Proposals for Task 39 reports:

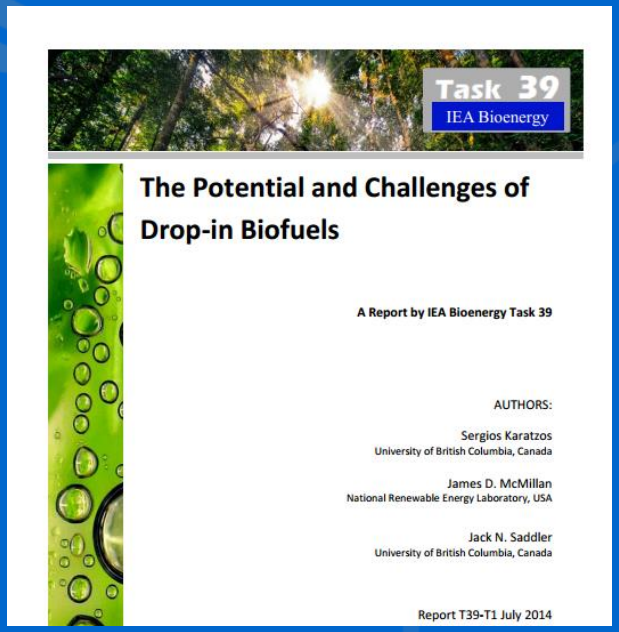
(1) *Biojet fuels – technology, current status and policy*

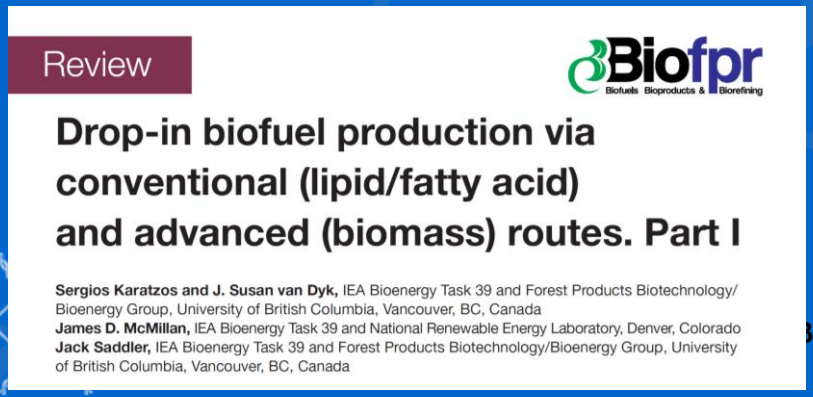
(2) The ability of the marine/shipping industry to meet strict fuel sulfur limits in 2020 and the role of biofuels

Susan van Dyk, Mahmood Ebadian, Jianping Su

Commissioned reports published by IEA Bioenergy Task 39 (2014) (Update late-2018)

