trans algae

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Conversion of Biomass to Biofuel (by HTL)

EUROPEAN UNION
Interreg
Botnia-Atlantica
European Regional Development Fund
Kempestiftelserna
Arctic Seaweed
Österbottens förbund
Pohjanmaan liitto
Nordland
FYLKESKOMMUNE
bodø
KOMMUNE
Landstinget Västernorrland
Länsstyrelsen
Västerbotten

Project leaders & Partners

Project leader

Swedish University of Agricultural Sciences (SLU)
Department of Wildlife, Fish and Environmental Studies

Partners

BioFuel Region AB

Nattviken Invest - Hugo Wikström

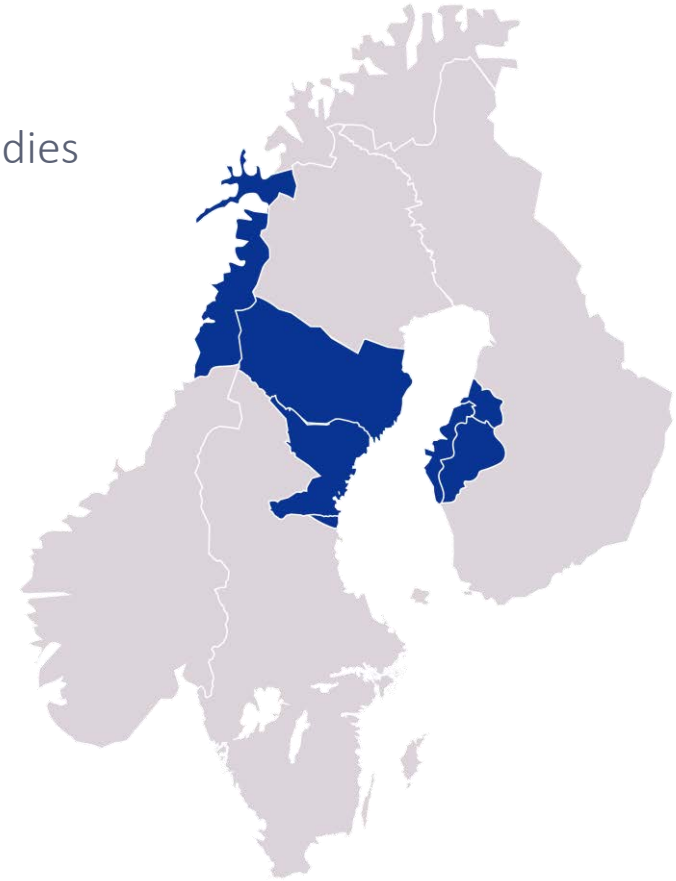
NIBIO Bodö

Mid Sweden University

Novia – University of Applied Science, Vaasa
University of Vaasa

Financiers

Botnia-Atlantica, Länsstyrelserna i Västerbotten och Västernorrland, Österbottens förbund, Kempestiftelserna, Arctic Seaweed, partners



