

# **HyFlexFuel**

***Hydrothermal Liquefaction: Enhanced performance and feedstock flexibility for efficient biofuel production***

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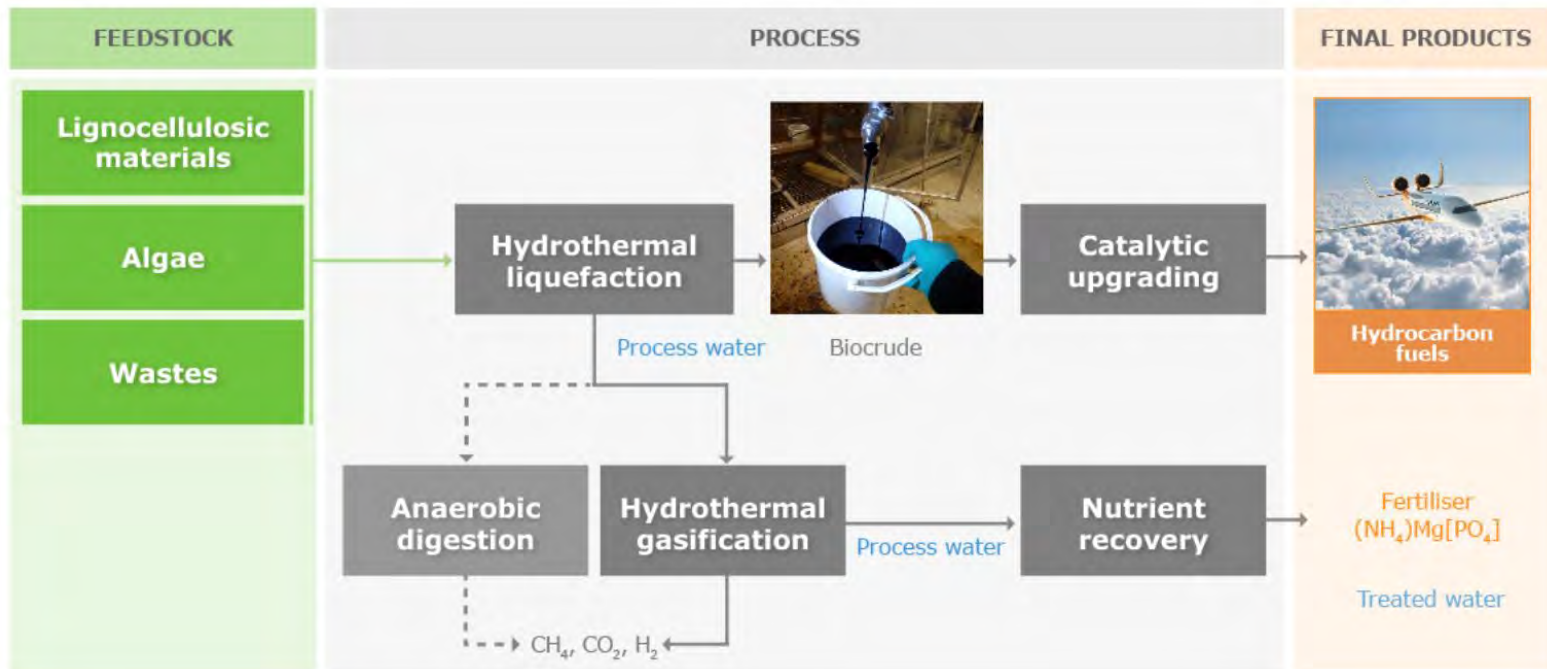
# Objectives

***Development of a process chain to produce sustainable liquid fuels based on **hydrothermal liquefaction** of **various biomass feedstocks*****