www.Task39.org





Envergent TECHNOLOGIES A Honeywell Company

UOP A Honeywell Company

ENSYN

NREL NATIONAL RENEWABLE ENERGY LABORATORY

NESTE

Pacific Northwest NATIONAL LABORATORY Proudly Operated by Battelle Since 1965

Enerkem

sundropfuels

Borregaard

BioTfueL

CTBE Brazilian Bioethanol Science and Technology Laboratory

KIT Karlsruhe Institute of Technology

CHEMREC Energy to succeed

bioenergy2020+

AMYRIS

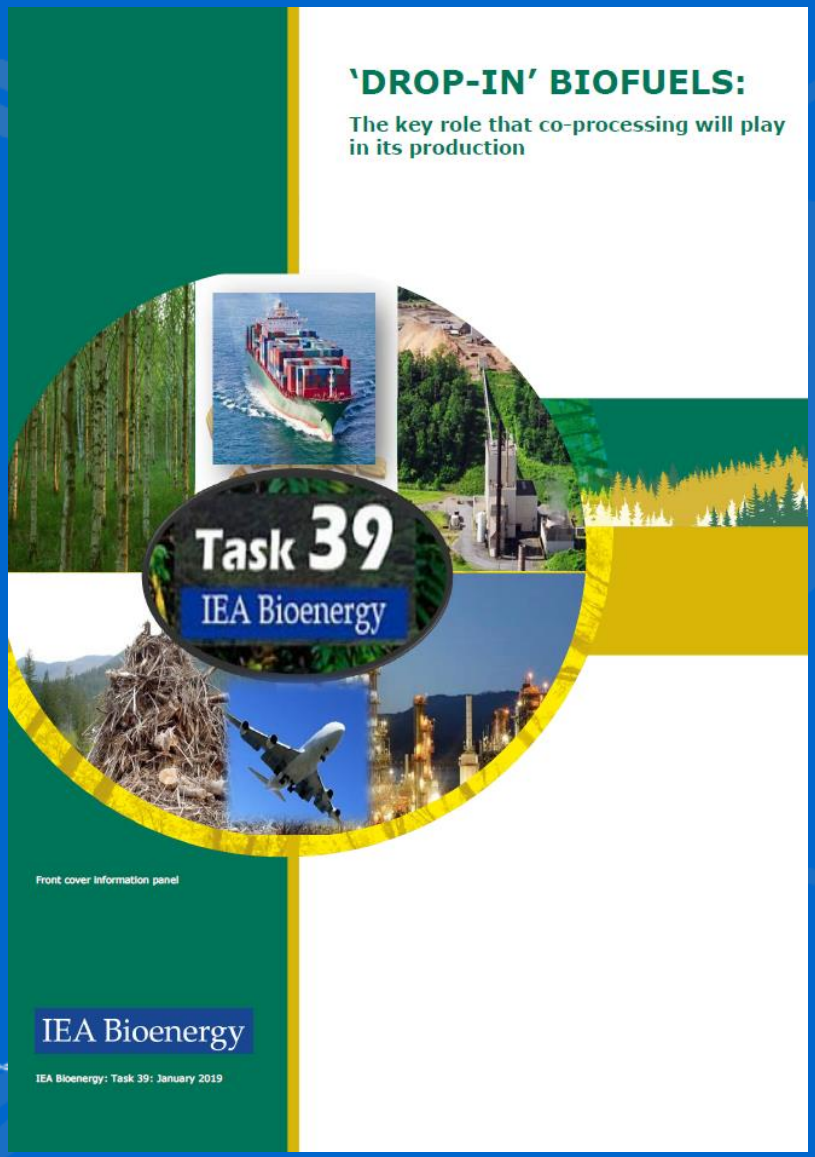
SINTEF

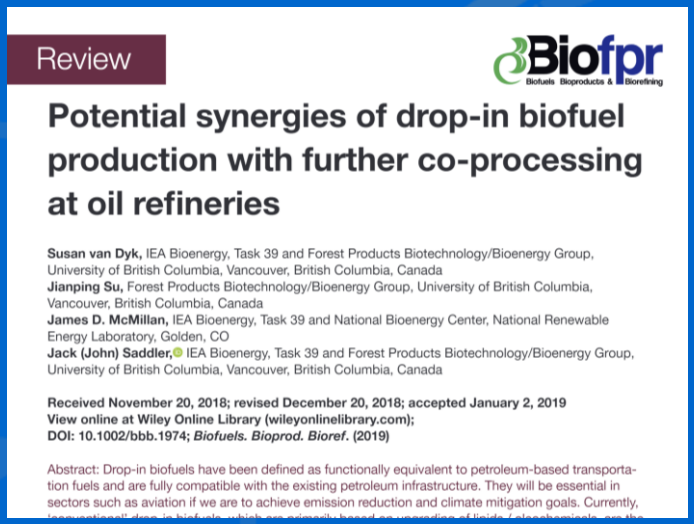
gevo

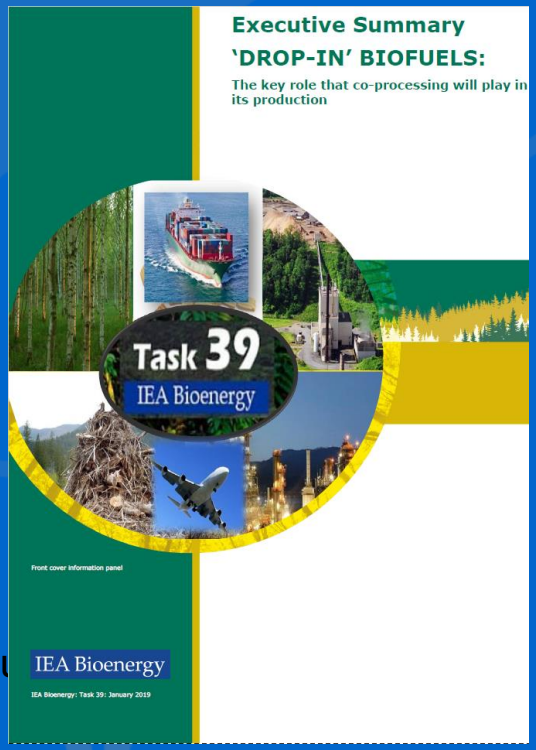
