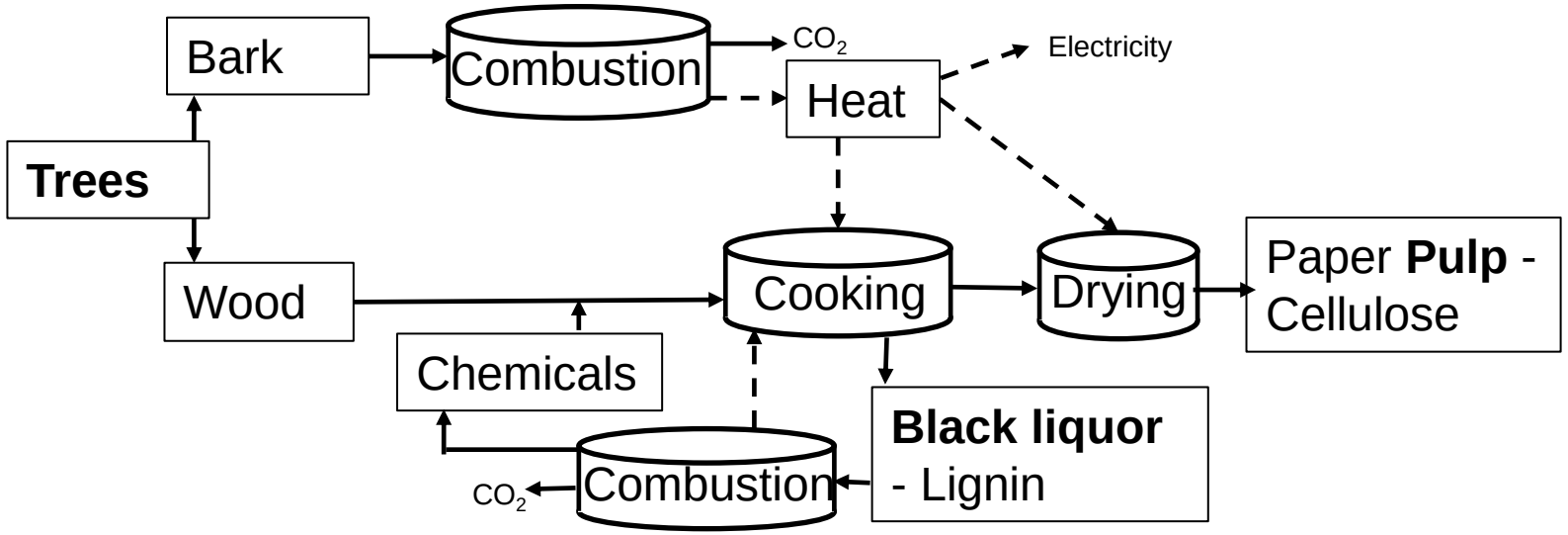
- OBJ1: Improve the **efficiency** of the **dry gasification** process from **70** to **80** %
- OBJ2: Improve the **carbon conversion** of the **wet gasification** process to above **90** %
- OBJ3: Improve fuel synthesis to obtain **carbon efficiencies above 50 %** (state of the art 45%)
  - Reduce CO_2 emissions fuel to 0.37 kg/L
  - Production 5 L biodiesel
- OBJ4: **Integration** of the **full process** and **synergy** between dry and wet gasification
- OBJ5: Show that **biofuels** can be produced **under 1 €/L**

