

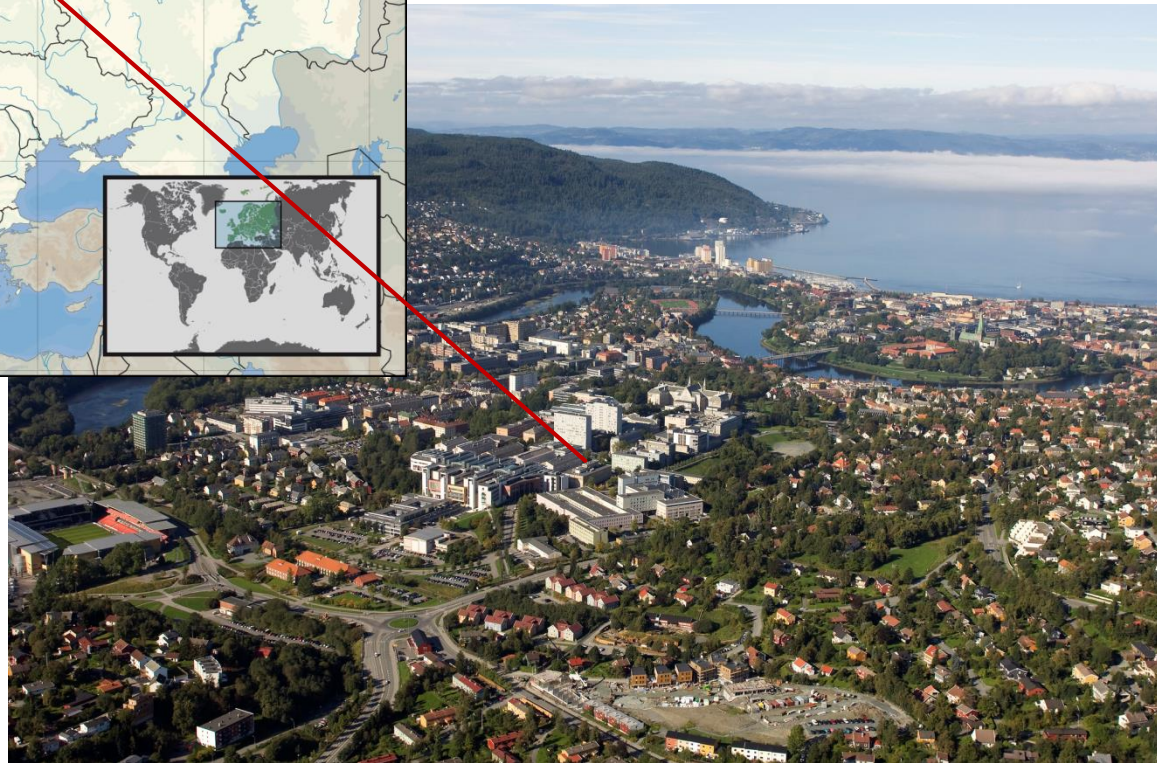
# SINTEF

Background for interest in BTL R&D and role in

LCE-22 call

**Torbjørn Gjervan**  
Research Manager



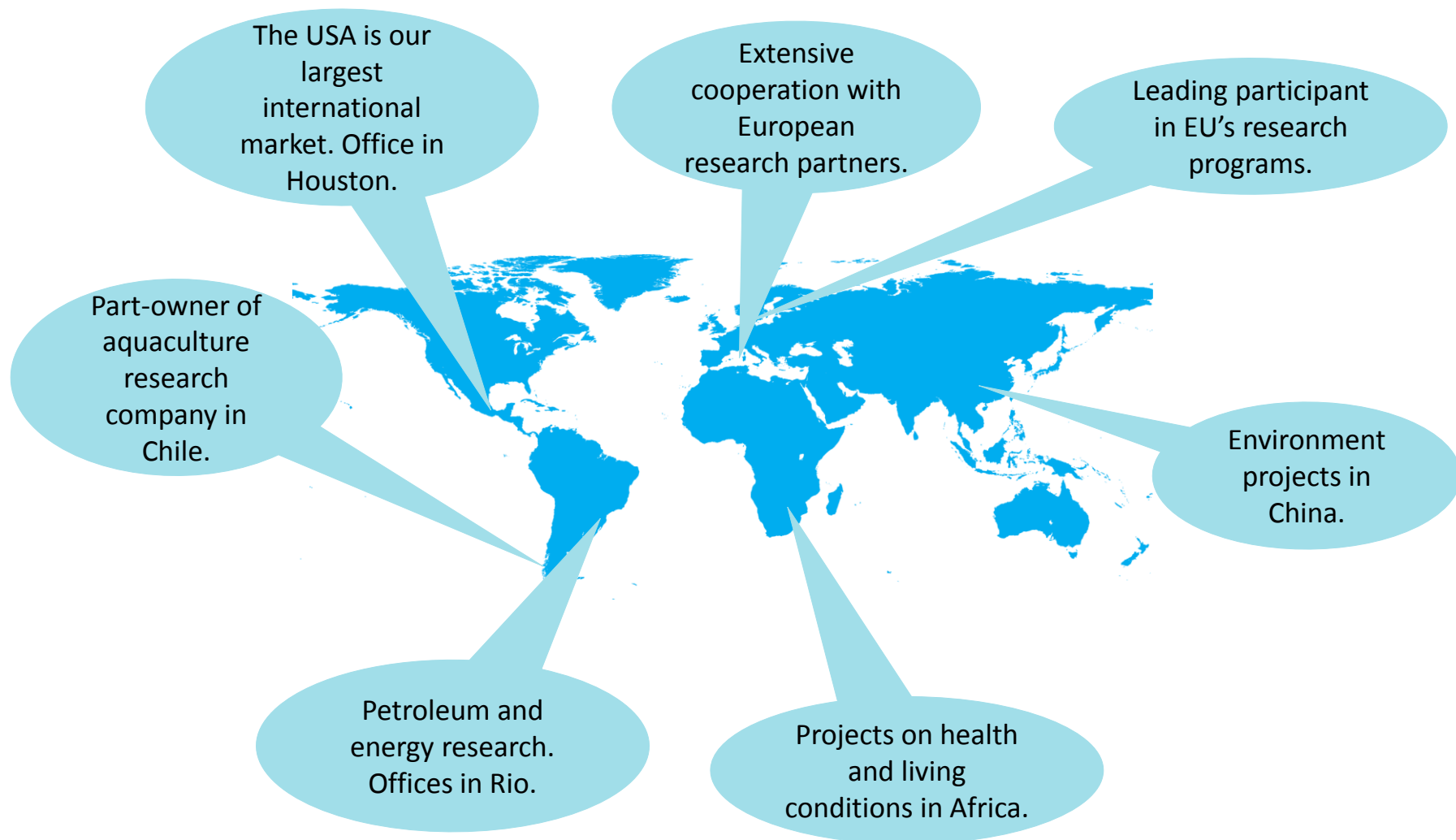


**KinCat**   
Catalysis Group – SINTEF – NTNU

# We are among Europe's largest contract research organisations



# We sell research to customers all over the world

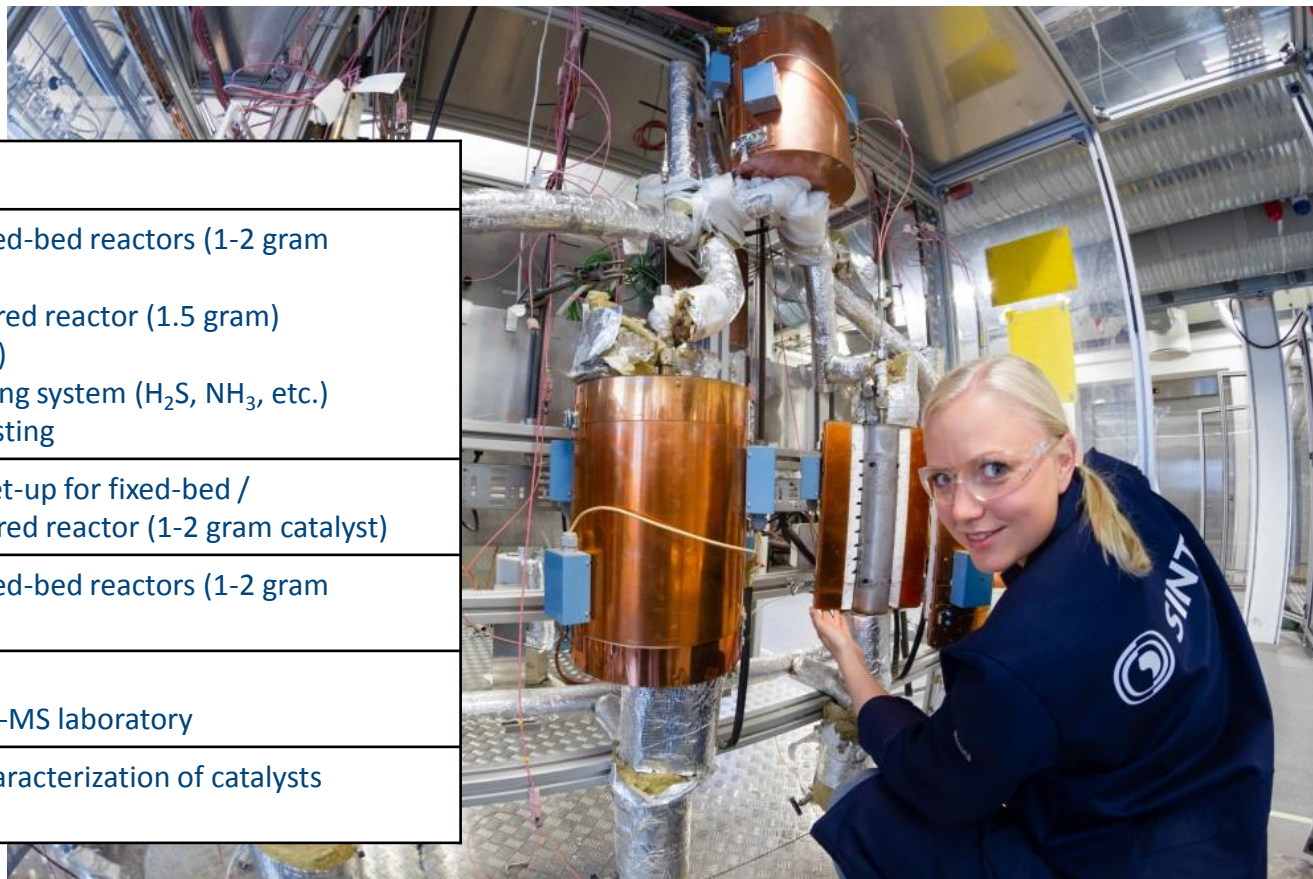


# Some national and international collaboration GTL/GTC

- > 20 years experience within GTL together with Statoil and University in Trondheim (NTNU)
- Centre for Research Based Innovation (CRI)
  - Industry: Statoil, Borealis, INEOS, Haldor Topsoe, Yara, Dynea
  - Research Institutes: University of Oslo (UiO), Norwegian University of Science and Technology (NTNU), SINTEF
- Gemini centres (formalised collaboration with Norwegian Universities and SINTEF)
- > 10 years experience in the application of microstructured/compact reactors together with University of Trondheim and Karlsruhe Institute of Technology
- EU projects and European networks
- National and international oil and petrochemical companies



# Infrastructure



Equipment	Description
4 x Reactors unit	4 parallell fixed-bed reactors (1-2 gram catalyst) Microstructured reactor (1.5 gram) CSTR (100 ml) Flexible feeding system (H <sub>2</sub> S, NH <sub>3</sub> , etc.) Long term testing
1x Reactor unit	Switchable set-up for fixed-bed / Mikrostructured reactor (1-2 gram catalyst)
2x Reactor unit	2 parallell fixed-bed reactors (1-2 gram catalyst)
Analytical capabilities	On-line GCs Advanced GC-MS laboratory
TPR, Chemisorption, XRD, TEM, ...	Advanced characterization of catalysts