Swedish Energy Agency

solazyme

Update to drop-in biofuel report 2019 - focus on co-processing







Biofuels for Aviation.
An IRENA Technology brief

FEBRUARY, 2017

http://www.irena.org/

Susan van Dyk & Jack Saddler

at UBC

BC SMART ROADMAP:

A decarbonisation strategy for

British Columbia's (BC's) Marine, Aviation, Rail and Truck (MART) Sectors

Establishing the BC SMART Fuels Consortium

Jack Saddler, Don O'Connor, Susan van Dyk, Mahmood Ebadian

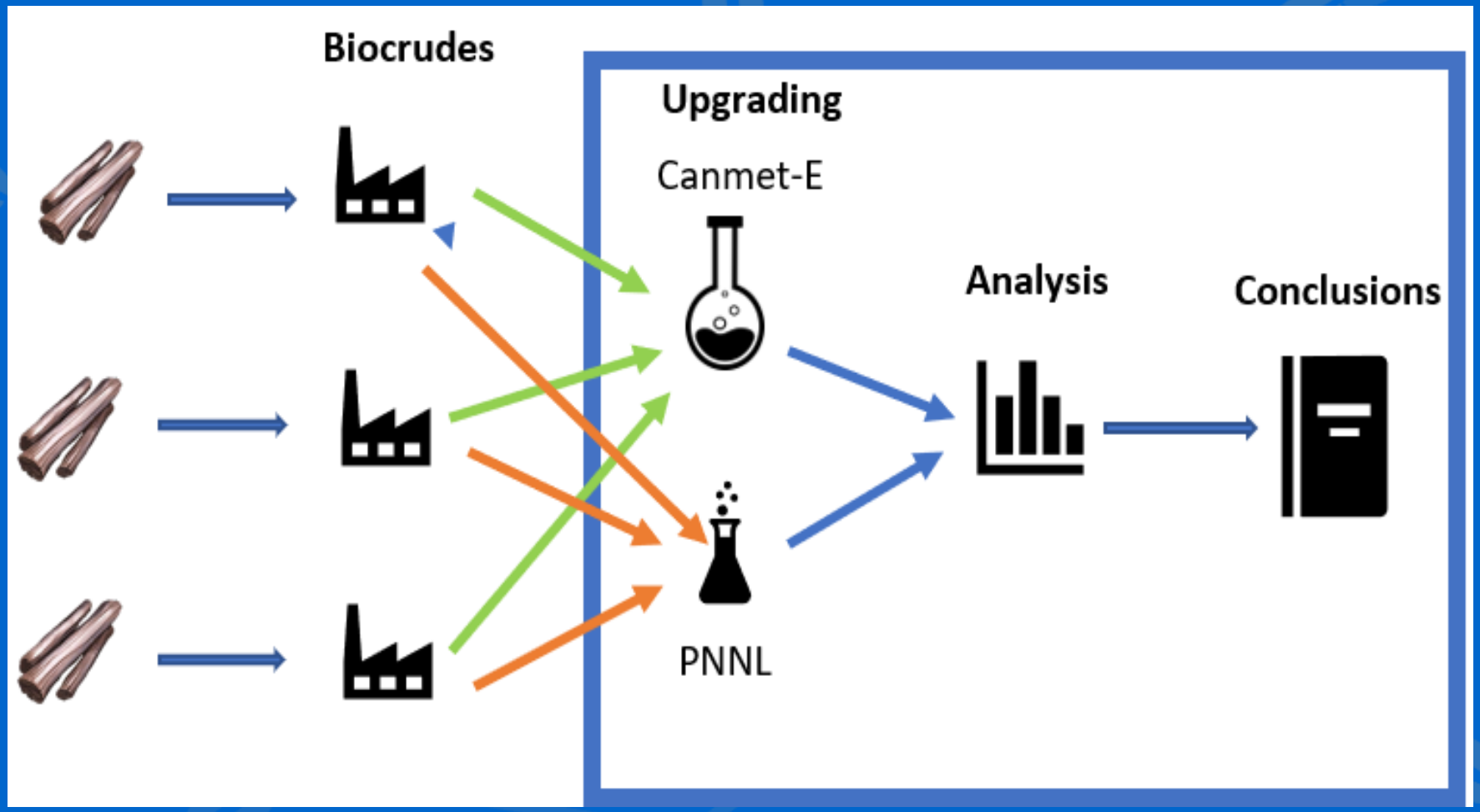
Forest Products Biotechnology/Bioenergy at UBC

