

# Optimal process design for thermochemical production of fuels from biomass

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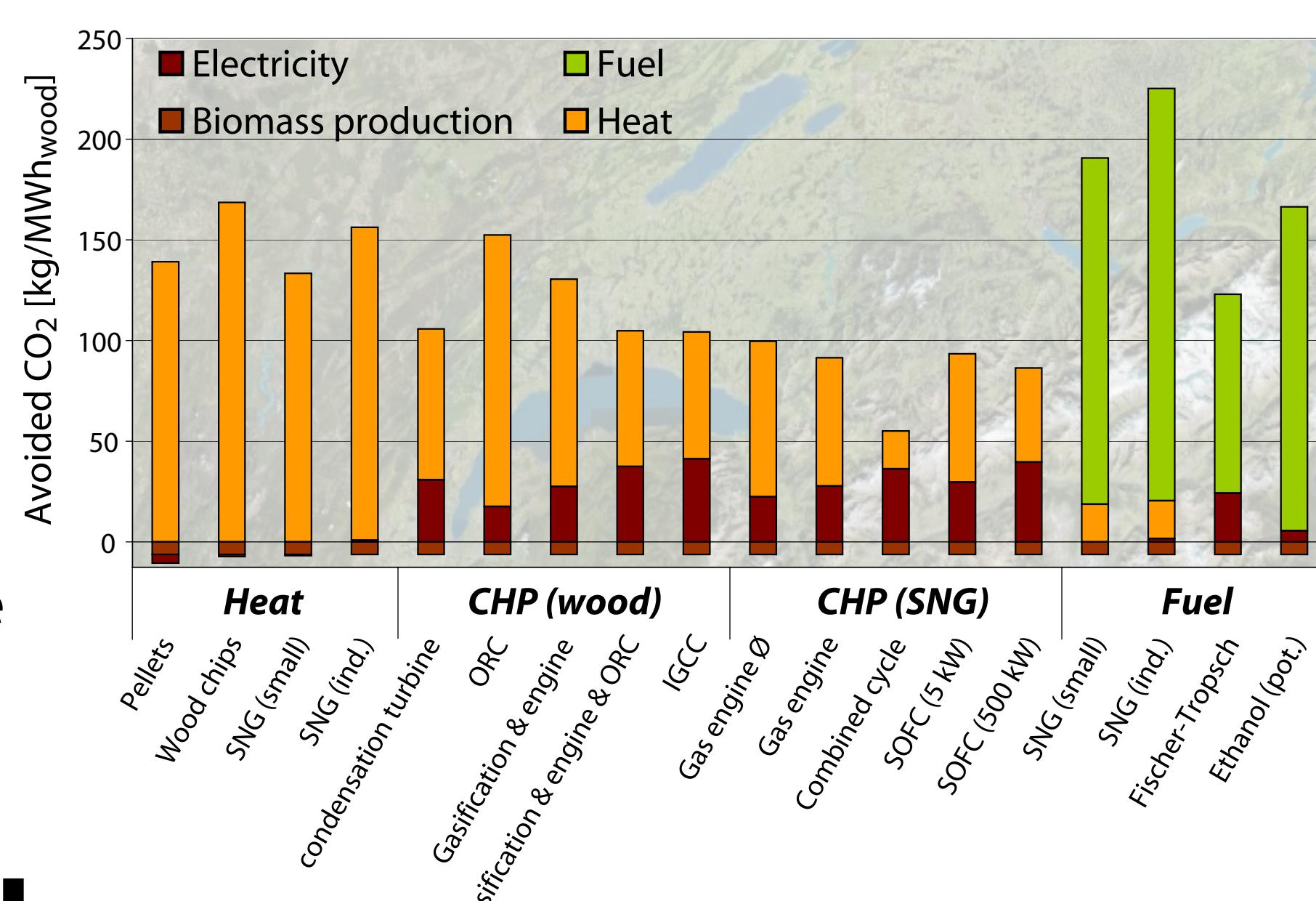
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## MOTIVATION

