

Techno-Economic Assessment of Processes that Produce Jet Fuel from Plant-Derived Sources



by
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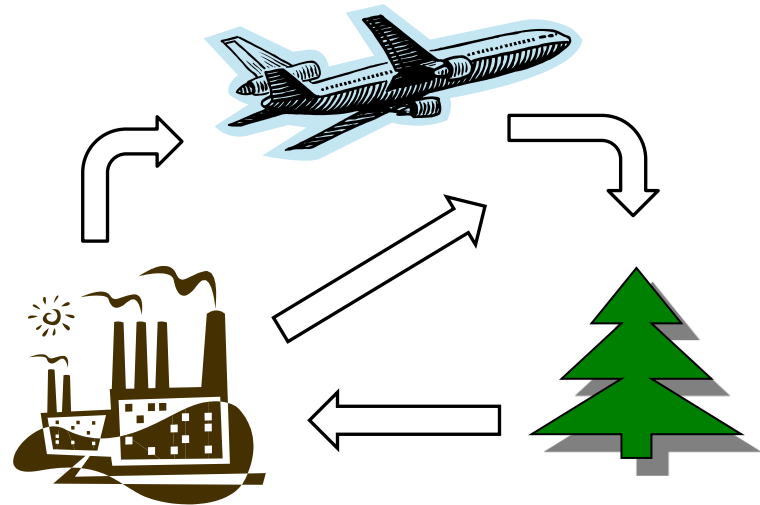
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Content

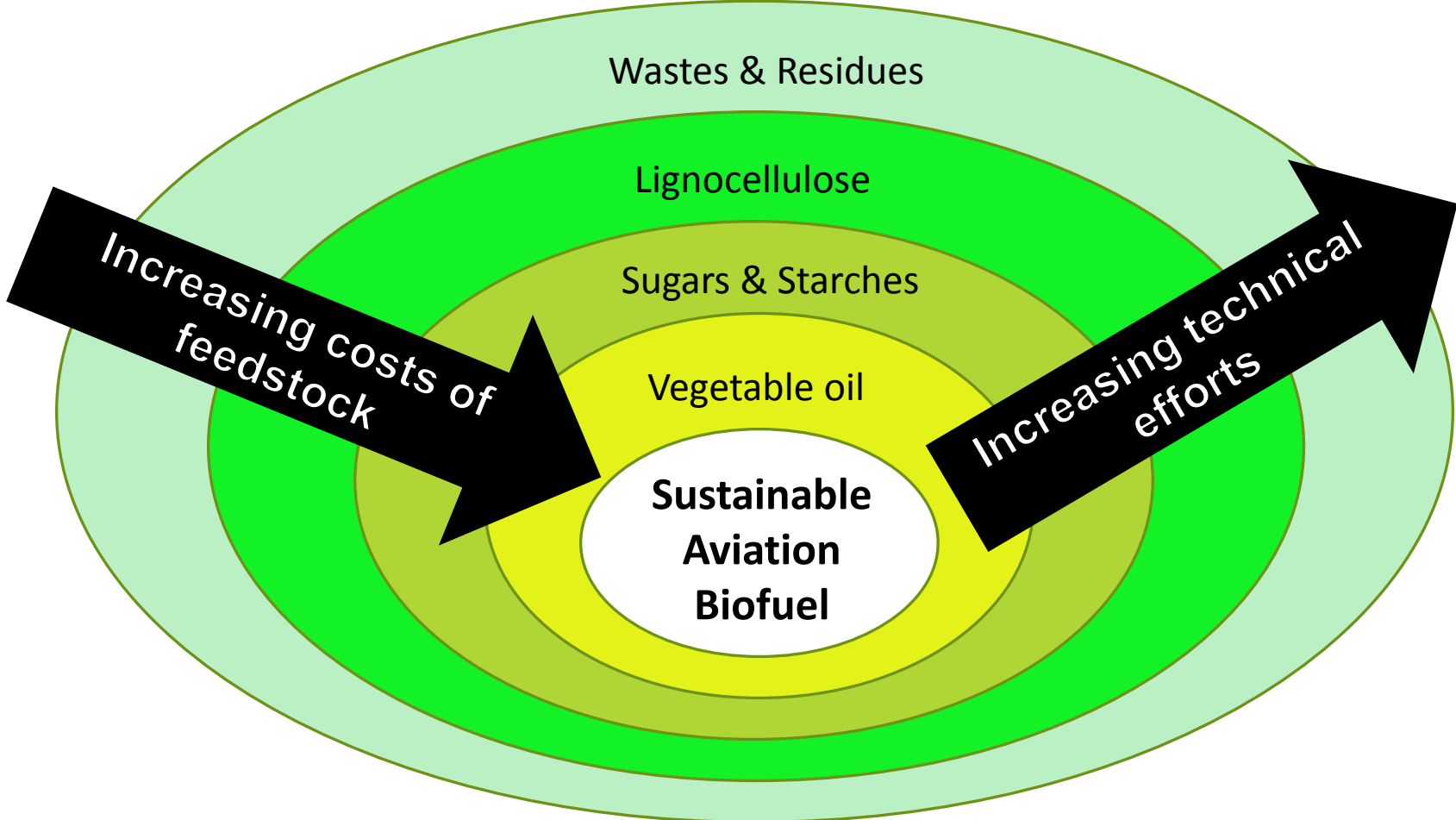
- Motivation
- Feedstock, product
- Objectives
- Investigated processes
- Approach
- Results
- Conclusions

Project motivation

- High consumption of Jet fuel
- Conventional Jet Fuel - high GHG emissions
- Non-fossil processes - low GHG emissions
- Closed carbon-cycle

