Flexible sector coupling – Integration into the energy system of the future and impact of the regulatory framework

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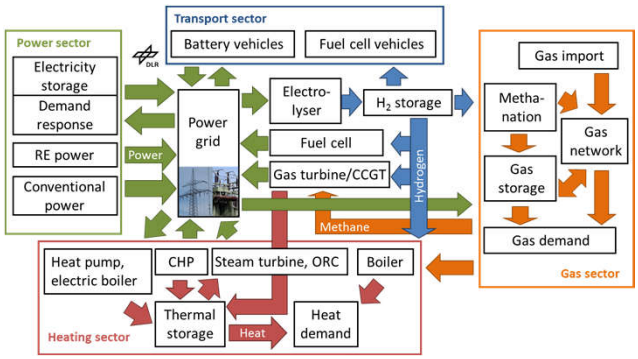
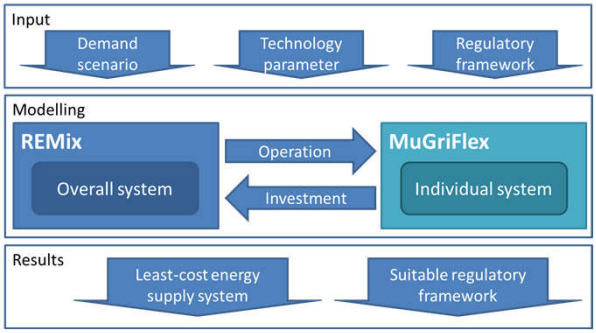
Project focus

- Evaluation of flexibility in future energy systems
- Integrated modelling of power, gas, heat & transport
- Interaction between sector coupling technologies
- Power demand flexibility in the gas system



Methodology

- Coupled application of two energy system models
- Comparison of macroeconomic & business perspective
- Analysis of the regulatory framework



Considered scenarios

- Myopic model application 2020, 2030, 2040, 2050
- Geographical scope: DE + neighbouring countries

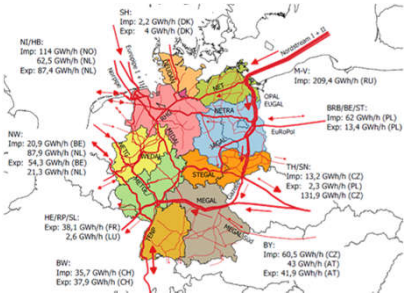
GHG80 (80% CO_2 reduction) | GHG95 (95% CO_2 reduction)

- Exogenously defined demand for power, CH_4, H_2 and heat
- Exogenously defined fuel and CO_2 emissions costs

- Higher CO_2 emission costs
- Increased power and H_2 demand in transport and heat sectors

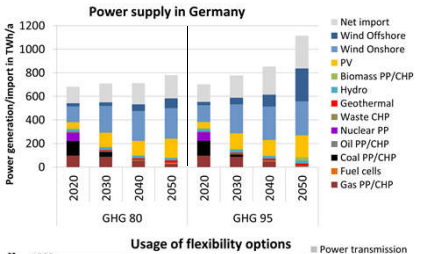
Consideration of today's gas infrastructure

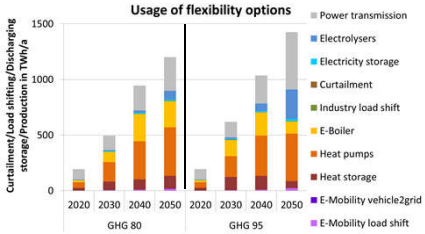
- Integration of today's storage, compression and transport pipeline capacities
- Endogenous expansion of:
  - Transport pipelines
  - Storage (H_2, CH_4)
  - Electrolysers
  - Methanation
  - Gas pre-heating

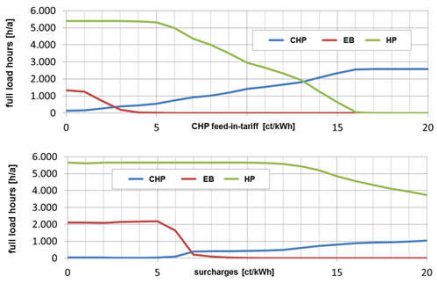


Model results

- Synergetic interaction of flexible sector coupling technologies
- Flexible hydrogen production can contribute to RE balancing
- Heat networks to be supplemented with storage and heat pumps
- Partial rededication of the natural gas transport infrastructure to hydrogen can reduce system transformation costs







- Framework conditions have decisive influence on achieving targets
- Adjustments in framework conditions required to trigger investment and operation towards the economic optimum

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