Suprabio Project- *an overview*

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Suprabio Project Focus

1. Pyrolysis Oil
2. Pretreated lignocellulose
3. Lignin free wood pulp

Intermediate feedstock

Reduce production cost

Bio based products

Focus 2

Feedstock Consistency

- Feedstock that can be made from different lignocellulosic biomasses using *small scale distributed production* processes and that are more or less invariant with biomass variations
- Suprabio focused on the following intermediate feedstock as starting material for the production of Bio-Products
    1. Pyrolysis oil
    2. Pretreated lignocellulose
    3. Lignin free wood pulp

Focus 1

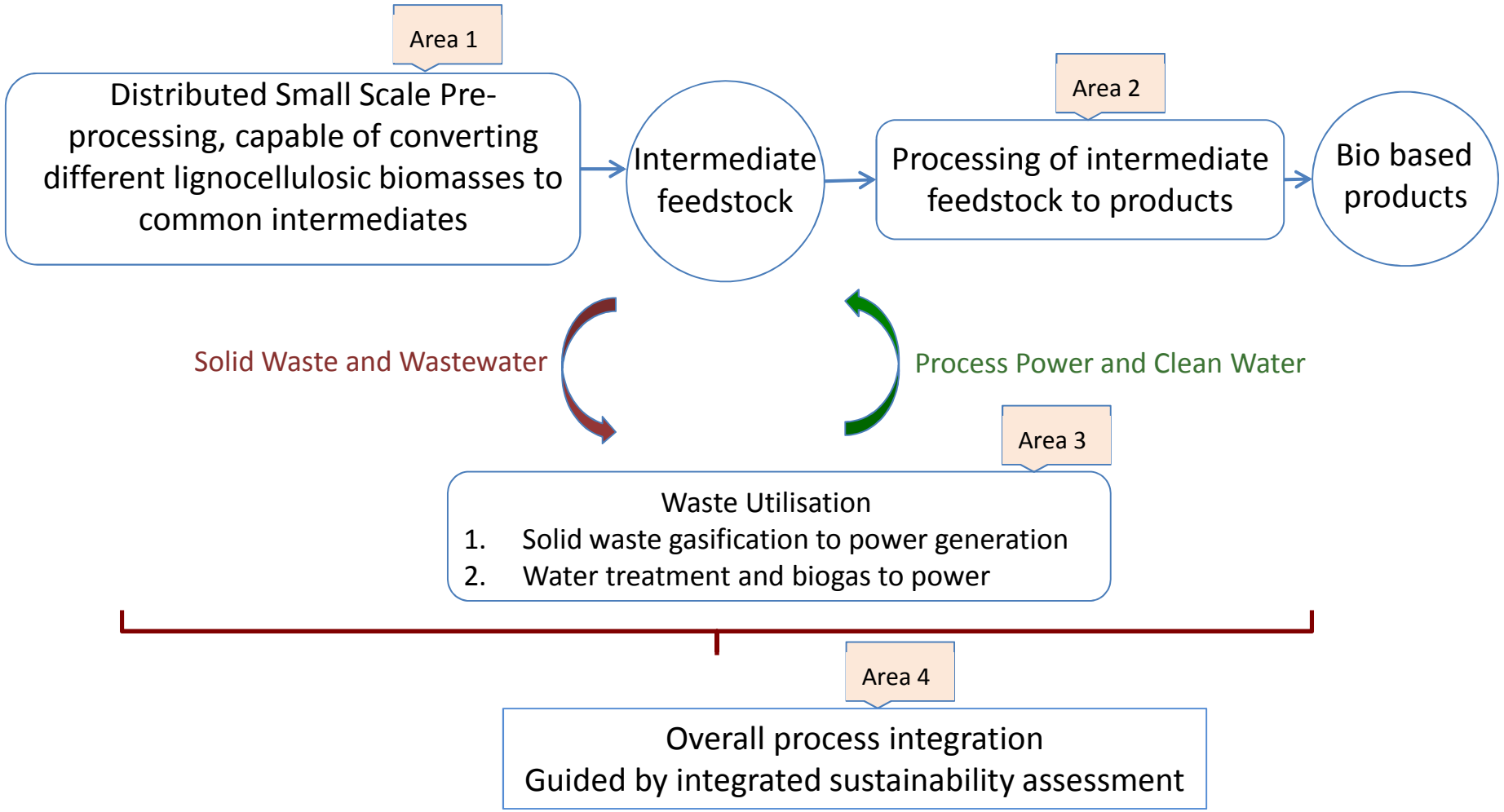
Selection of a mix of products including