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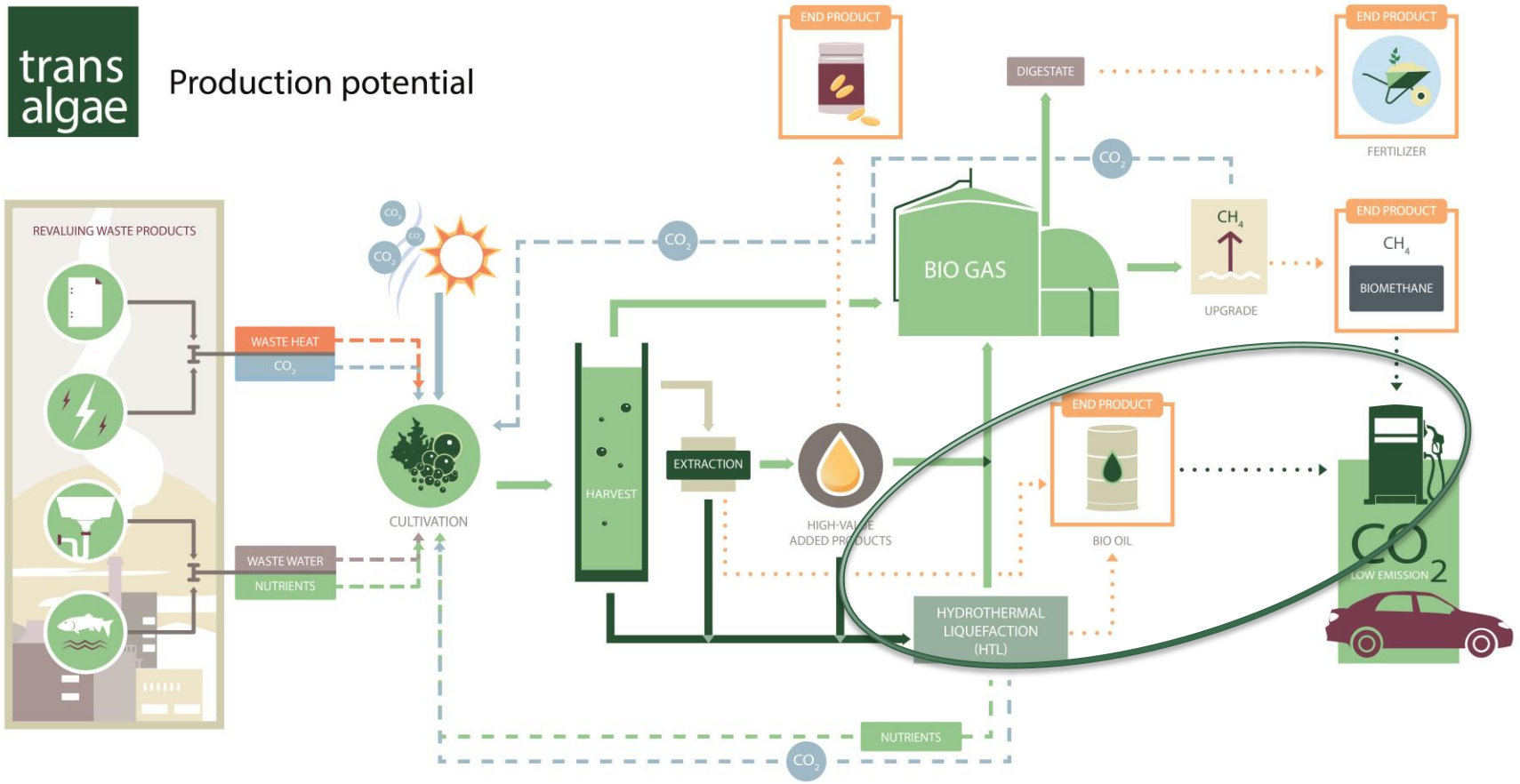
Production potential



PROJECT COURSE

REVALUATION OF WASTE PRODUCTS | CULTIVATION | HARVEST | TRANSFORMATION | SYSTEM ANALYSIS

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Why Algae HTL (Hydro Thermal Liquefaction)?

- Microalgae rapid growth rate and favorable cultivation characteristics
- Easily to pump wet feedstock into HTL-process
- No drying and less dewatering for feedstock
- Product self-separation
- Energy-dense biocrude to hydrocarbon fuels and chemicals
- Nutrient recovery from aqueous phase recycling
- All components (lipids, proteins and carbohydrates) can be converted to biocrude
- Entirely renewable feedstock.

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First and Second Generation biofuels

First:

- Produced directly from food crops such as wheat and sugar, oil seed rape _i.e. oils for use in biodiesel or bioethanol through fermentation.
- Crops has proved very effective.
- Debate over benefit in reducing green house gas and Co_2 emissions,
- Can produce negative net energy gains.
- 'fuel vs food', possible increase in food prices.

Second:

- Produced from non-food crops
- Wood, organic waste, food crop waste and specific biomass crops,
- *Cost competitive?* in relation to existing fossil fuels.
- Increase 'net energy gains' over coming limitations of first generation biofuels.