# SINTEF Materials and Chemistry – EU experience

- SINTEF is one of the top 20 research organizations in the European Framework Programs (FP) with more than 203 projects between 2007 and 2013.
- **FP7 and related programmes portfolio for SINTEF MC (2007-2013):**
  - Participant in 80 projects, 20 as coordinator
  - 25 projects in NMP, 6 as coordinator
  - 12 FCH JU projects, 6 as coordinator
  - 18 ENERGY projects, 5 as coordinator
  - 7 ERA-Net projects, 2 as coordinator
- **SINTEF MC Horizon 2020 project acquisition:**
  - 12 new coordinator projects in the 2014 and 2015 calls:
    - 6 in Horizon 2020 (2 SPIRE, 1 FoF, 3 NMBP )
  - High success rate as coordinator in competitive programmes
    - 34 % success rate in Horizon 2020 and related programmes for 2014-2015
    - 50% success rate in the Competitive industries pillar (FoF, SPIRE, NMP, Pilots)



# Recent relevant EU projects

## BRISK (EU FP7) 2011 - 2015

- **Tasks:** Transnational Access to research infrastructure for thermochemical conversion of biomass
- **Objective:** Fund researchers to carry out research any of the (26) partners
- **SINTEF's role:** Infrastructure for catalytic gas conditioning and cleaning, hydrotreatment

## CARENA (EU FP7) 2011 - 2015

- **Tasks:** Process intensification,
- **Objective:** Activation of light alkanes and CO<sub>2</sub>
- **SINTEF's role:** Membrane, Catalyst synthesis

## FASTCARD (EU FP7) 2014 - 2018

- **Tasks:** Catalyst development for gasification and pyrolysis (liquid) value chain
- **Objective:** To speed up catalyst development
- **SINTEF's role:** Coordinator, catalyst development



# Recent GTL projects

## Remote Gas (2005 – 2009)

- **Task:** Reactor and catalyst development for MeOH
- **Objective:** Offshore MeOH synthesis
- **Partners:** Statoil, UOP, Aker Solutions, DNV, Bayerngas, Norwegian research council

## Research project – microstructured reactors (2011 – 2014)

- **Task:** Reactor and catalyst development for DME and FTS
- **Objective:** Increased knowledge on microstructured reactor technology for production of liquid fuels from natural gas
- **Client:** Norwegian research council

## Catalyst development for SBCR reactor (2007 – 2015)

- **Task:** Catalyst testing and screening, process optimization
- **Objective:** Improved FTS catalysts
- **Client:** Norwegian research council, Statoil

# Recent GTL projects

## Chemicals production from synthesis gas (2013 –)

- **Task:** Catalyst testing and screening, process optimization
- **Objective:** Development of catalyst for chemicals production
- **Client:** SABIC