1. Fuels (currently made from fossil fuel)
2. Platform chemicals (currently made from fossil fuel)
3. Value added materials (cannot be made from fossil fuel)

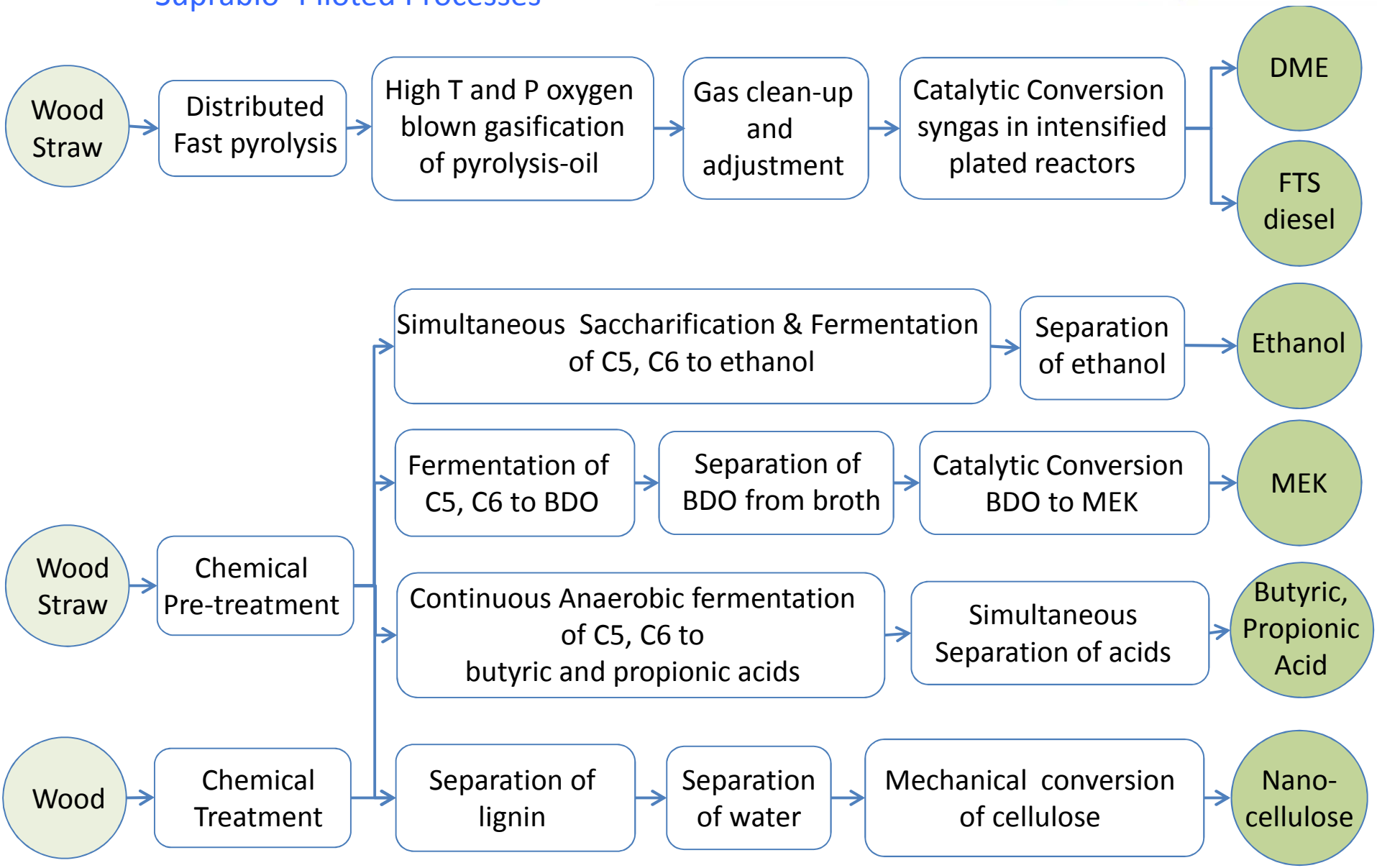
- Cost of production from biomass much higher than that from fossil fuel.
- Suprabio focused on the reduction of this gap in production cost through technical innovation