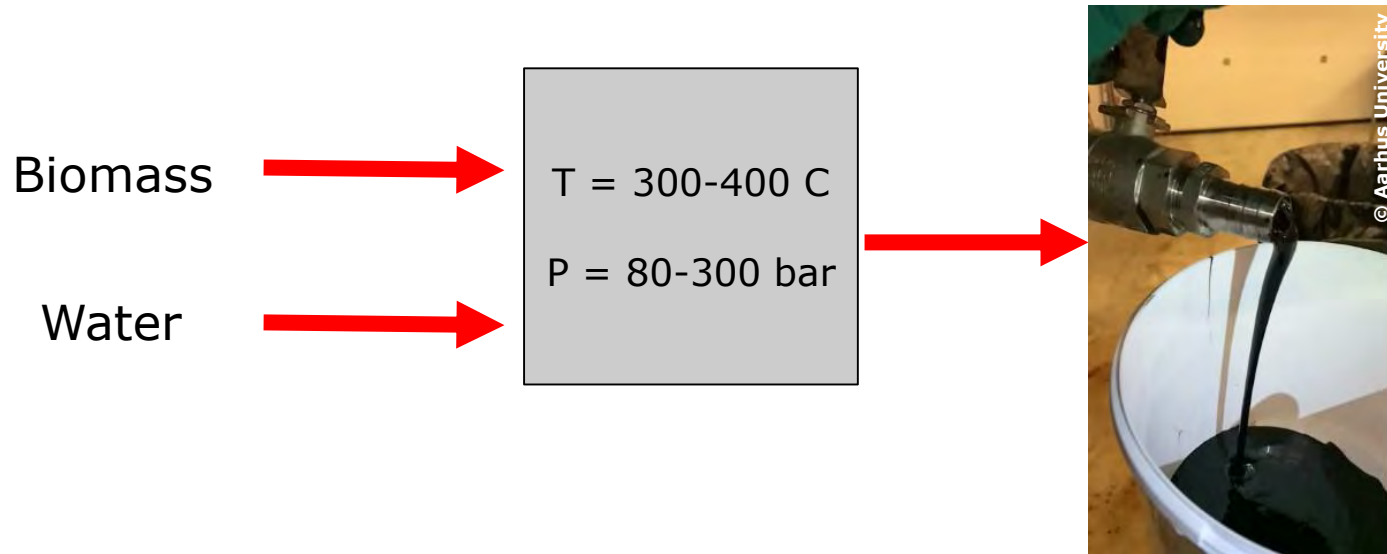
## ■ ***Specific objectives***

- **Demonstrate compatibility with diverse biomass feedstock portfolio (incl. algae and waste streams, such as sewage sludge)**
- **Increase energy and carbon efficiency through improved heat integration and product recovery**
- **Valorise organic and inorganic components in residual process streams**
- **Upgrade biocrude by catalytic hydrotreatment into fuel products and demonstrate their drop-in capability**
- **Assess technical, socio-economic and environmental performance potentials**

# The HyFlexFuel project



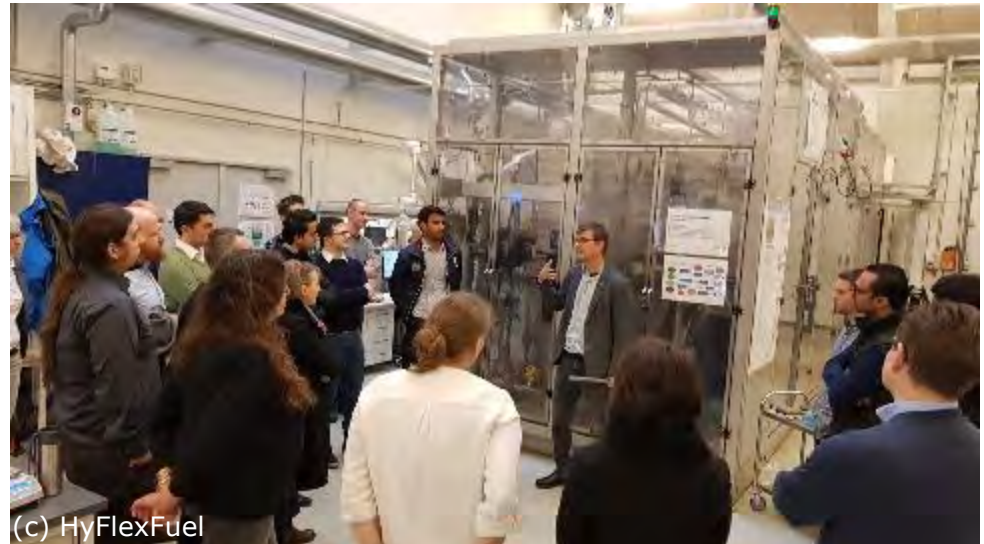
# Key step: Hydrothermal liquefaction (HTL)