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Our project works with third generation processes

Third and Fourth Generation Bio-fuels

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Third:

- Specially engineered energy crops such as algae as source base
- Cultured to act as a low-cost, high-energy and entirely renewable feedstock.
- Predicted to produce more energy per acre than conventional crops
- Can be grown using land and water unsuitable for food production,
- Manufactured into a wide range of fuels such as diesel, petrol and jet fuel.

Fourth:

- Aimed at not only producing sustainable energy but also a way of capturing and storing Co_2.
- Differs from second and third generation using processes such as oxy-fuel combustion, CCS.
- Carbon capture makes fourth generation biofuel production carbon negative
- Locks' away more carbon than it produces.

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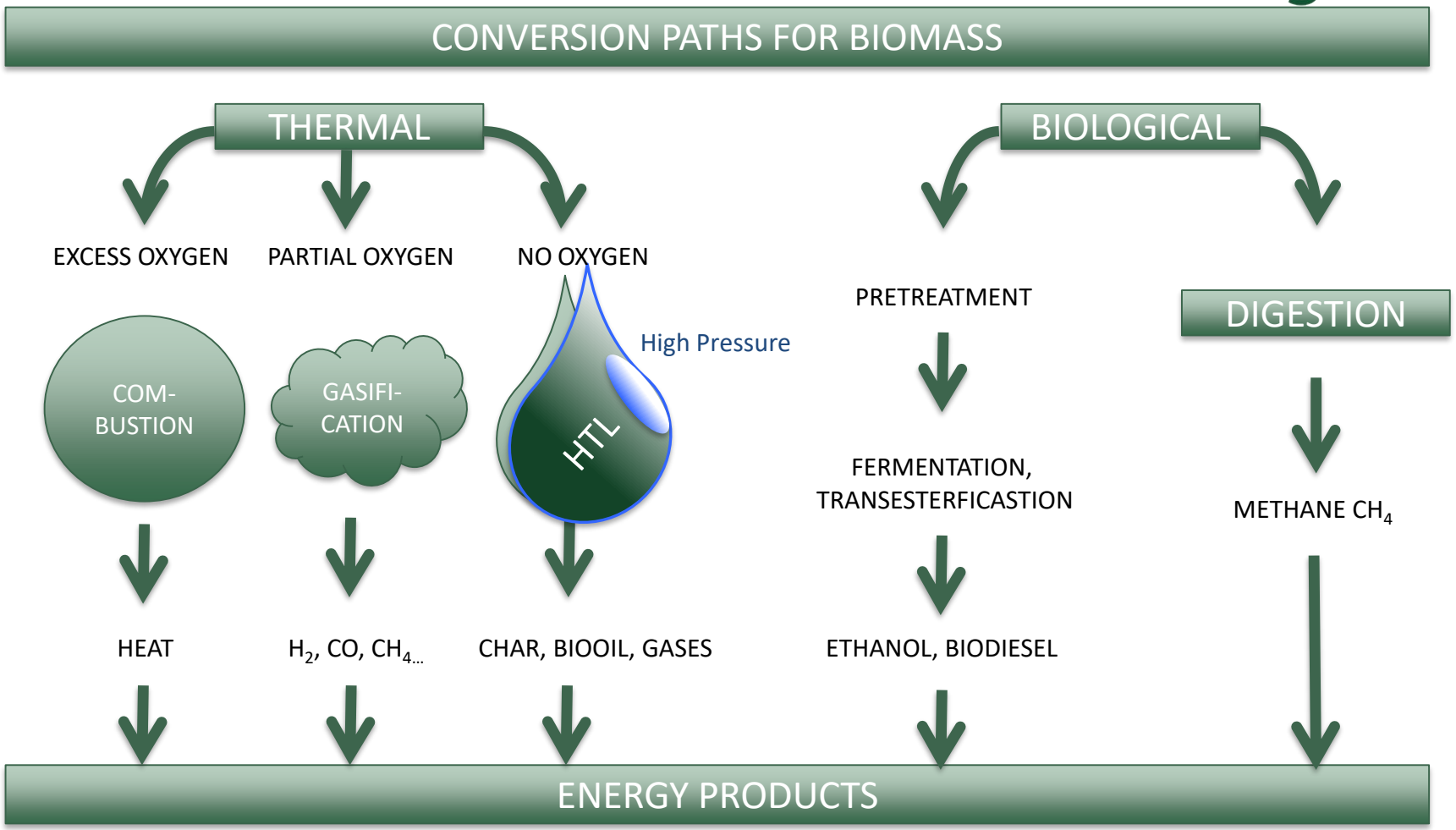
Biomass Pathways