Suprabio Project Focus

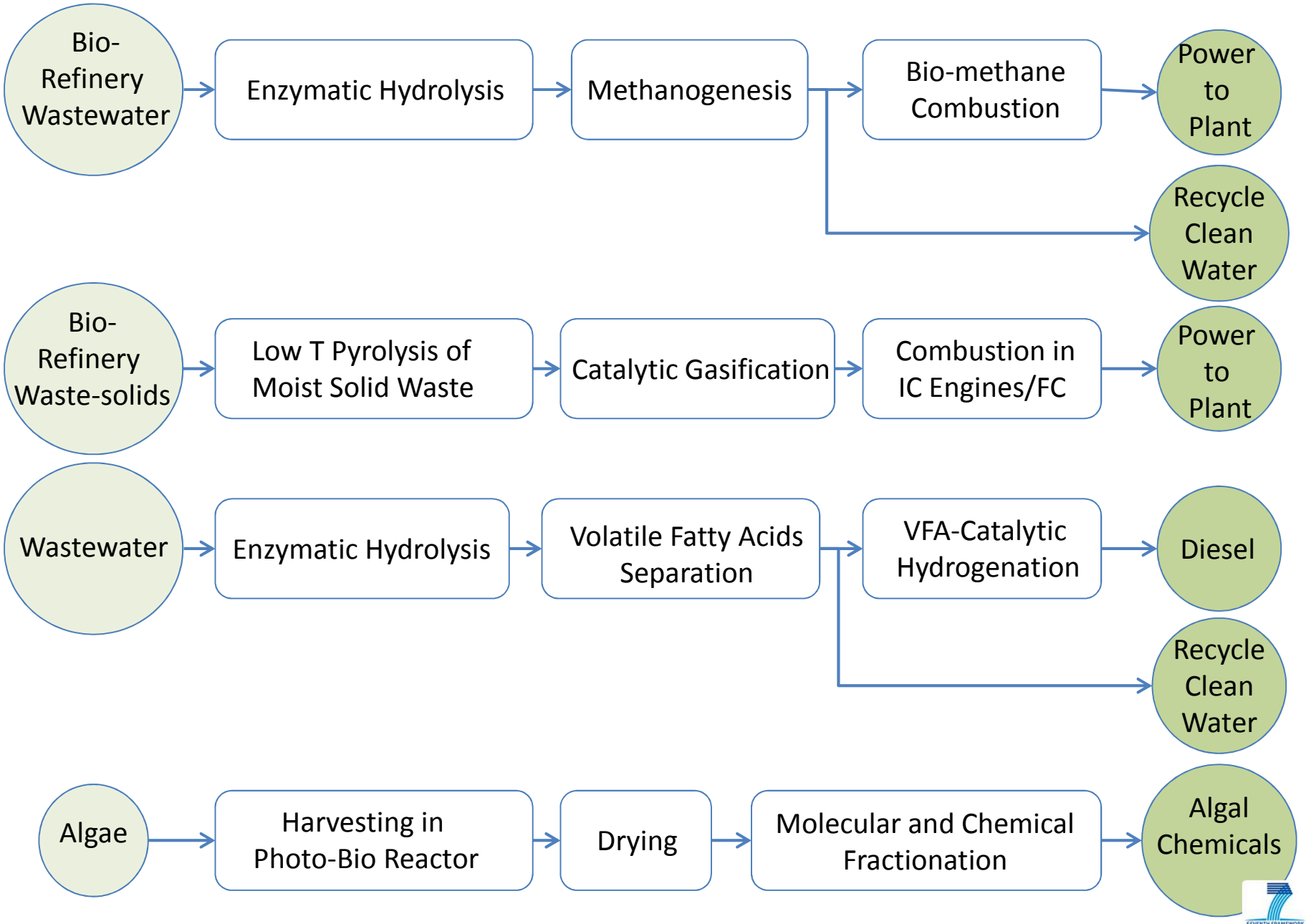
Focus 3
In order to reduce the gap in production cost, Suprabio directed its research activities on four areas