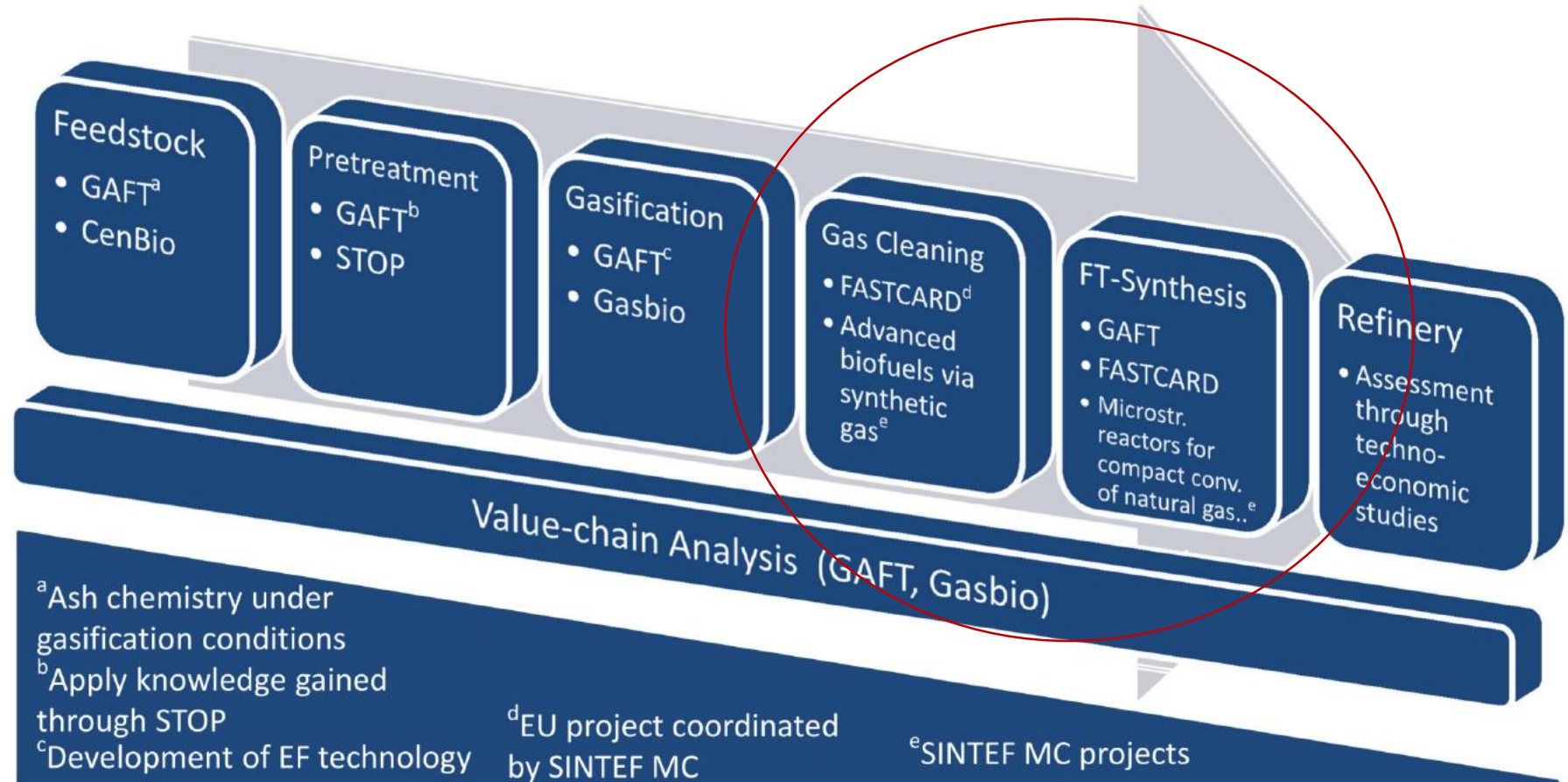
## Development of micro CSTR reactor (2011 - 2015)

- **Task:** Catalyst testing at realistic conditions in a Continuous Stirred Tank Reactor (CSTR)
- **Objective:** Cost effective method for evaluation of FTS catalysts
- **Client:** Norwegian research council, Statoil

## Biomass to liquids (2009 – 2016)

- **Task:** Hot gas cleaning and conditioning, catalytic synthesis of fuel(BTL)
- **Objective:** Fundamental studies on central catalytic steps in BTL via FTS based on biomass-derived synthesis gas
- **Client:** Norwegian research council, Statoil