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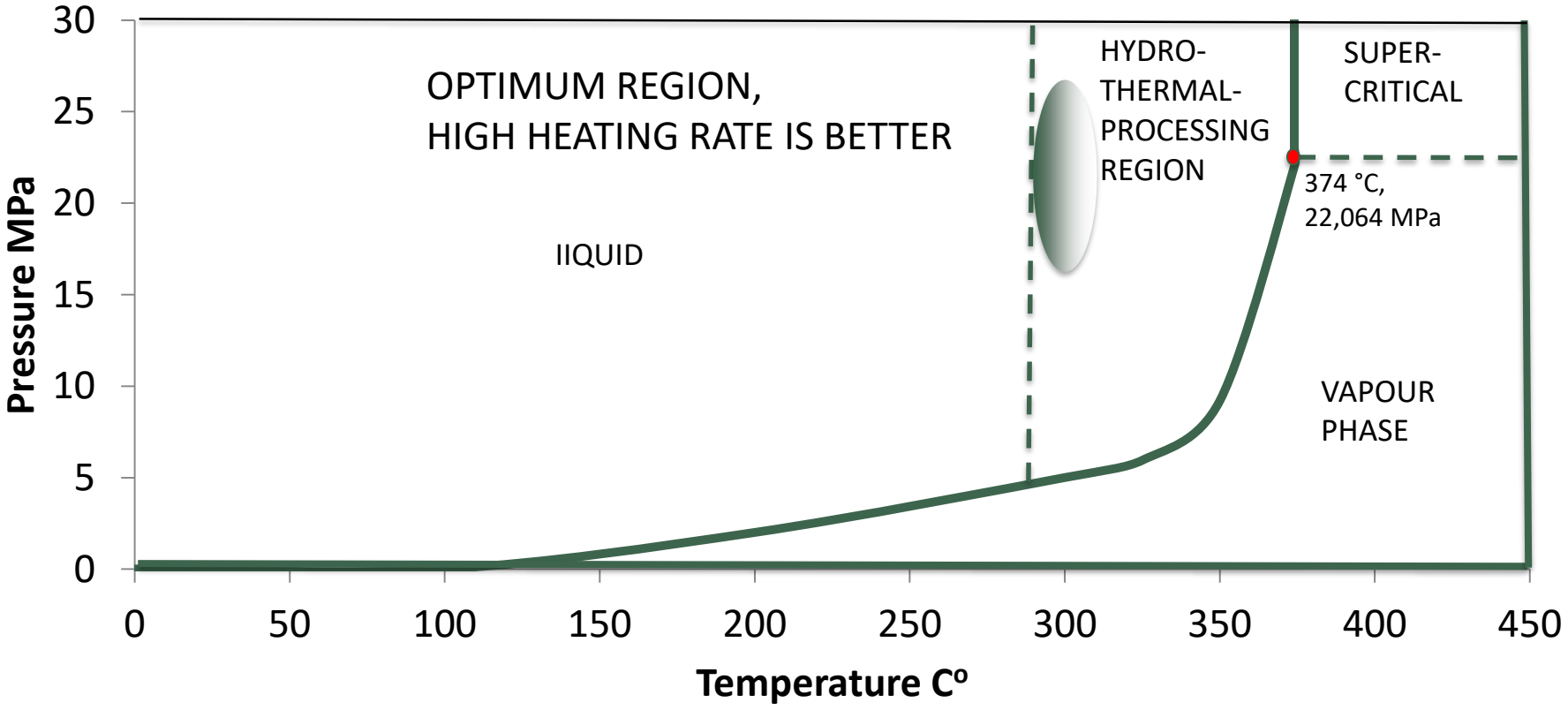
HTL PARAMETERS