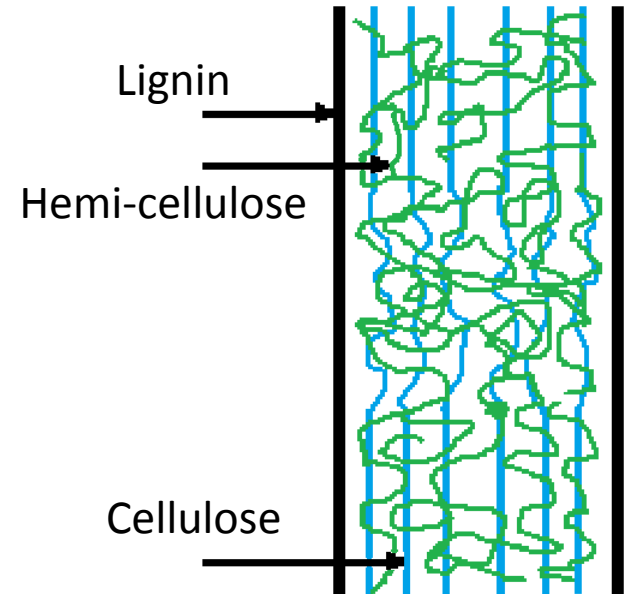


Feedstock



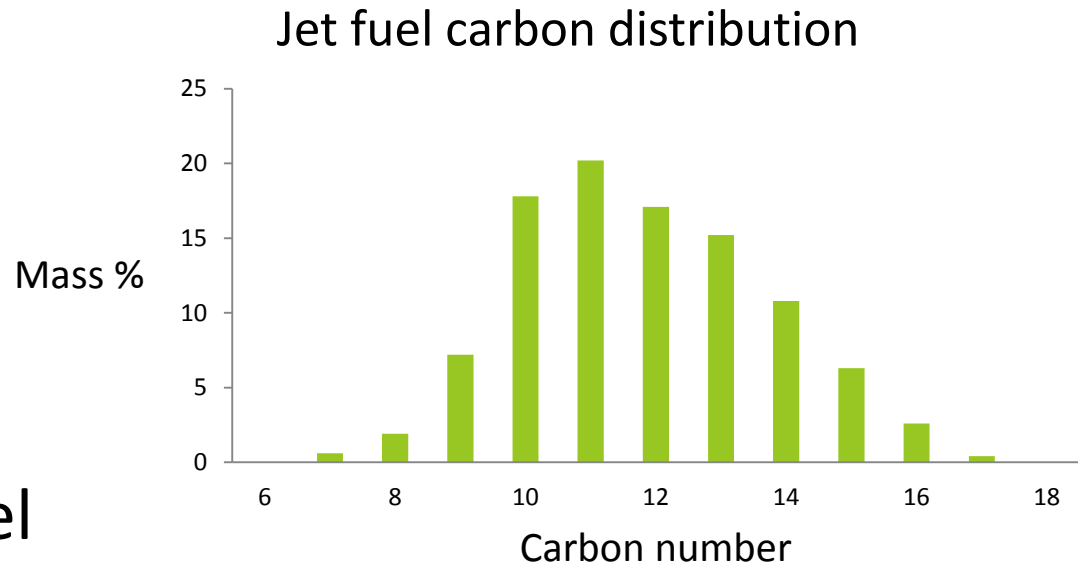
Lignocellulose

- Cellulose, hemi-cellulose and lignin
- Sources
 - Forest products
 - Energy crops
 - Wastes



Jet fuel

- Mixture of hydrocarbons



- “Drop-in” jet fuel

Objectives

Main Objective:

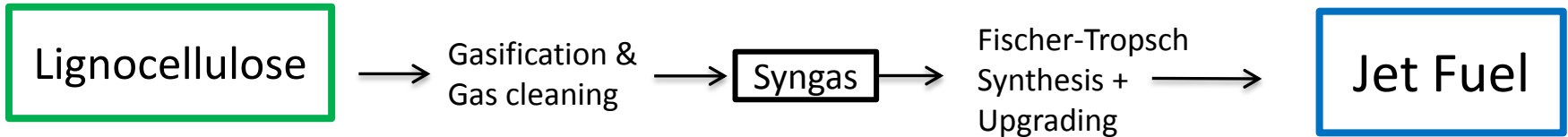
- Compare lignocellulose to jet fuel processes

Minor Objectives:

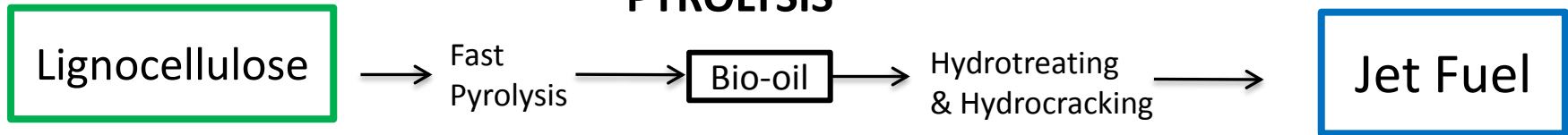
- Compare plant-derived jet fuel production processes
- Commercial feasibility of lignocellulose to jet fuel processes