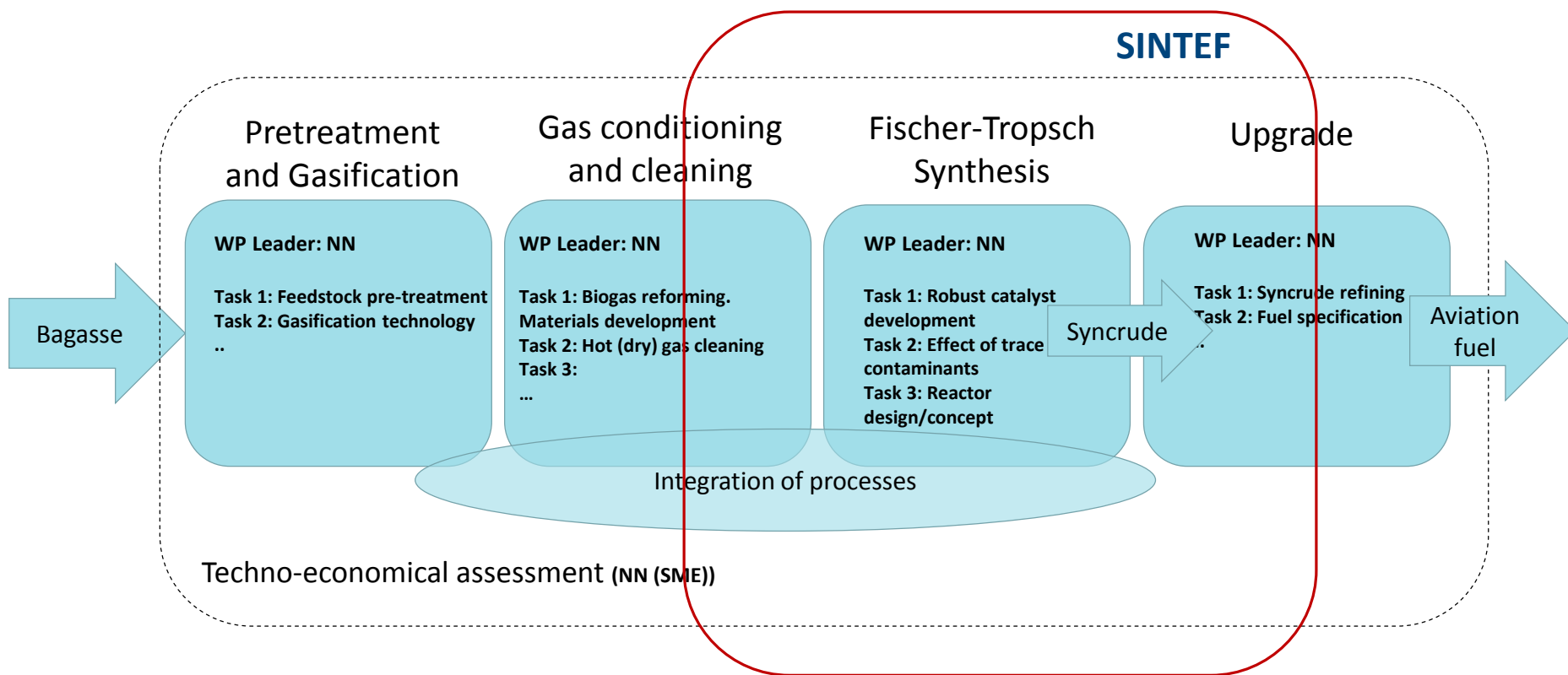
# Gasification value chain



# LCE-22

## Objectives:

- Optimization of process steps in terms of energy efficiency
- Process integration and intensification
- Catalyst materials development and testing
- Knowledge transfer between Brazil and EU through coordinated actions



# LCE-22

Up to 5 years, 3- 5 m EUR (EU)

## Consortium EU:

- SINTEF (R&D institute)
  - Coordination, catalyst development
- Johnson Matthey
  - Process technology, catalyst manufacturer and developer
- NN Life cycle analysis
- NN

## Consortium Brazil:

- INT (R&D institute)
- Petrobras (Gasification, end user)
- NN
- NN

# Contact details SINTEF



Torbjørn Gjervan

Research Manager

Phone: + 47 915 81 466

E-mail: [torbjorn.gjervan@sintef.no](mailto:torbjorn.gjervan@sintef.no)

# Technology for a better society