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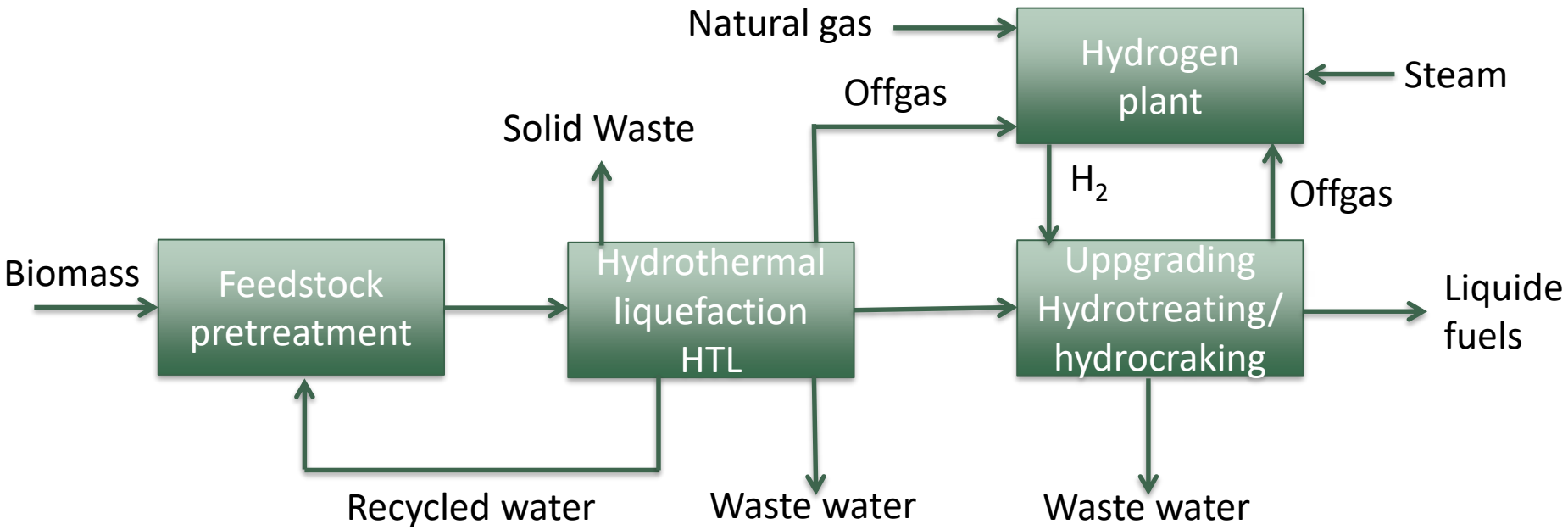
Biomass HTL + Upgrading



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Biocrude Properties

	Biocrude	Biooil	Biomass
Moisture	5%	25%	4%
C	77%	58%	51%
H	8%	6%	6%
O	12%	36%	42%
HHV	35.7	22.6	20.0
Viscosity (cP)	15000	59	SOLID