Assessment of likely Technology Maturation pathways used to produce biojet from forest residues (The ATM project)

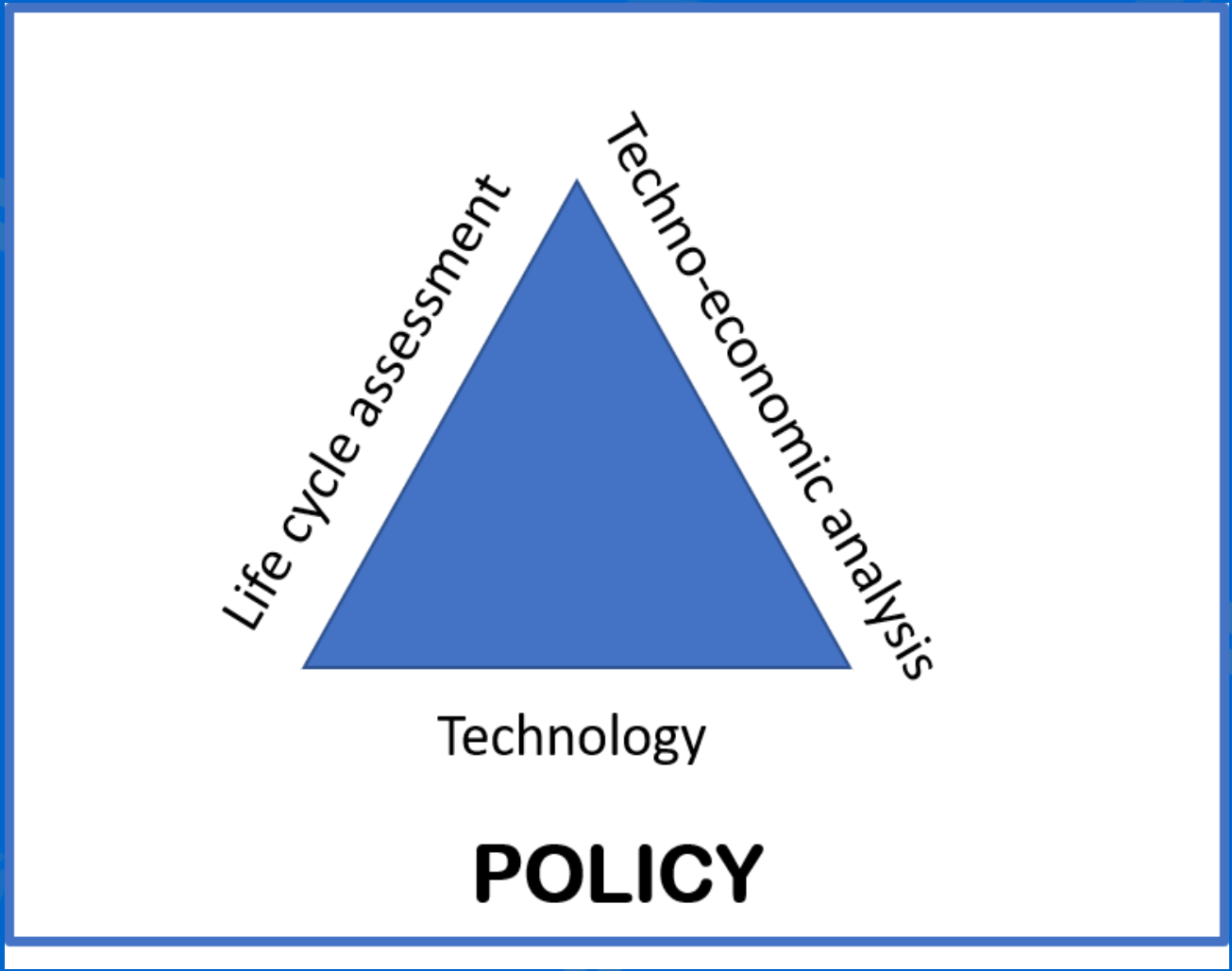
Forest Products Bio

ATM Project outline

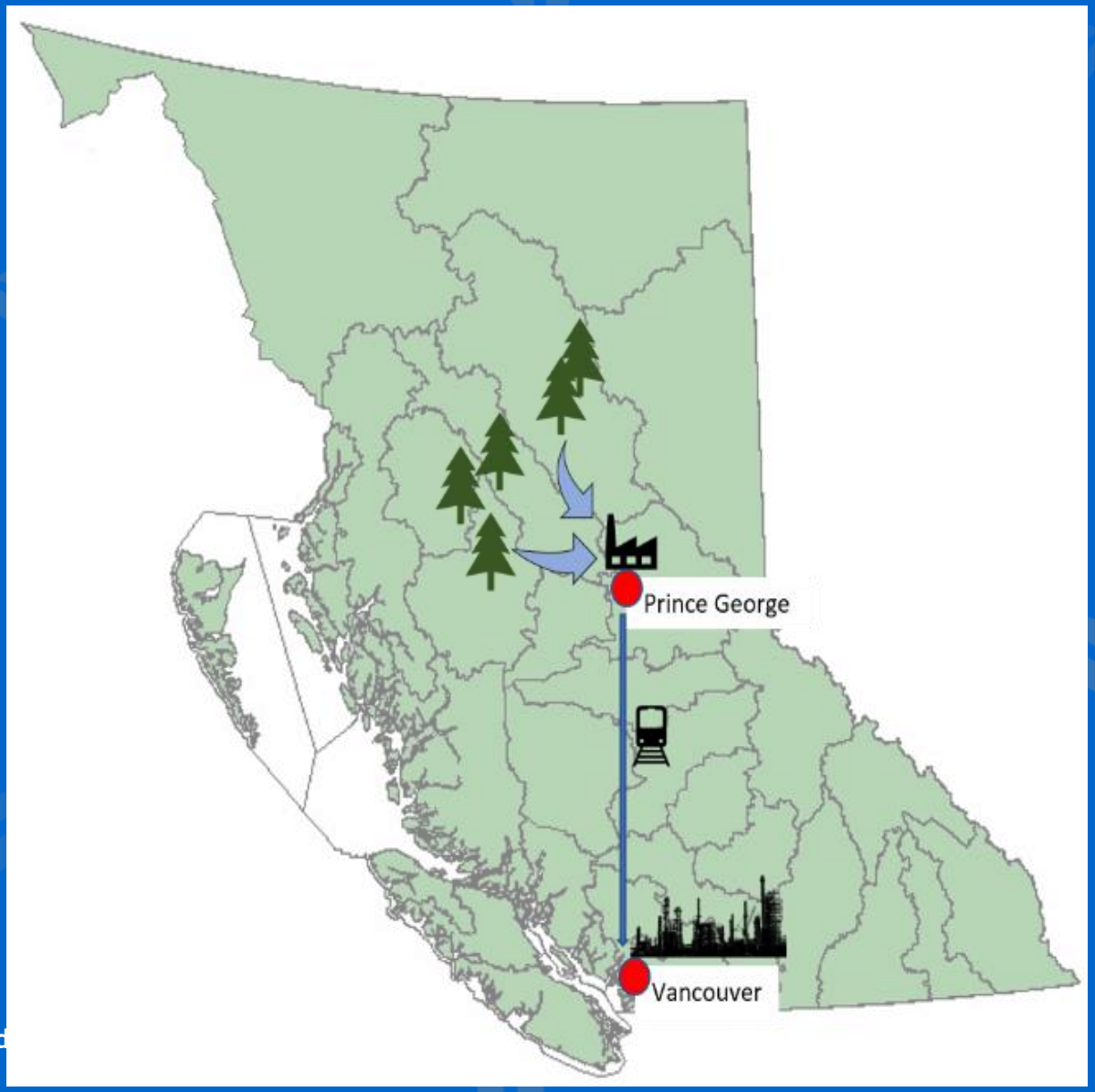
- Source bio-oil from different technology providers (3)
- Upgrading of bio-oil; characterization of biojet & other fractions
- Feedstock supply chain logistics and feasibility;
- Life cycle assessment;
- Bio-oil production process performance and techno-economics;
- Demonstration plant concept and design
- Policy