### Polygeneration of energy services from waste biomass

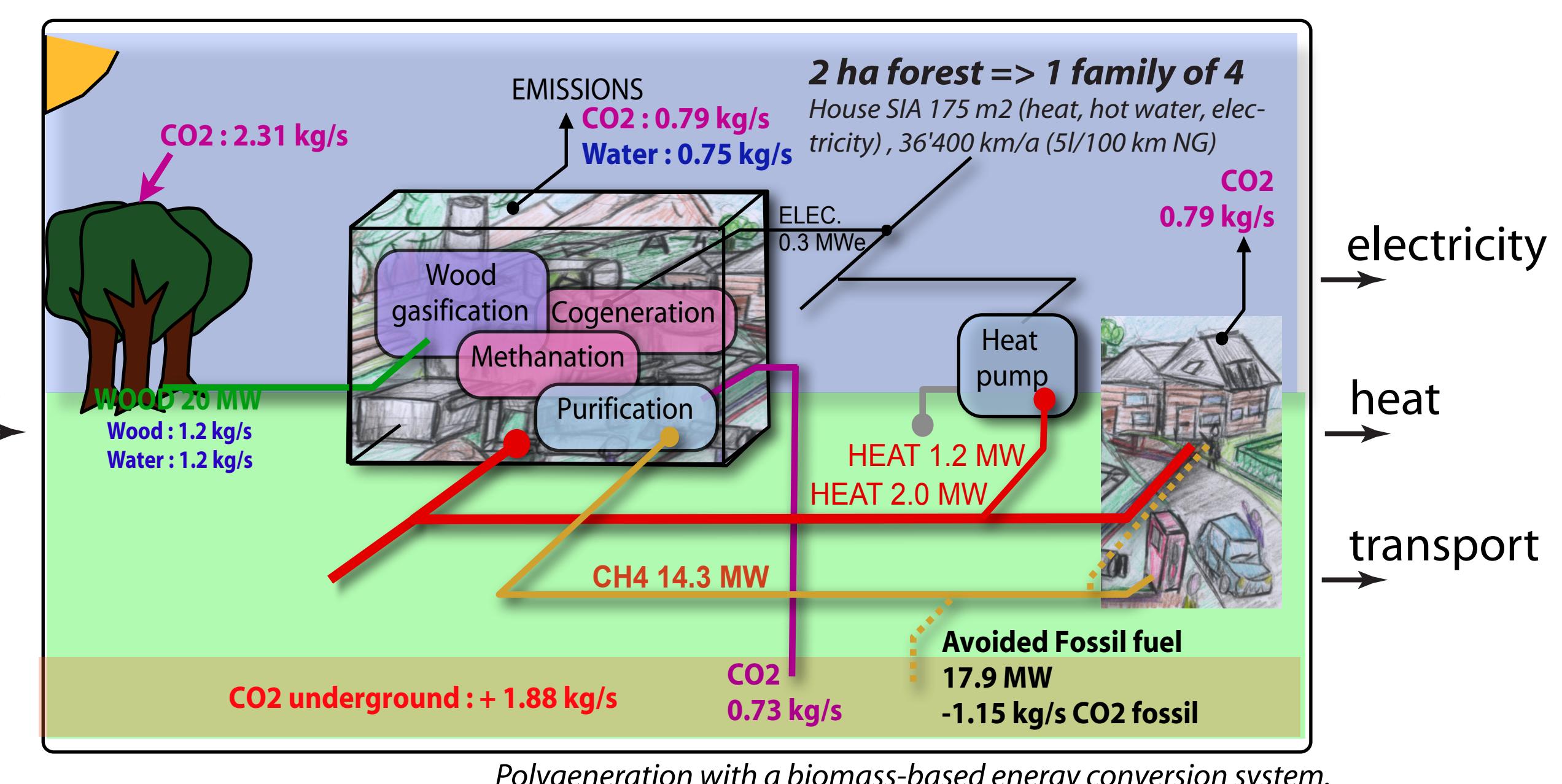
CO<sub>2</sub>-mitigation potential for wood-based cogeneration options:

- Biomass:
  - renewable
  - CO<sub>2</sub> neutral
  - land is limited
- Heat and power sector:
  - energy/CO<sub>2</sub> efficient technologies exist
- Transport is the challenge



