

SP 5: Methanation of biomass gasification products

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Summary

- Power-to-Gas can be combined with biomass gasification to yield a flexible renewable natural gas production
- Process simulation with time variable electricity cost were performed
- Flexibility allows to decrease the production costs and to adapt to market conditions

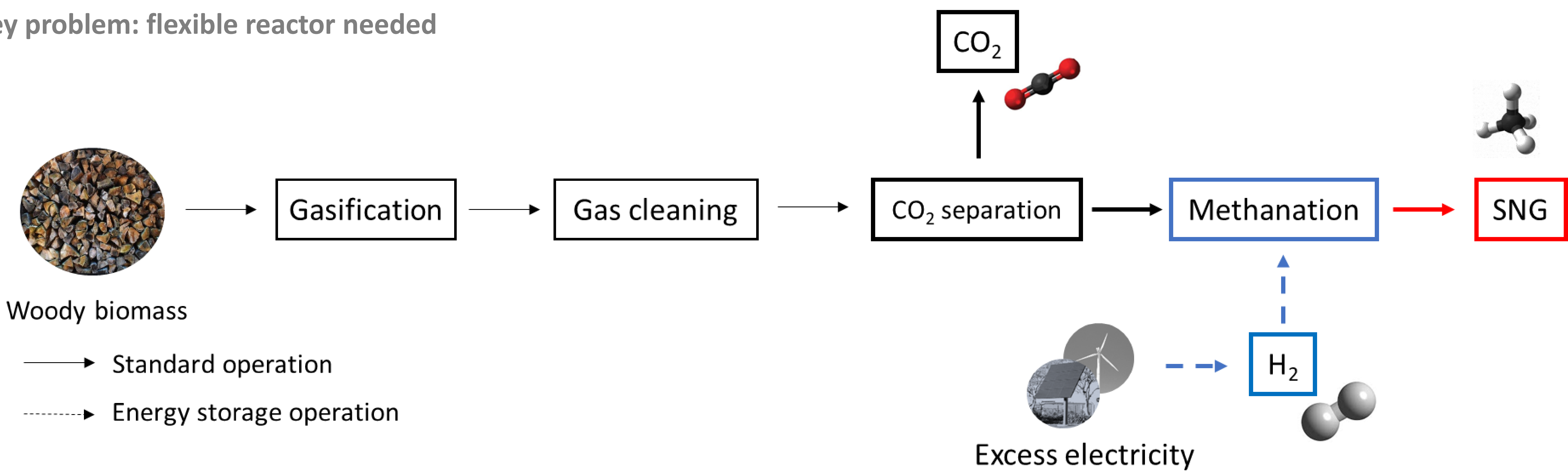
Research question

The introduction of **power-to-X** processes requires the combination with cheap CO₂ sources – especially (biogenic) point sources

Methanation after gasification is an ideal example: **CO₂ is removed** in SNG production and **H₂ is used** in methanation to SNG

Need for flexible process: **CC(S)** when e⁻ is expensive, **CCU** when e⁻ is cheap