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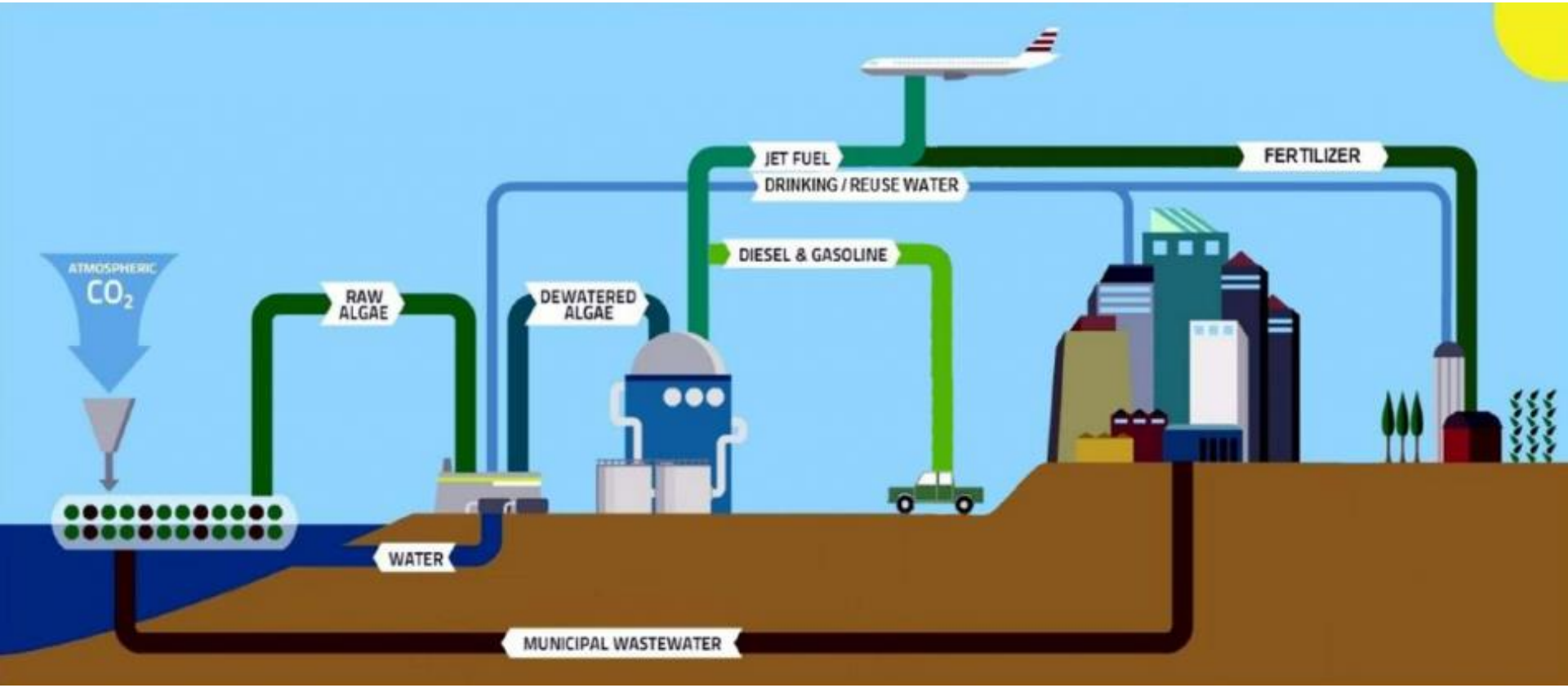
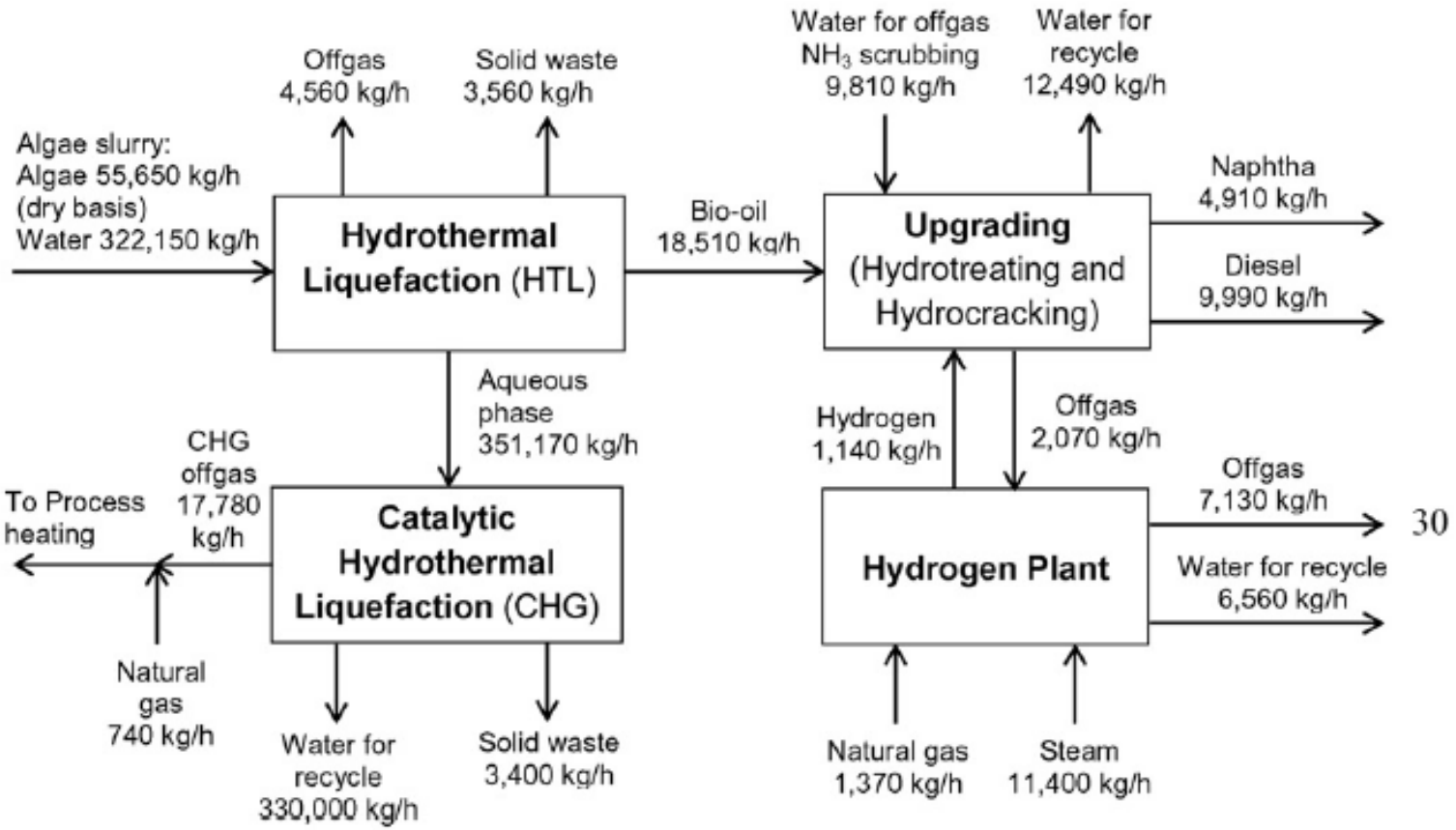
Algae HTL In System