- High flexibility: nearly every kind of biomass can be successfully processed
- Residual and wet biomass are good candidates
- Process yields of up to 50% biocrude can be achieved
- Oil of higher quality compared to e.g. pyrolysis

# Key step: Hydrothermal liquefaction (HTL)

- **First HTL campaign at pilot-scale completed**
  - Feedstock: Miscanthus, spirulina (microalgae), sewage sludge
  - >10 kg biocrude and >200 L aqueous phase produced per feedstock

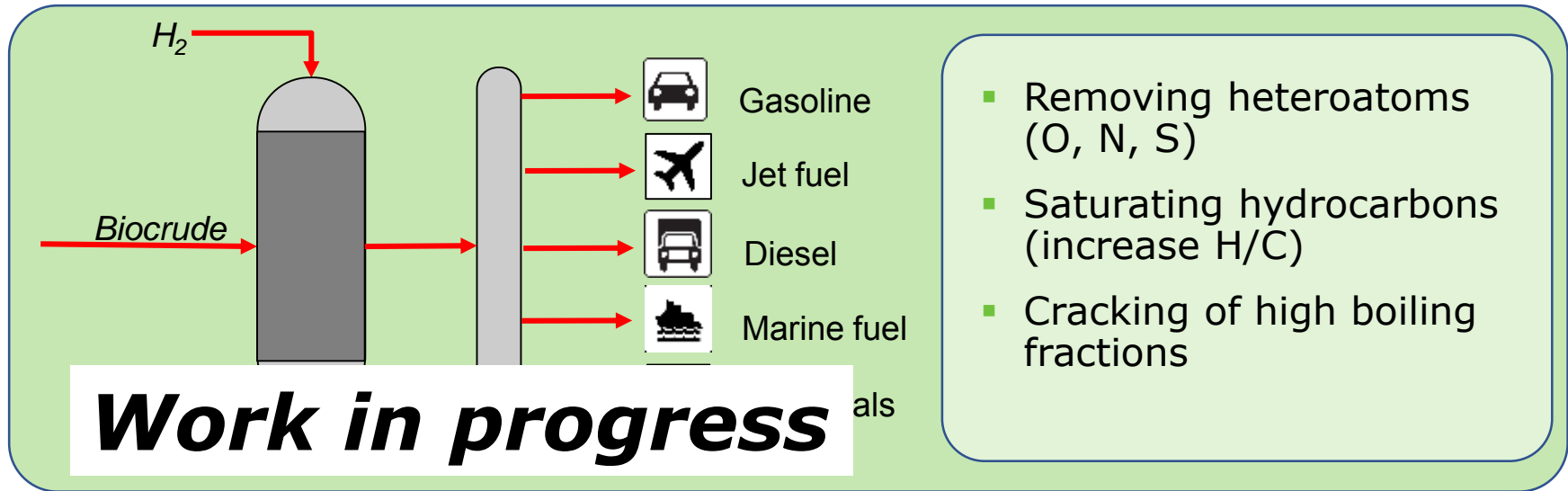


## HTL pilot plant @Aarhus University

K. Anastasakis et al., Continuous Hydrothermal Liquefaction of Biomass in a Novel Pilot Plant with Heat Recovery and Hydraulic Oscillation, *Energies* **2018**, *11*, 2695; doi:10.3390/en11102695



# Fuel production: Catalytic hydrotreatment



## Challenges

- Under which conditions can we achieve complete deoxygenation and (especially) denitrogenation?
- Which kind of fuels can be produced from each biomass?
- Which are the reaction mechanisms?

D. Castello et al., „Drop-in fuels from biomass and waste - Upgrading of hydrothermal biocrudes from ligno-cellulosics, algae and sewage sludge“, 7<sup>th</sup> International Symposium on Energy from Biomass and Waste, Venice 2018

# Communication & dissemination

- **Website:** [www.hyflexfuel.eu](http://www.hyflexfuel.eu)
- **Twitter:** [@HyFlexFuel](https://twitter.com/HyFlexFuel)
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- **HyFlexFuel Stakeholder Community**
- **Summer school for young academics**
  - October 14–18, 2019, Aarhus University
- **Scientific publications**



**Thank you!**

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