Biocrudes
Upgrading
Canmet-E
PNNL
Analysis
Conclusions

Components of ATM Project

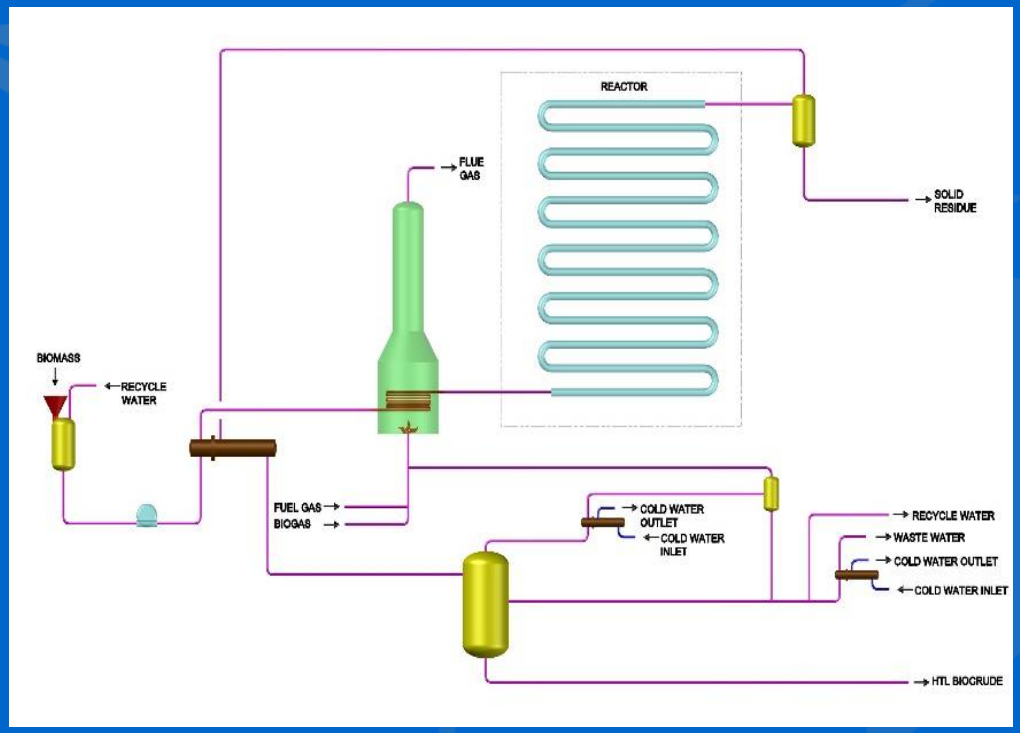


Supply chain for ATM Project

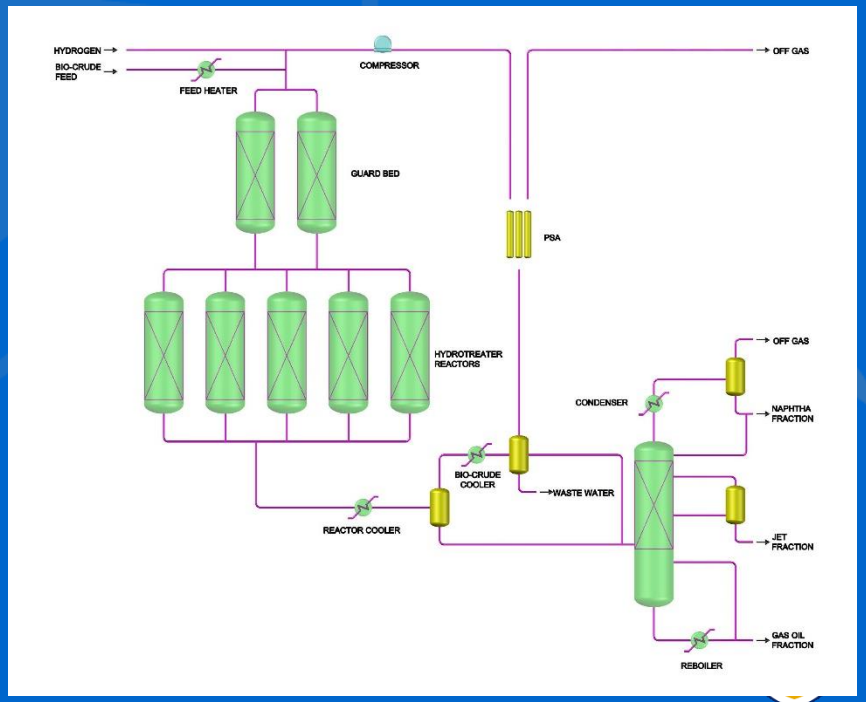


Engineering design for demonstration scale facility

Biocrude production hydrothermal liquefaction



Hydrotreatment



ATM Project achievements

- Biocrudes produced through direct thermochemical liquefaction technologies, was demonstrated to be successfully used to produce a significant volume of biojet fuel.
- The jet fractions were analysed and demonstrated a high level of compliance with general standards for jet fuel based on ASTM certification.
- Assessment of potential emission reductions of these pathways through life cycle analysis demonstrated that significant emission reductions were possible with many of the pathways.
- The ATM Project represents a significant achievement in advancing the knowledge and identifying key challenges of producing biojet fuels through thermochemical liquefaction technologies.
- To our knowledge, it is the first integrated study that compared technical, life cycle and techno-economic parameters of three types of thermochemical liquefaction technologies and upgrading into finished fuels.

Proposal for a Task 39 biojet report

- Aviation and biojet fuels is a rapidly developing area with great significance for advancement of drop-in biofuels production
- This report will provide a comprehensive state of the art on the subject including technology development, cost, LCA, commercialization and policy

- 40-50 pages
- Authors – Susan van Dyk, Mahmood Ebadian, Jianping Su
- Completion date
  - 1st draft – December 2019
  - Final report – February 2020

Proposed structure of biojet report

- Technologies for production of biojet fuels
  - Current status of technologies and production volumes
  - Companies producing biojet fuels
- Jet fuel standards and ASTM certification
  - Certified pathways and pathways in the pipeline