Lignocellulose-to-Jet processes

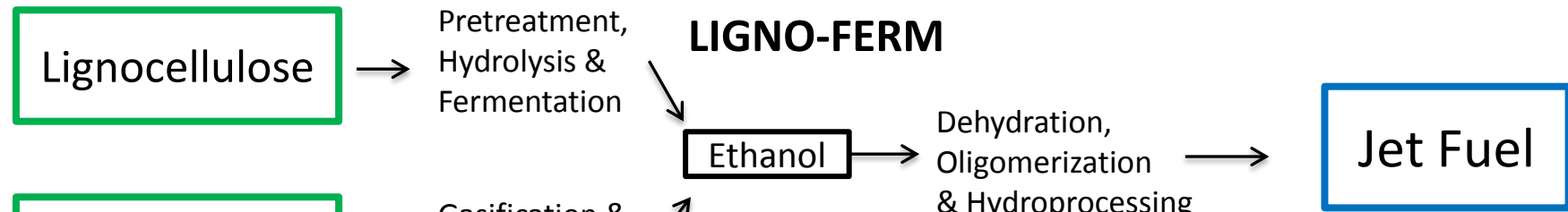
FISCHER-TROPSCH



PYROLYSIS



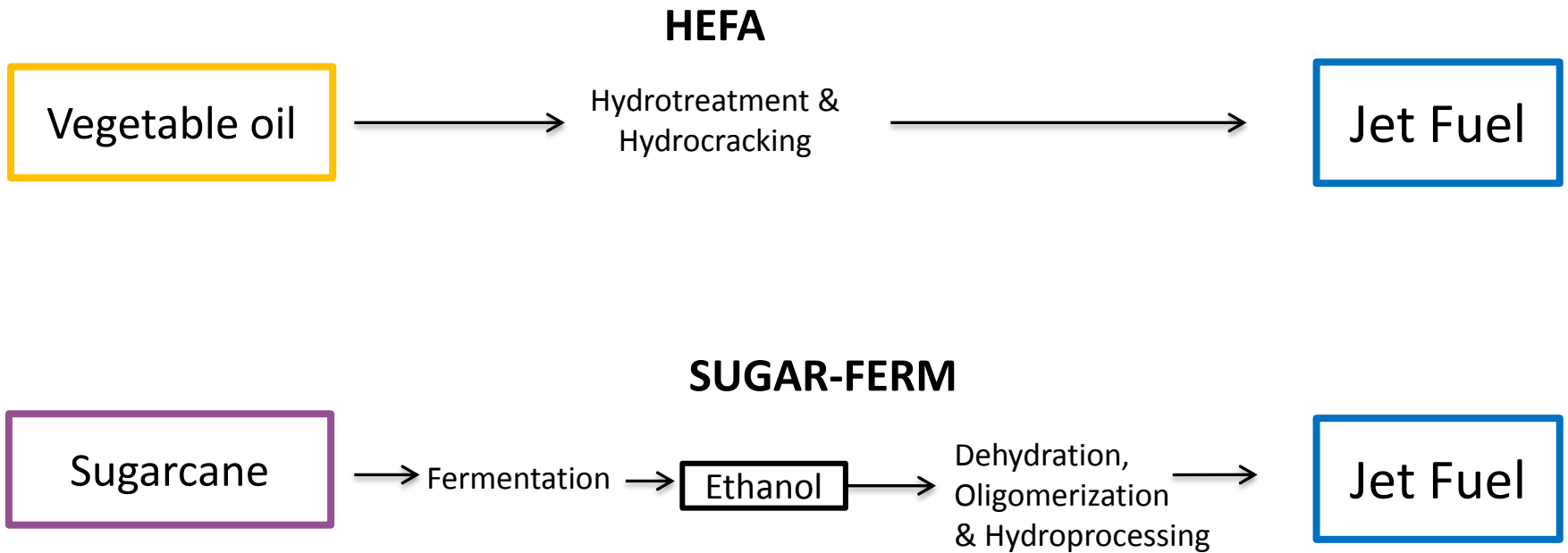
LIGNO-FERM



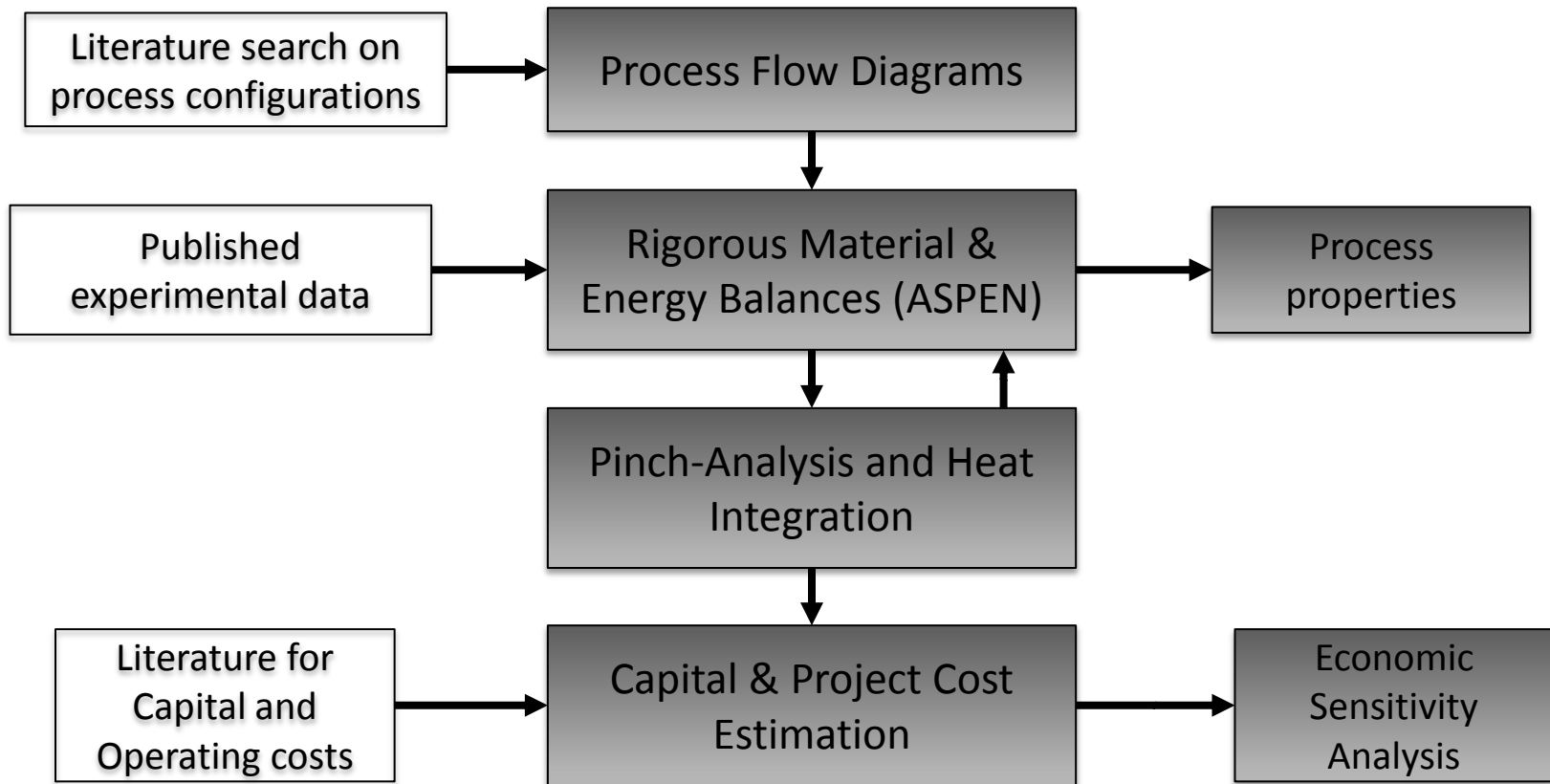