PULP & PAPER INDUSTRY EXISTING PROCESS FOR WASTES VALORIZATION

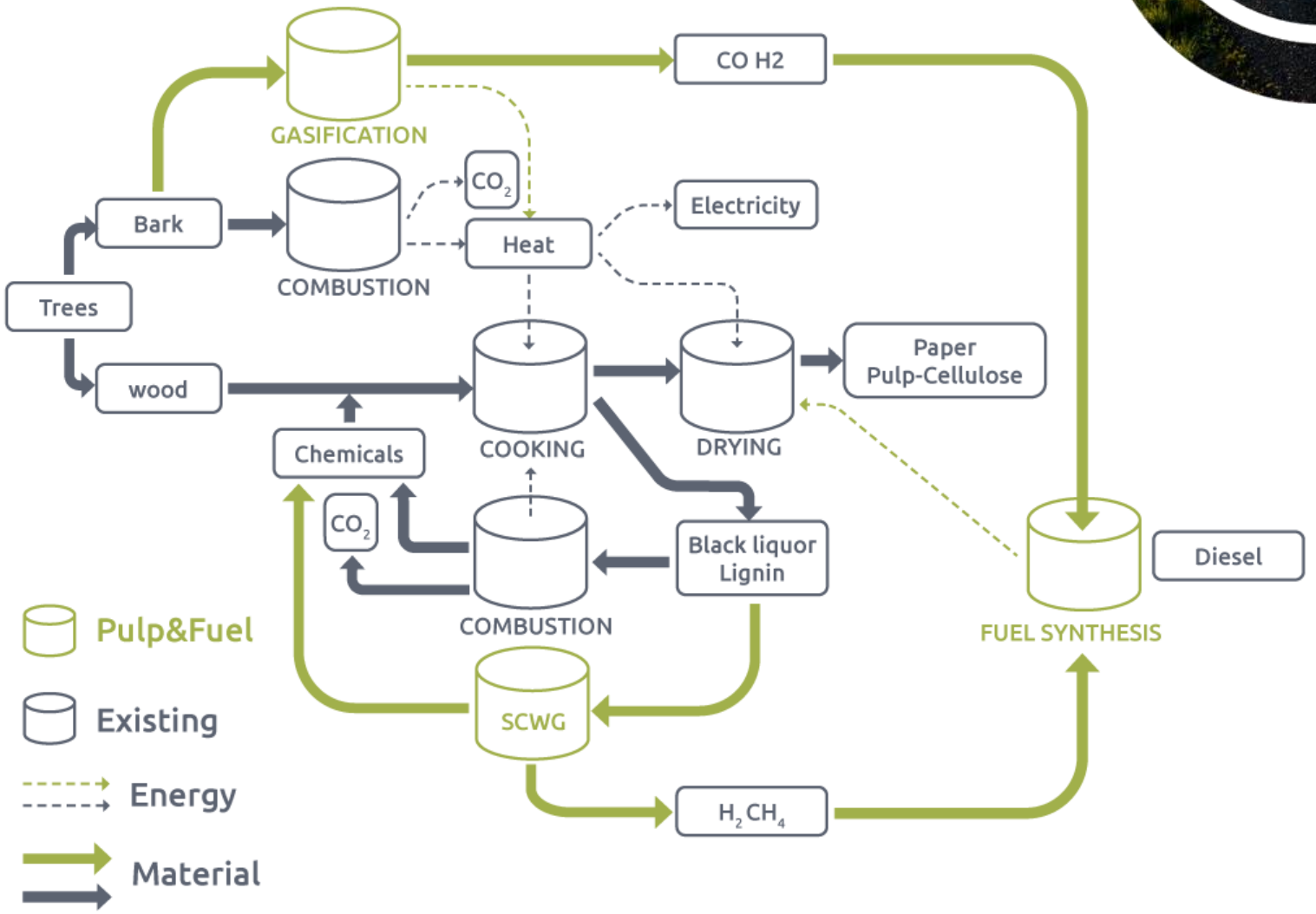
Pulp and Paper Industry:

- Manipulates large amounts of biomass
- Generates large residue streams (black liquor, bark, sludge, rejects from recycling)
- Heat in excess