Key problem: flexible reactor needed

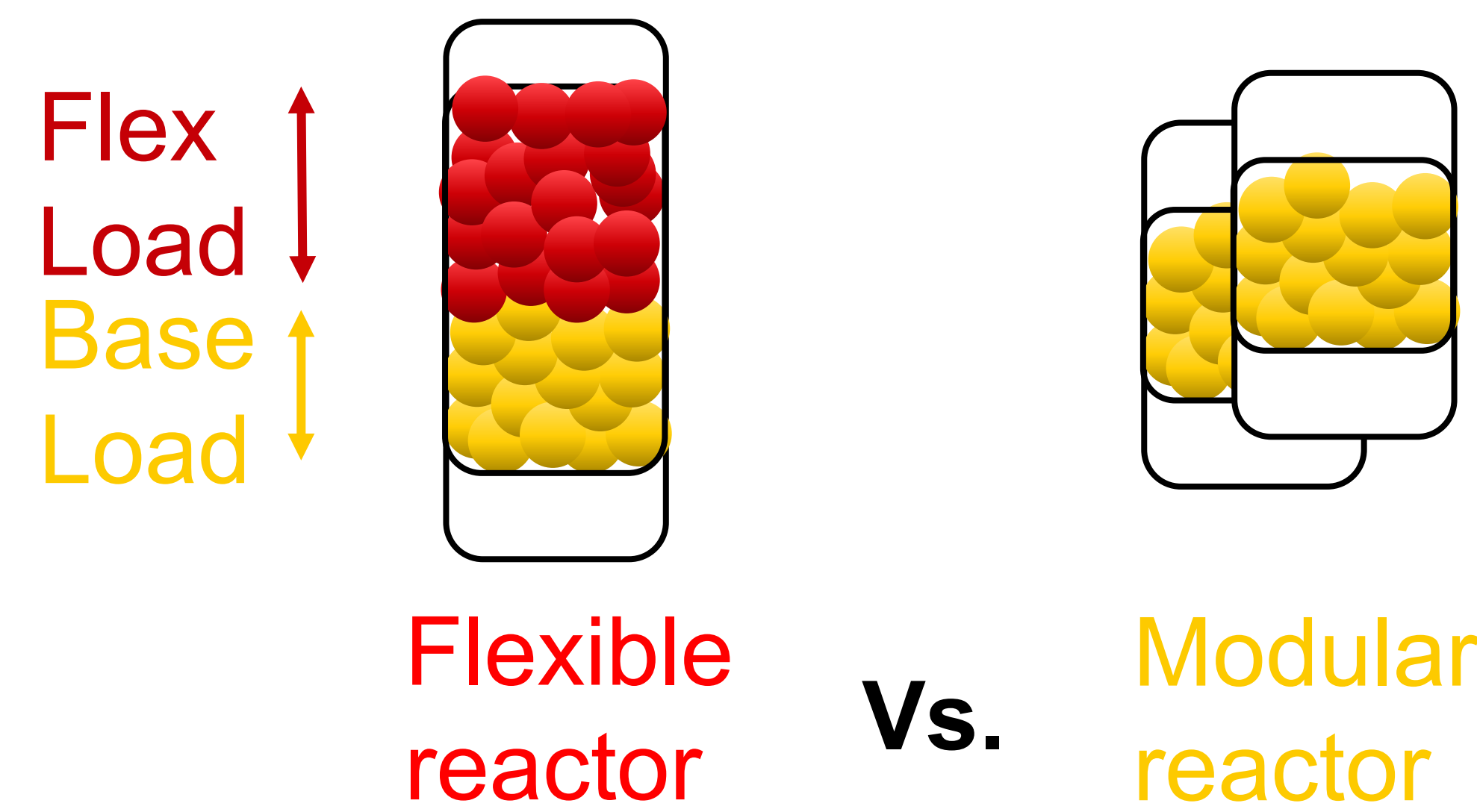


What do process simulations say?

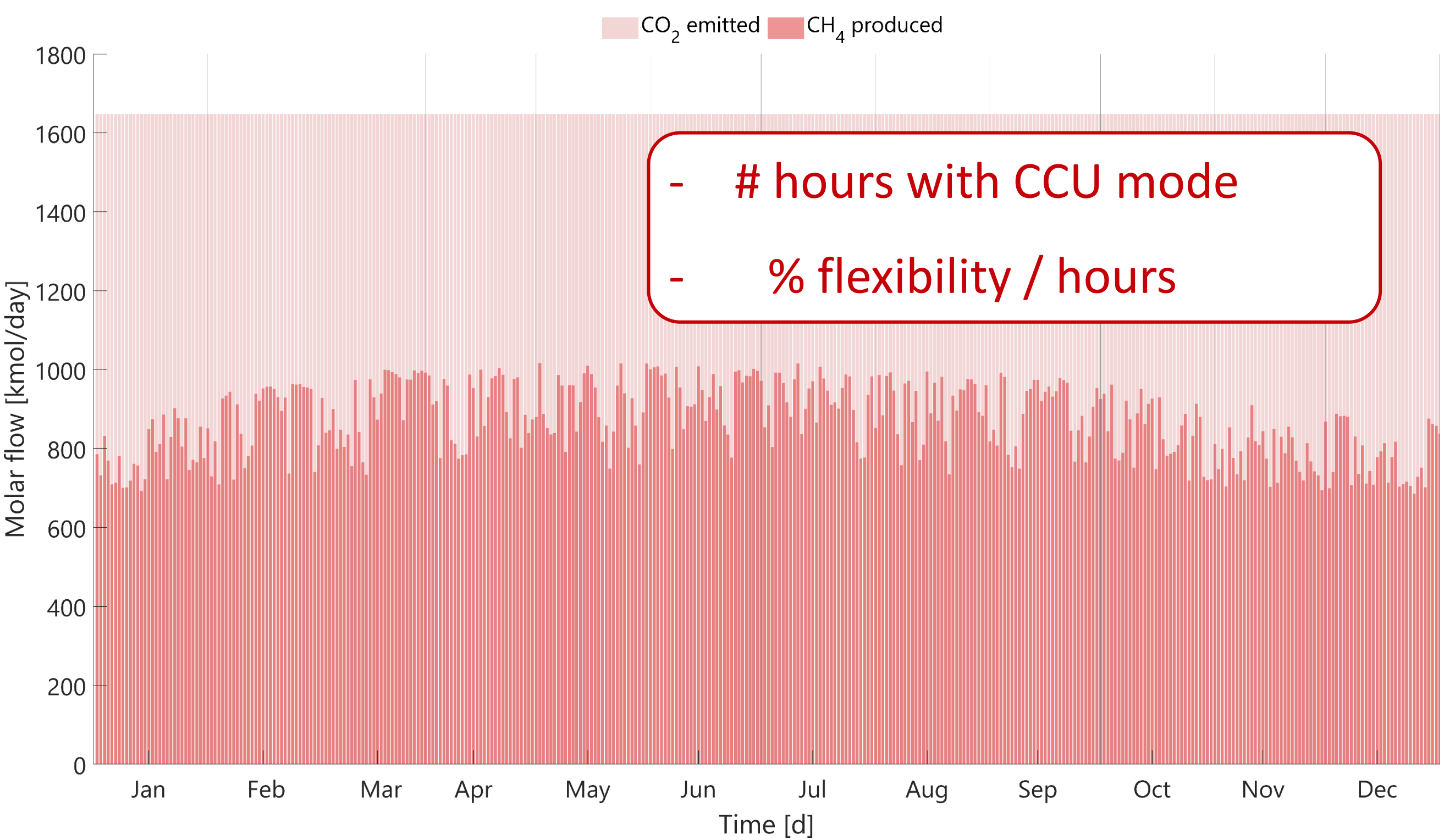
Reactor design tailored to the specific case