SYNGAS-FERM



1G-to-Jet processes

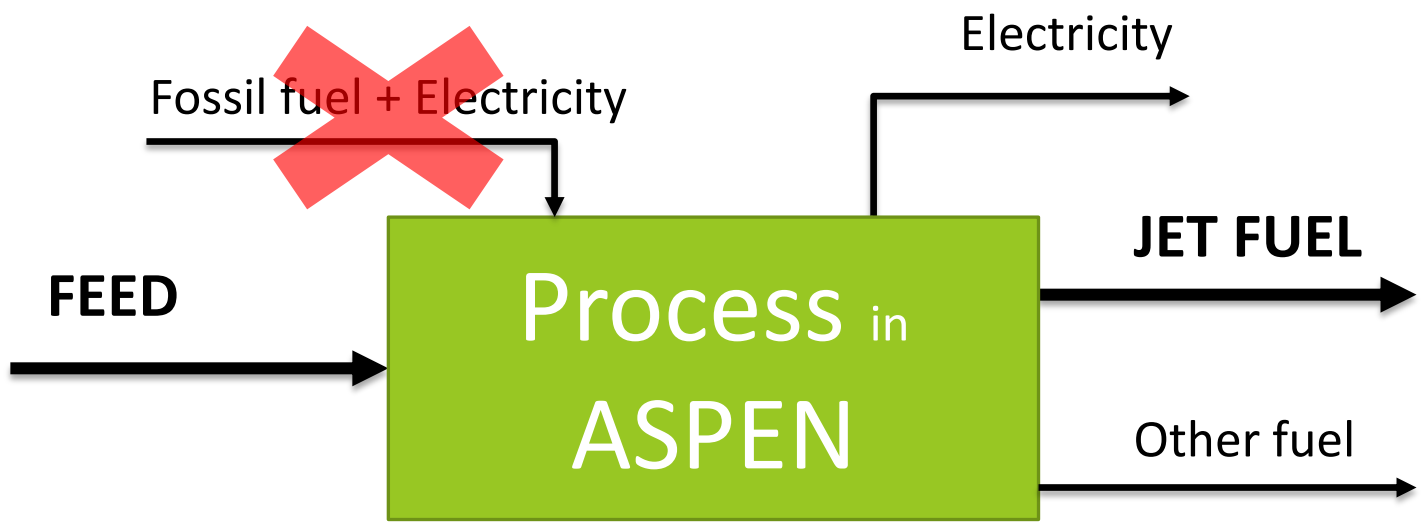


Approach

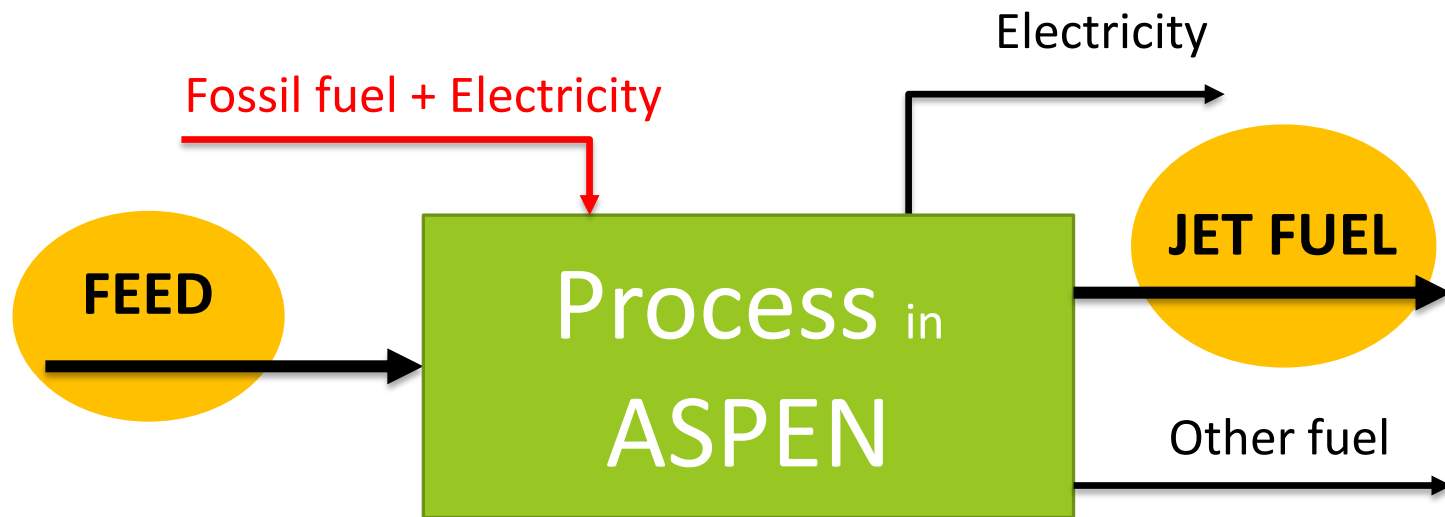


ASPEN Simulation

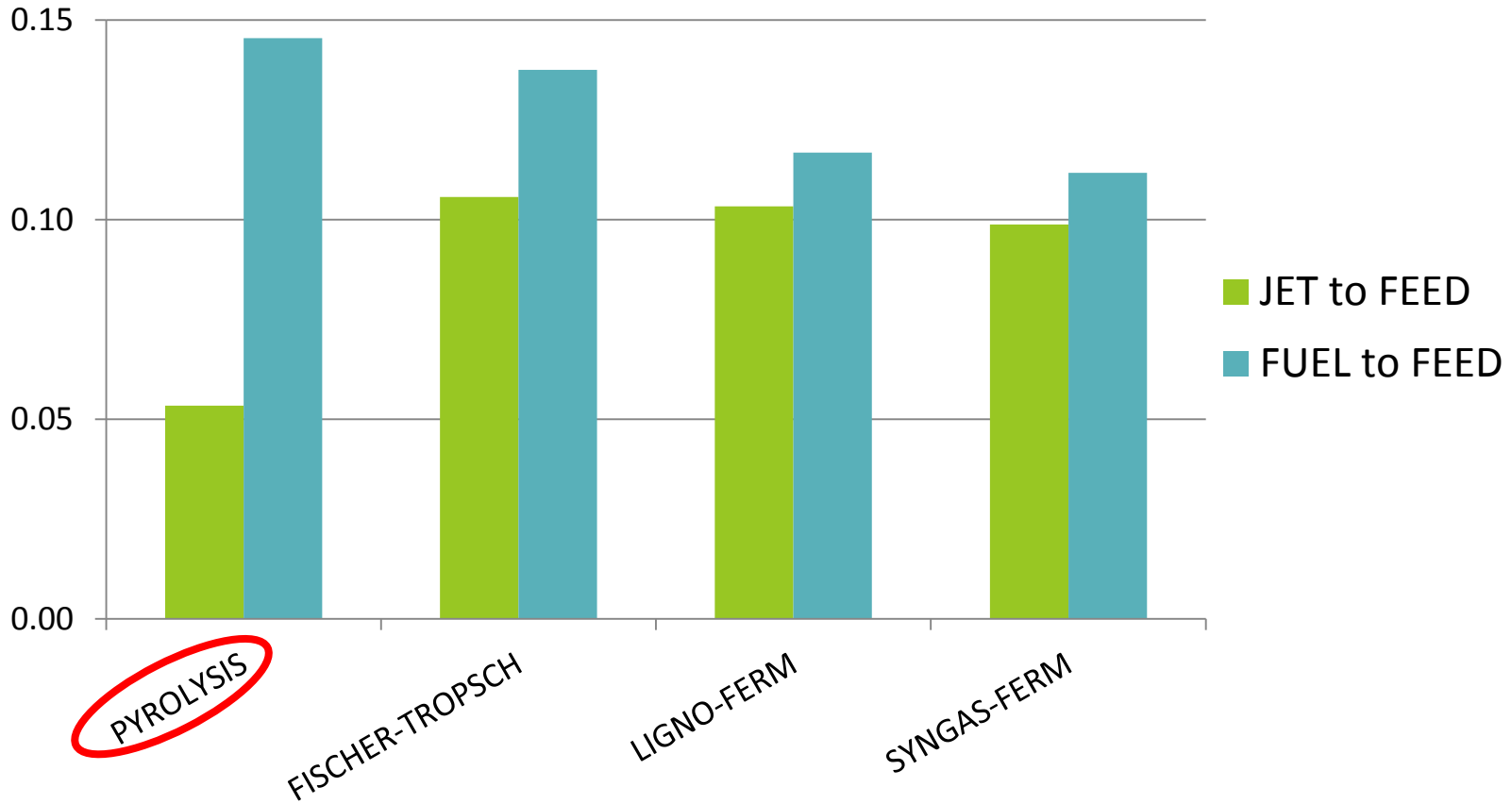