Suprabio- Piloted Processes



Piloted Processes for Waste Utilisation



Areas of technical focus

- Mild chemical preprocessing of biomass to extract high yield of fermentable C6, C5
- Genetic modification/natural selection of microbes to increased thermophilicity and tolerance to substrate and product concentration
- Simultaneous sccharification and fermentation
- Mild chemical processing to extract high yield of cellulose fibres
- Technology to produce nano cellulose fibres
- High temperature and pressure entrained flow gasification of pyrolysis oil
- Skid mounted pumping system for pyrolysis oil
- Atomisation of pyrolysis oil
- Intensified plated reactors with nano catalysts for improved syngas and seed oil conversions
- Low temperature pyrolysis and catalytic gasification of wet waste solids
- Natural selection of anaerobic microbes for water treatment from biorefinery
- Heat management
- Improved separation of products
- Integration of biorefinery with solid waste utilisation
- Recovering energy from waste water and recycling of clean process water
- Process integration

Achievements

- A skid mounted pumping system for feeding pyrolysis oil to gasifiers
- An improved burner assembly for pyrolysis oil
- Intensified compact plated reactors for syngas conversion to DME, FTS hydrocarbon and Mixed alcohols
- Improved nano catalysts for catalytic conversion of syngas to DME, FTS hydrocarbon and mixed alcohols
- Improved nano catalysts for seed oil hydrogenation to diesel
- Anaerobic microbes for the conversion of C5 and C6 sugars to acids with improved tolerance to 100% substrate concentration
- Novel technology for the separation of acids from dilute solutions
- Novel technology for the production of nanocellulose
- Improvement of an existing SSH process for ethanol production
- Novel low temperature pyrolysis and catalytic gasification unit for wet solid waste conversion to fuel gas
- Model for wastewater utilisation
- Model for adding value to wastewater and flue gas through algae production