Source:© 2011 Algae Systems LLC.

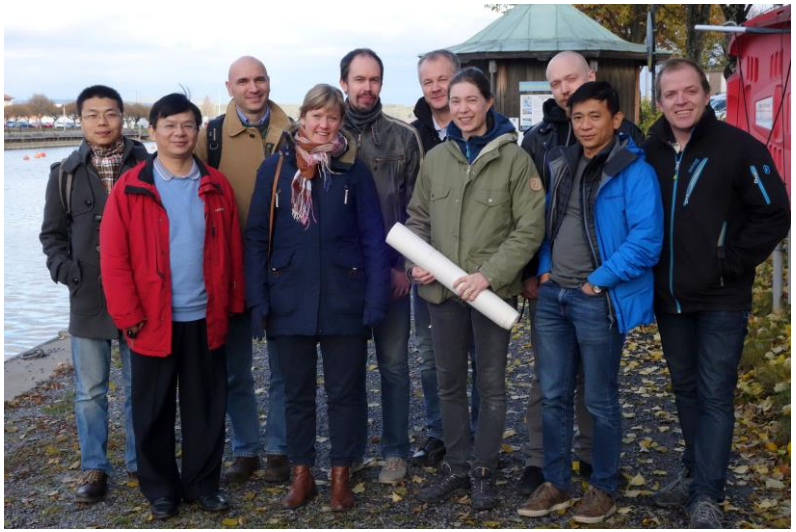
HTL Mass Balance Diagram



Albrecht et al., Algal Research 2016

- H2--> 2110 KG/H
- PRODUCT--> 14900 KG/H
- WASTE--> 6960 KG/H
- OFFGAS--> 11690 KG/H

www.biofuelregion.se/transalgae



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