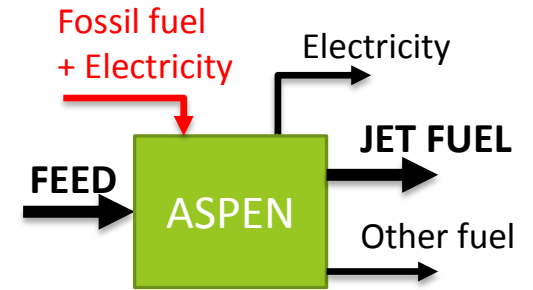
- Mass and Energy balances



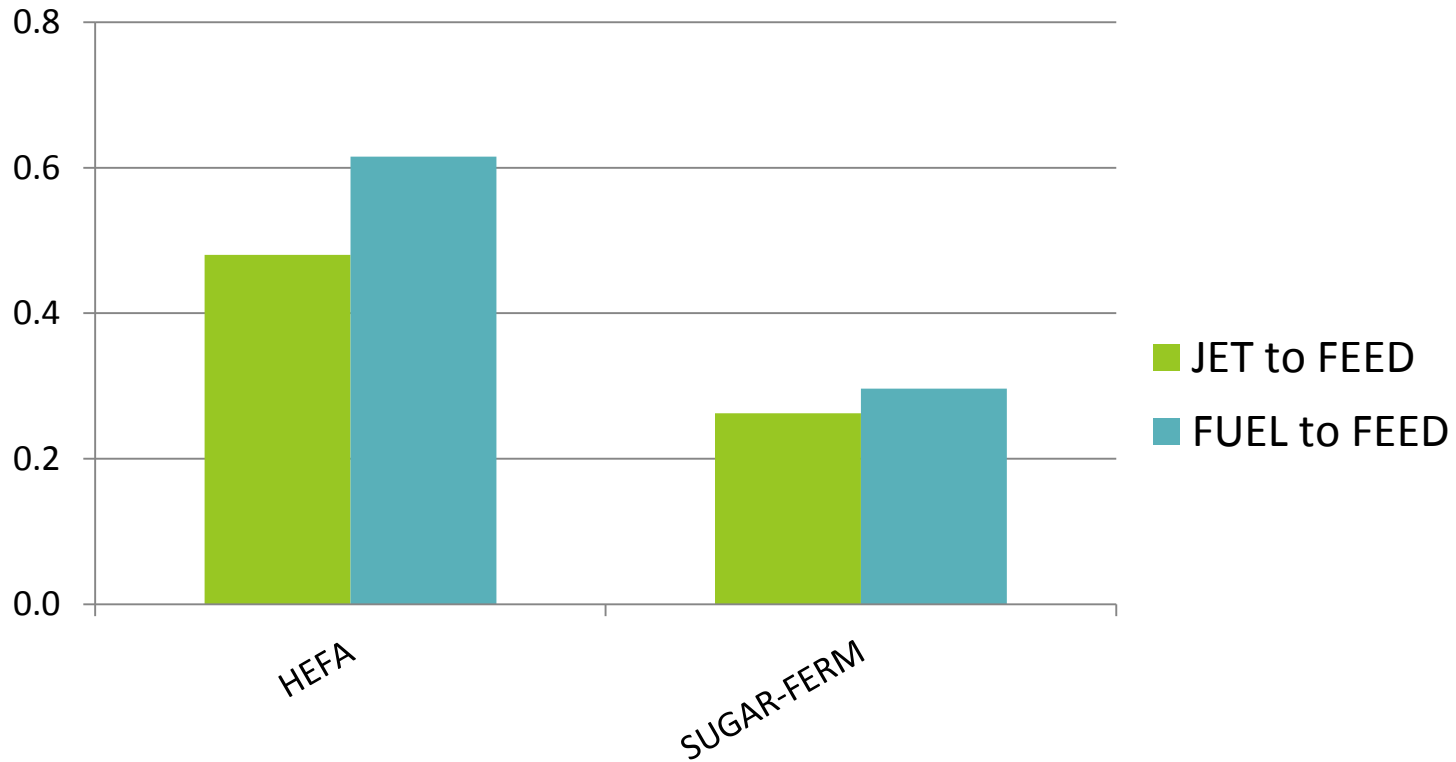
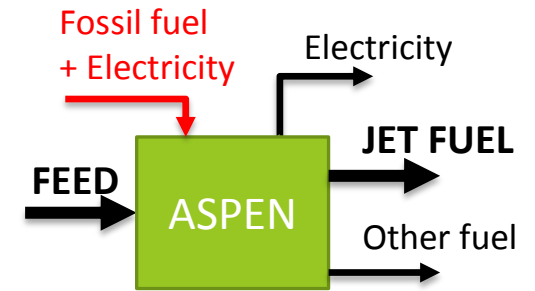
Mass ratios