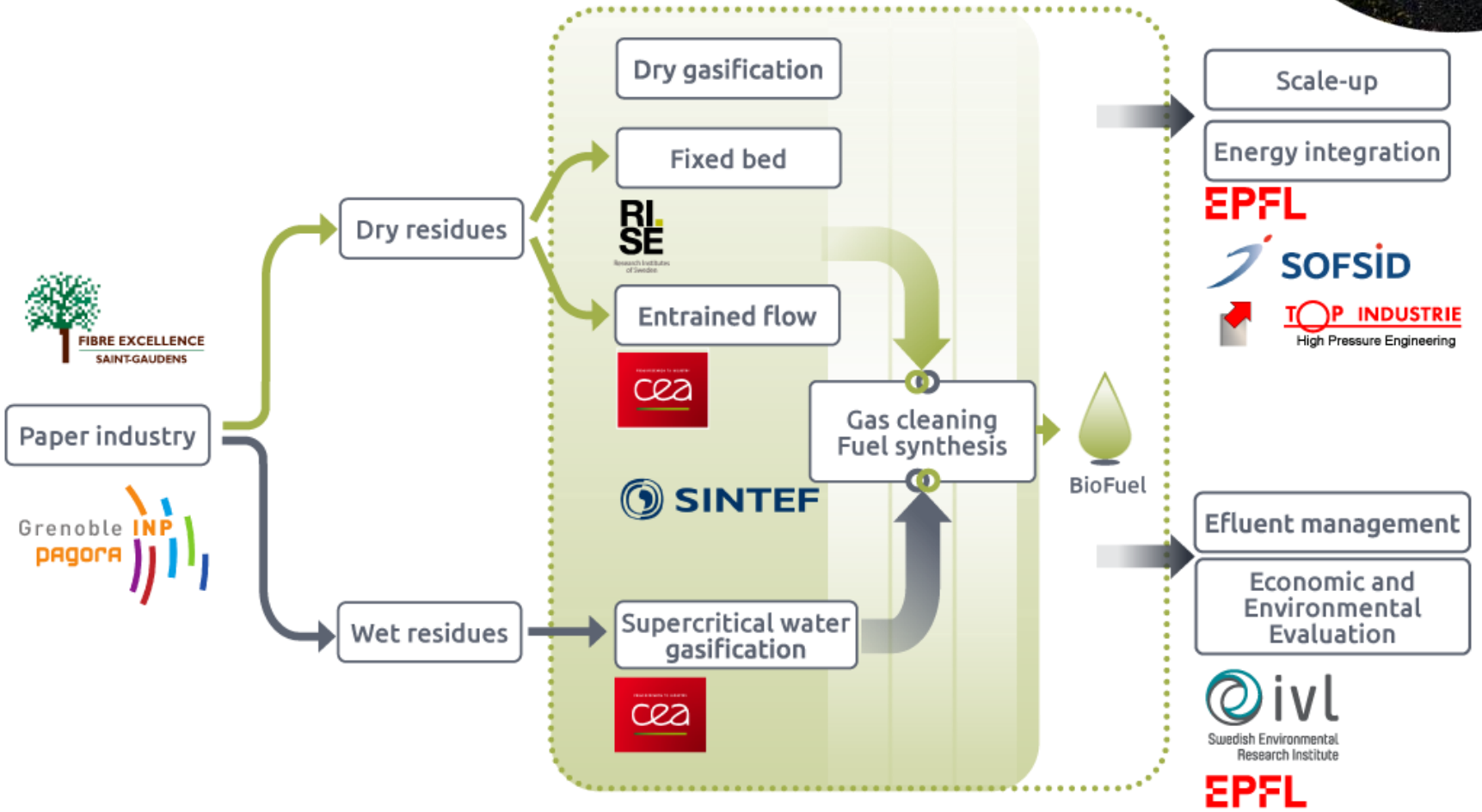
Existing valorization:



THE PULP & FUEL CONCEPT



WORK DISTRIBUTION



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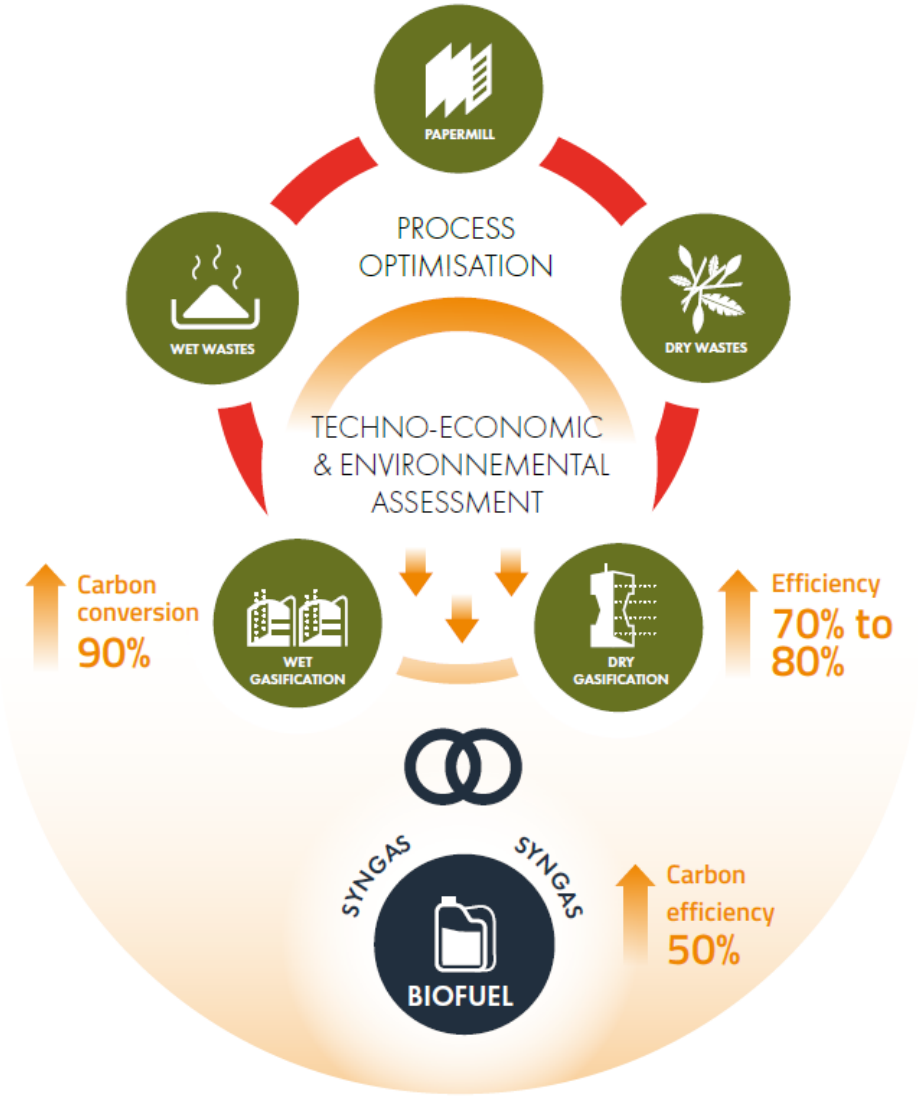
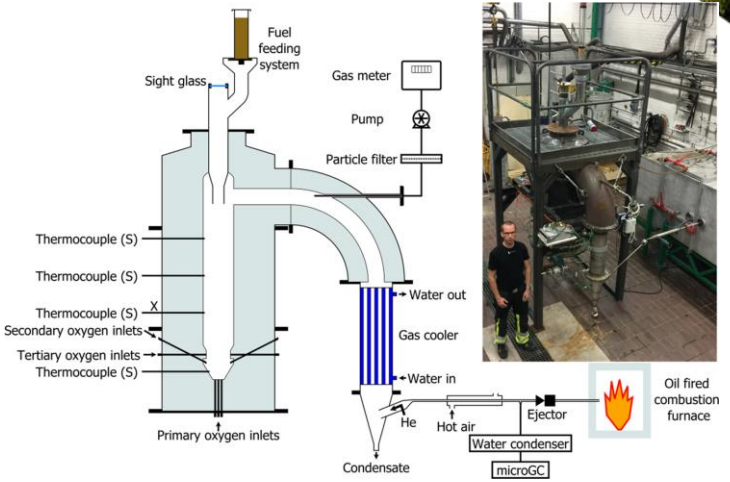
CONCEPT & PROCESS SCHEME