Some findings

We will consider Biofuels

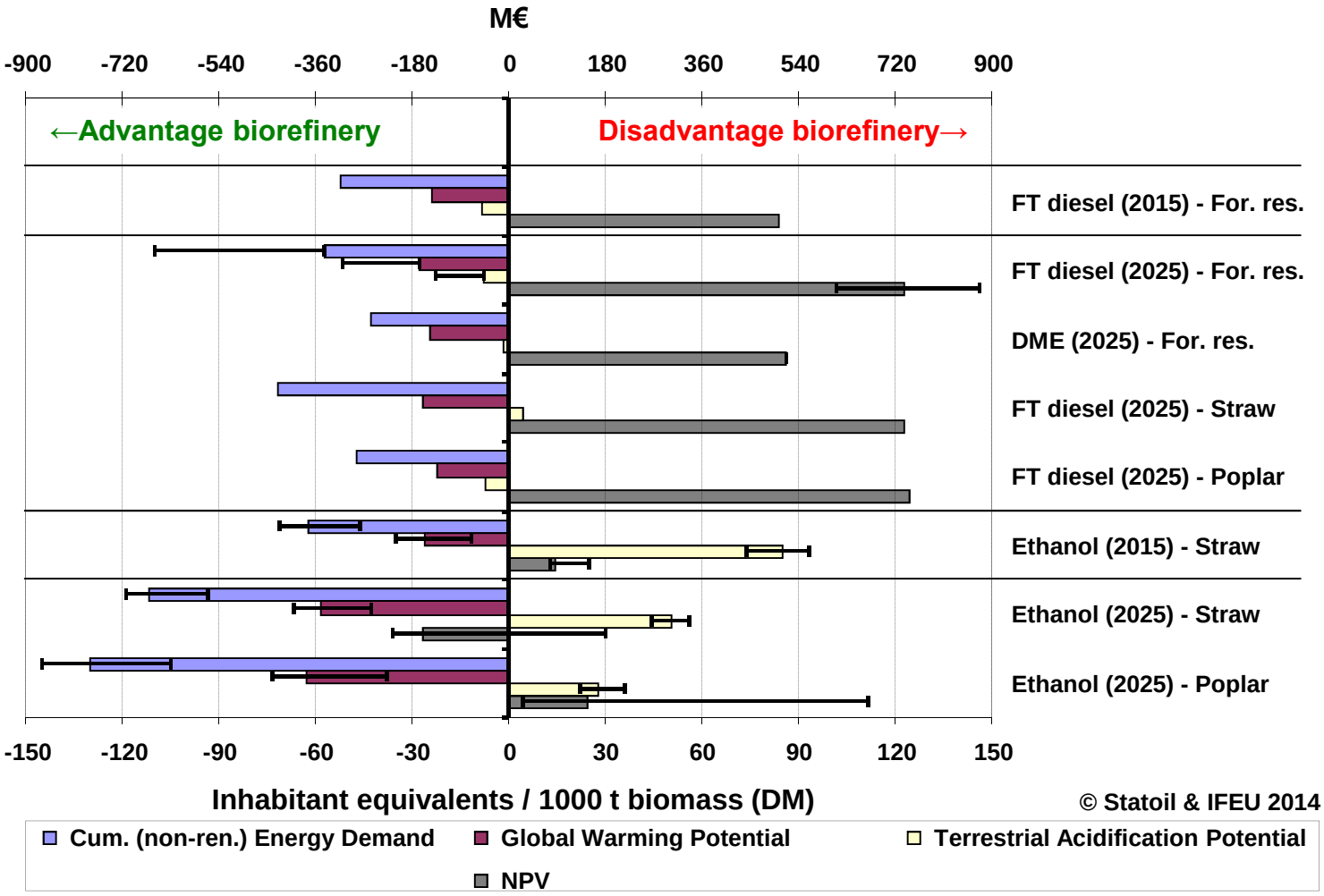
Scenarios Biochemical Route

I. Straw to Ethanol (2015) – Early implementation
II. Straw to Ethanol (2025) – Mature technology configuration
III. Poplar to Ethanol (2025) – Mature technology configuration

Scenarios Thermochemical route

I. Forest residues to FT liquids (2015) – Early implementation
II. Forest residues to FT liquids (2025) – Mature configuration
III. Forest residues to DME (2025) – Mature configuration
IV. Straw to FT liquids (2025) – Mature configuration
V. Poplar to FT liquids (2025) – Mature configuration

Thermochemical and Biochemical Routes to Biofuels
LCA and Economic evaluation



Conclusions

- It is environmentally very beneficial to produce biofuels
- The cost of production of biofuels with current technology renders them uncompetitive
- We have been able to identify unit operations that can be further improved to considerably reduce the disparity of production cost with respect to fossil fuels
- Despite this, however, a cost parity cannot be achieved unless some policies such as including environmental costs in production costs etc. are introduced