  - General considerations for certification
- Targets and projections for biojet production volumes
- Cost of biojet fuels and techno-economic analysis
- Sustainability and Life cycle analysis
- Policies for promotion of biojet fuel production and consumption
  - ICAO, CORSIA and offsets
  - Different policies implemented globally
- Potential and Barriers/obstacles to production & consumption of biojet fuels

Proposal for report:
The ability of the marine/shipping industry to meet strict fuel sulfur limits in 2020 and the role of biofuels

- While Task 39 published a comprehensive report on Biofuels in the Marine Shipping Sector in 2017, new sulfur limits from 1 January 2020 require a "deep dive" into measures to reduce sulfur and the role of biofuels

- 40-50 pages
- Authors – Susan van Dyk, Mahmood Ebadian, Jianping Su
- Completion date
  - 1st draft – October 2019
  - Final report – December 2019

IEA Bioenergy Task 39 report
Biofuels for the marine shipping sector

- Published in 2017
- International vs local shipping
- Low quality & low cost fuel
- But recent strict sulfur regulations require fuels to be more refined (increasing CO2)
- Biofuels can assist in meeting sulfur requirements but at higher cost
- Policy will drive this development

Proposed structure of the report

1) The IMO and regulation of emissions in the marine sector
   a) SOx emissions – emission control areas and recent agreed regulations
   b) CO2 emissions and regulations
2) Current fuels used in the marine sector
   a) Heavy Fuel oil – characteristics & sulfur
   b) Marine diesel oil
   c) Marine gas oil
3) Technologies for reducing sulfur in fuels
   a) On board scrubbers,
   b) Refinery actions (hydrotreating, etc. to meet a new fuel spec)
   c) Other actions to remove sulfur
   d) The potential of biofuels to meet sulfur specification (naturally Low sulfur) and GHG emission reductions
   e) Co-processing as a strategy
4) Cost implications of higher specification fuels, increased demand