DEVELOPED TECHNOLOGIES (1/4)

Gasification dry resources

- Fixed bed gasification
  - Work on more complicated new resources, bark
  - Ash Management

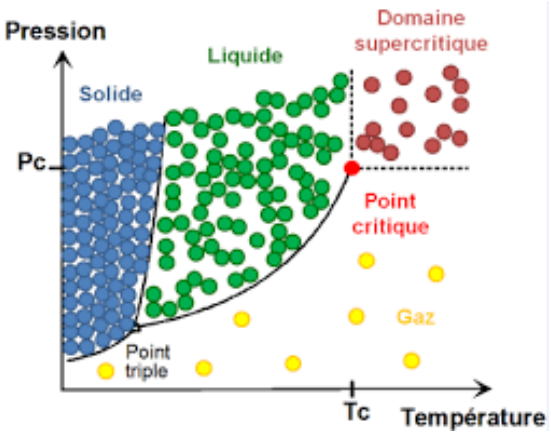


- Entrained flow gasification
  - Injection of complex resources, bark and paper recycling waste

DEVELOPED TECHNOLOGIES (2/4)

Gasification wet resources

- Supercritical Water Gasification
  - In water
  - 300 bar
  - 700 °C



- Wet resources
  - Black Liquor
  - Deinking sludge

DEVELOPED TECHNOLOGIES (3/4)

Gas cleaning and Fuel Synthesis

- Development of gas cleaning adapted to capacity pulp plant.
  - Chemical looping

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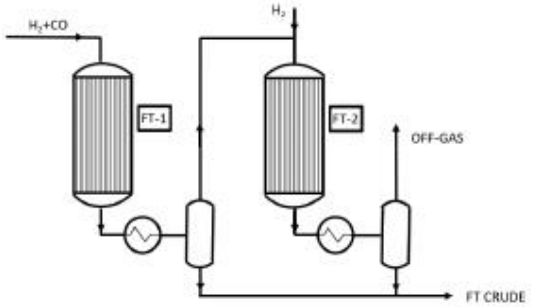
- Innovative concepts Fischer-Tropsch fuel synthesis
  - Exploiting the different quality synthesis gas streams.
  - Staged Fischer-Tropsch.
  - Adapted catalyst.



DEVELOPED TECHNOLOGIES (4/4)

Process design

- Full material and energy integration fuel synthesis with pulp plant.
- Show that there are no negative environmental impacts

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THANK YOU FOR YOUR ATTENTION!