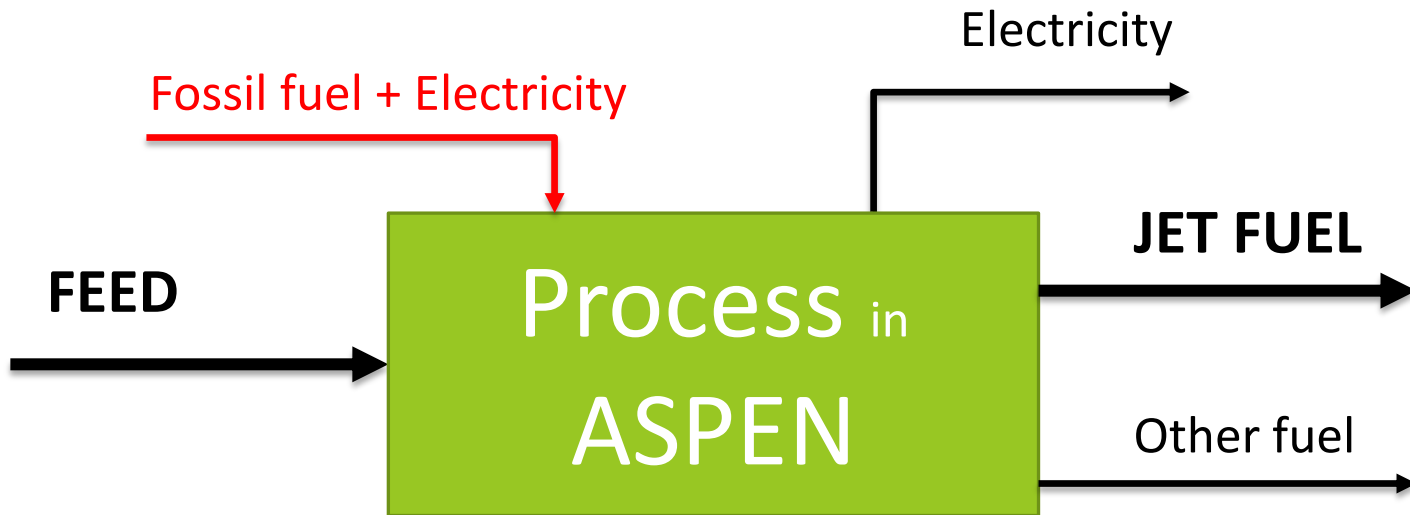
Mass ratios



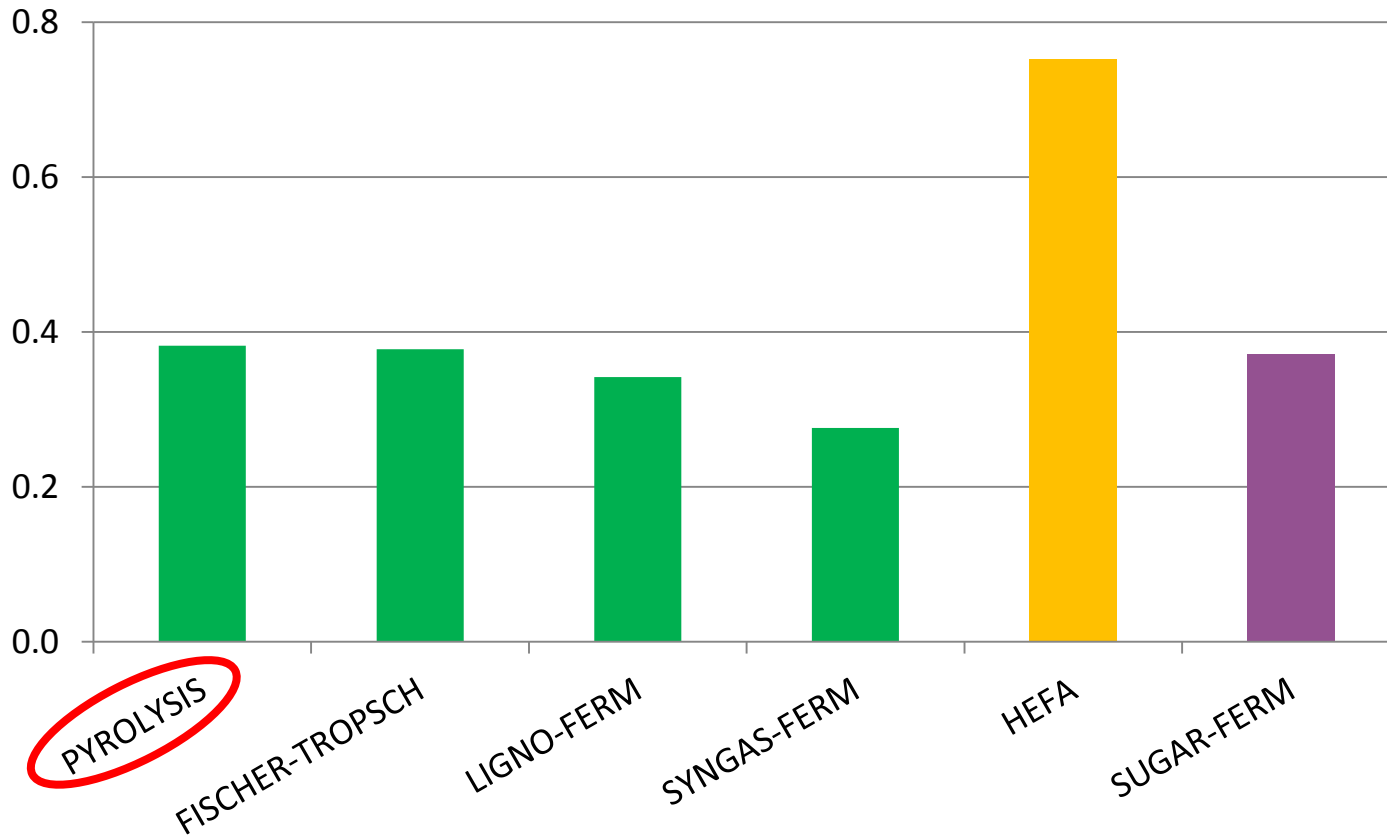
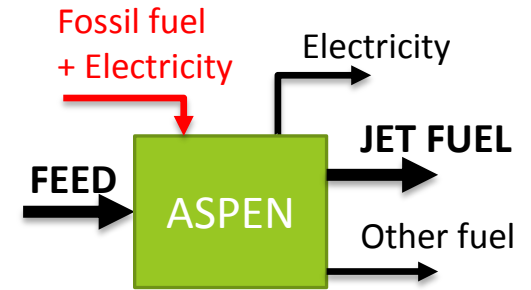
Mass ratios