2 main elements of flexibility { Load change between CCS and CCU
Load flexibility of the reactor

Reactor flexibility



Integration of reactor and system model allows determining the required flexibility

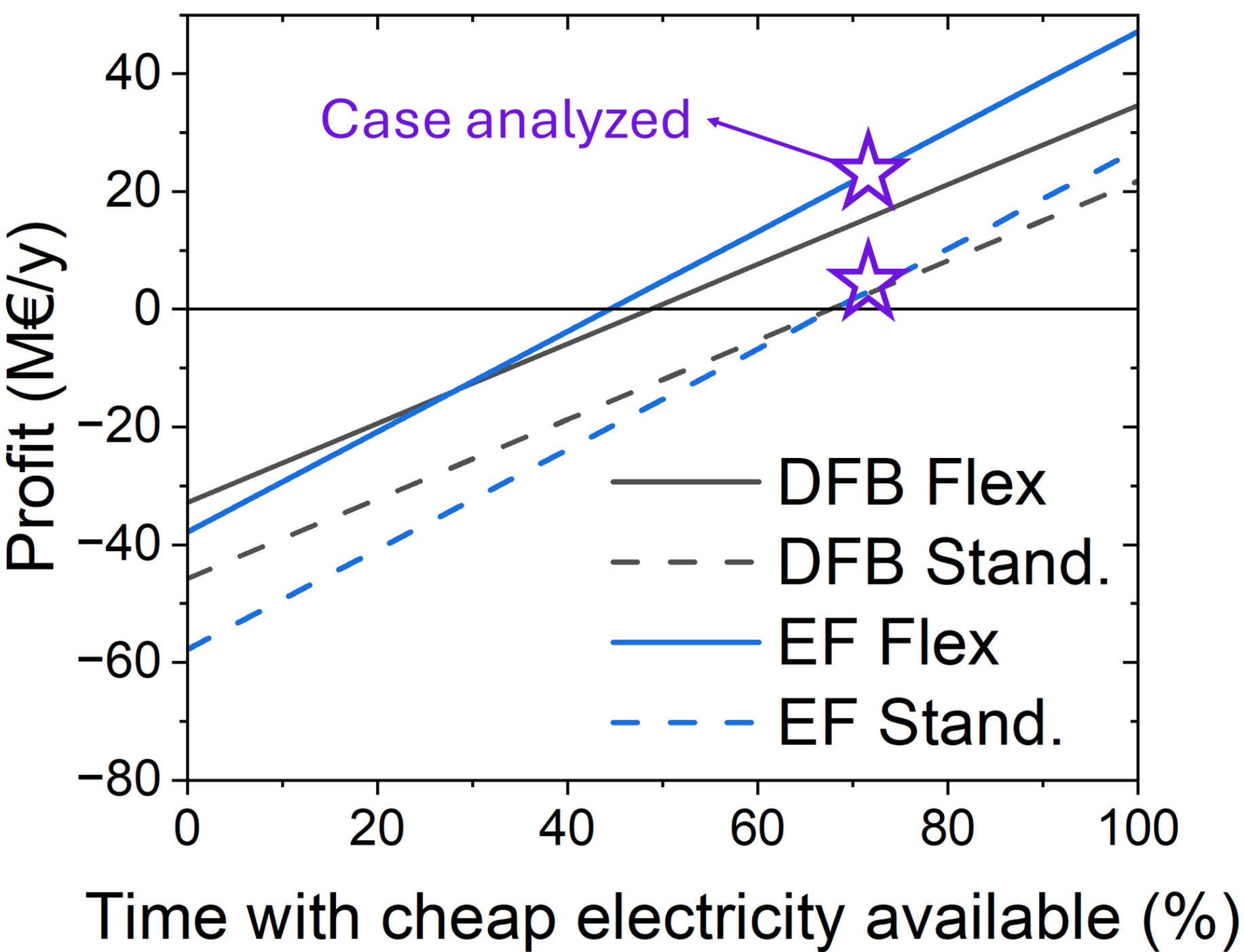


Product gas volume

Gasifier/ load case	DFB [m³/h]	EF [m³/h]
CCS case	100	100
CCU case	229	289

DFB = Dual Fluidized Bed, EF = Entrained Flow

Determination of profitability



Validation with sensitivity analysis