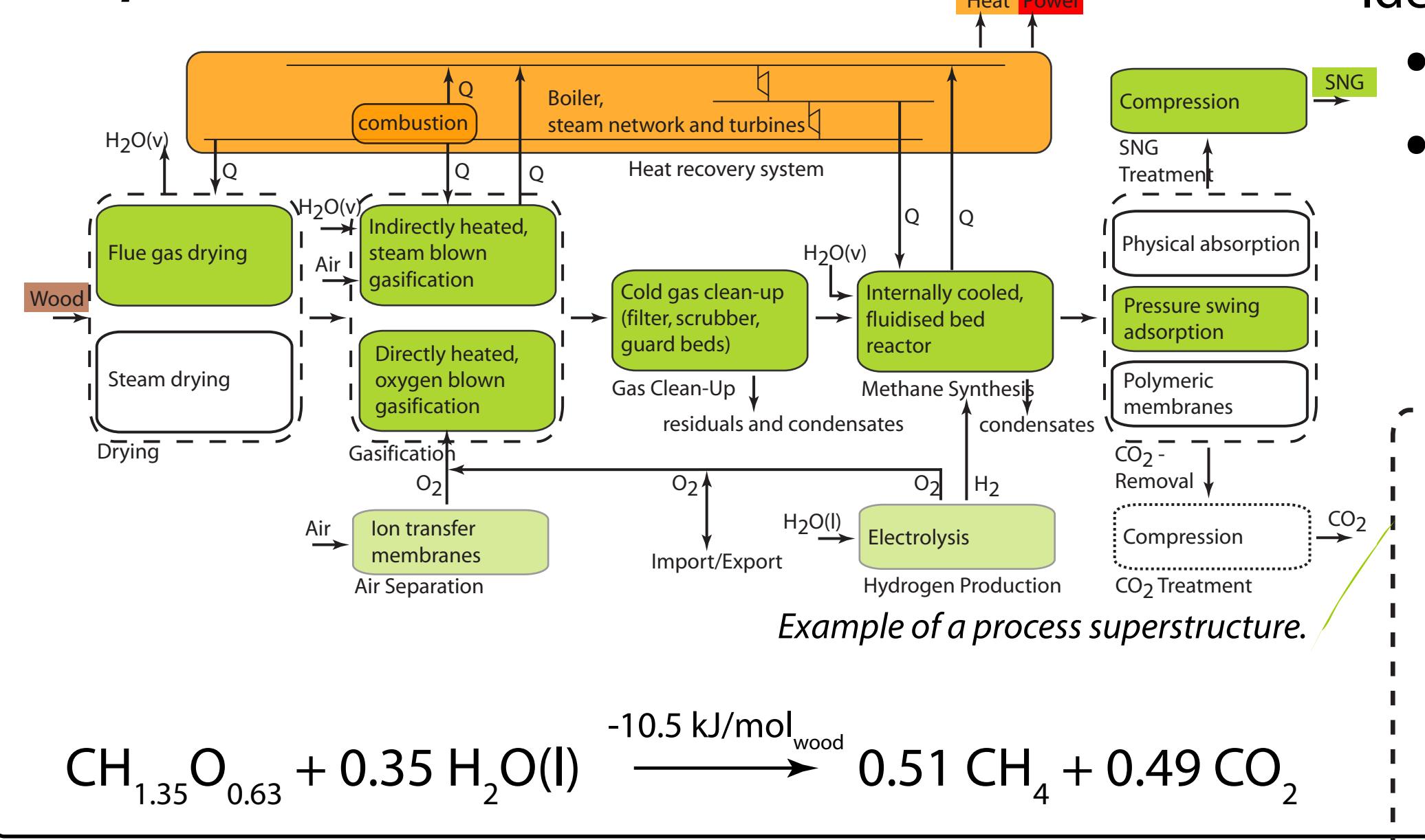
## OBJECTIVES

### Process design for the optimal use of a scarce resource



## APPROACH

### Superstructure definition



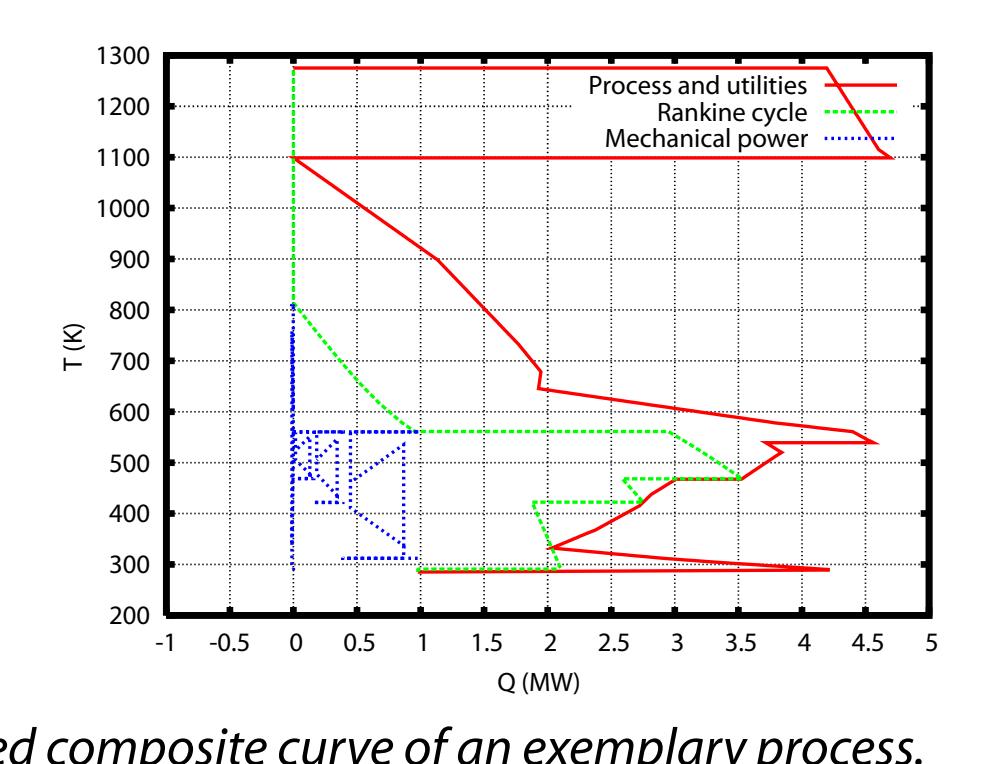
- Identification of:
- feasible production pathways
  - suitable technology

block flow superstructure ①

### Thermo-economic modelling

- Flowsheet generation:
- decoupled energy flow & integration modelling
  - equipment rating & costing

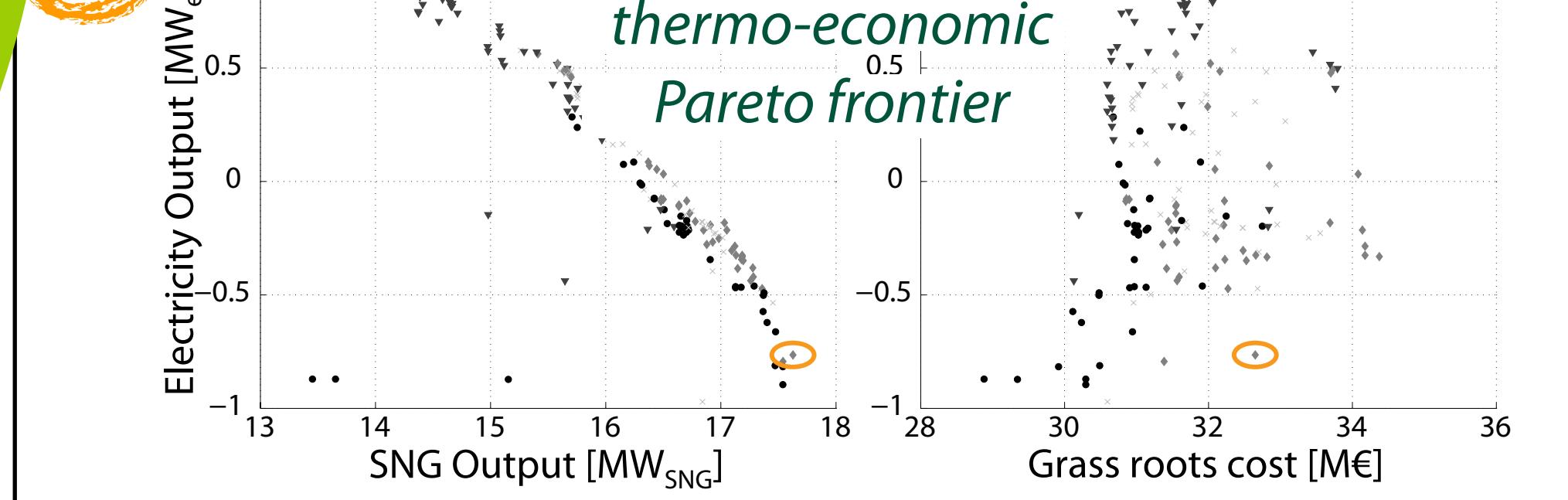
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### Multi-objective optimisation

- Generation of optimal flowsheets. Determine:
- performance indicators
  - decision variables (technology/operating conditions)
  - objectives that represent all performance indicators

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### Optimisation results analysis

Analysis of the decision variables along the Pareto frontier. Identify:

- system interactions
- technological bottlenecks

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