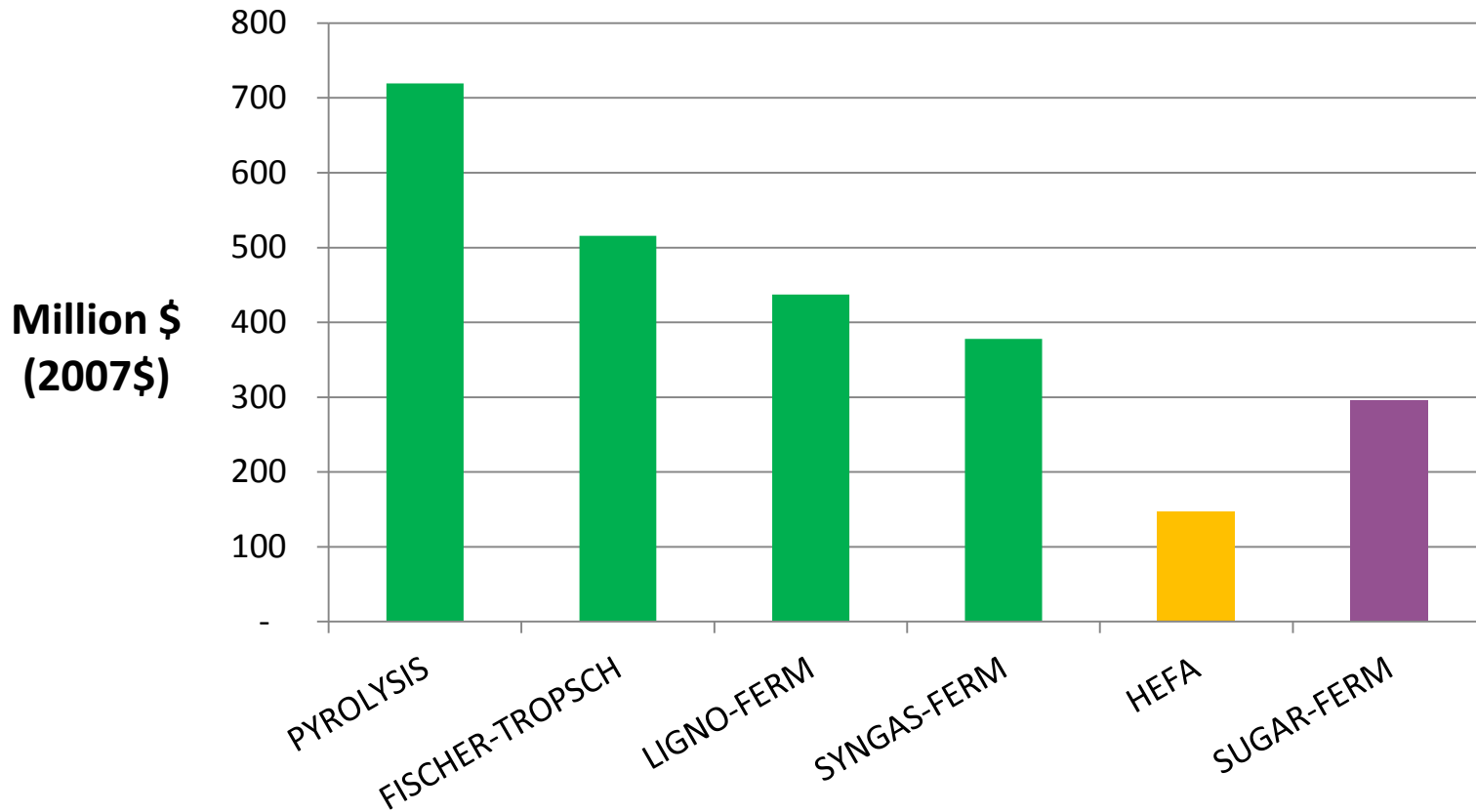
Overall Energy Efficiencies



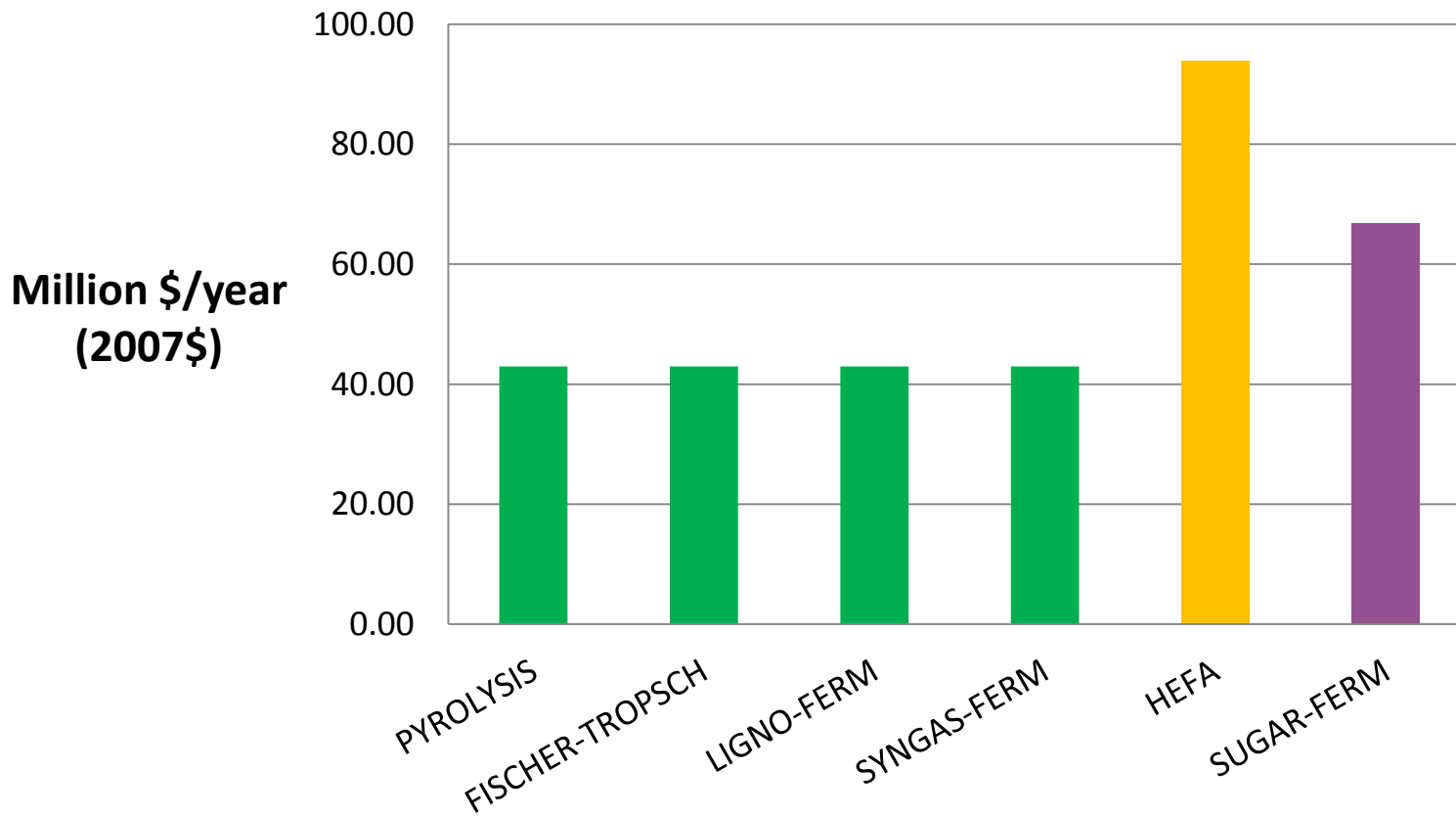
Overall Energy Efficiencies



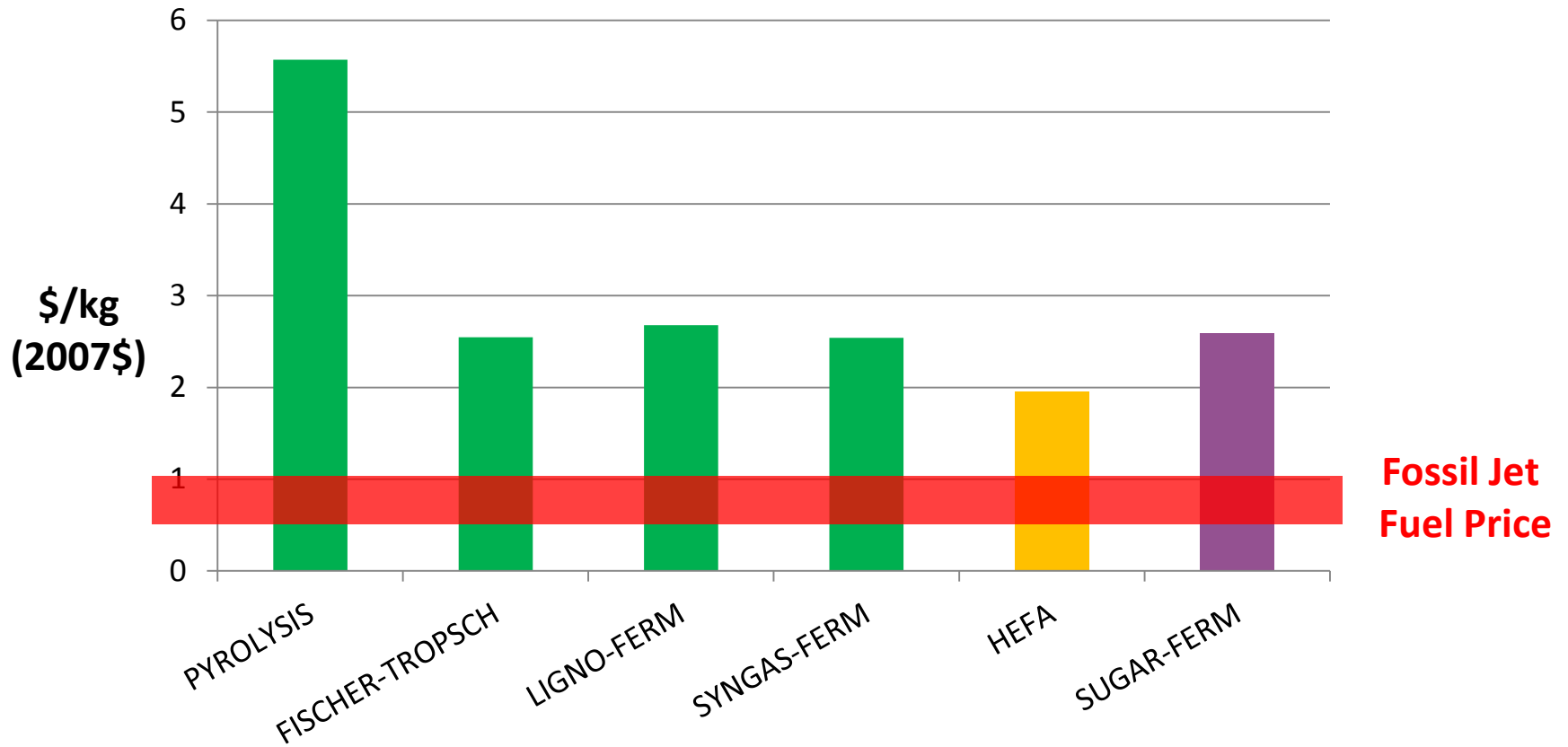
Process Capital Cost



Feedstock Cost



Minimum Jet Selling Price



Conclusions (thus far)

- Lignocellulose – promising for jet fuel
- No outright winner
- Biogenic jet fuel is expensive!
- Further investigate GHG emissions

Further work

- Economic sensitivity analysis
- Comparison of processes

Acknowledgements

- CRSES