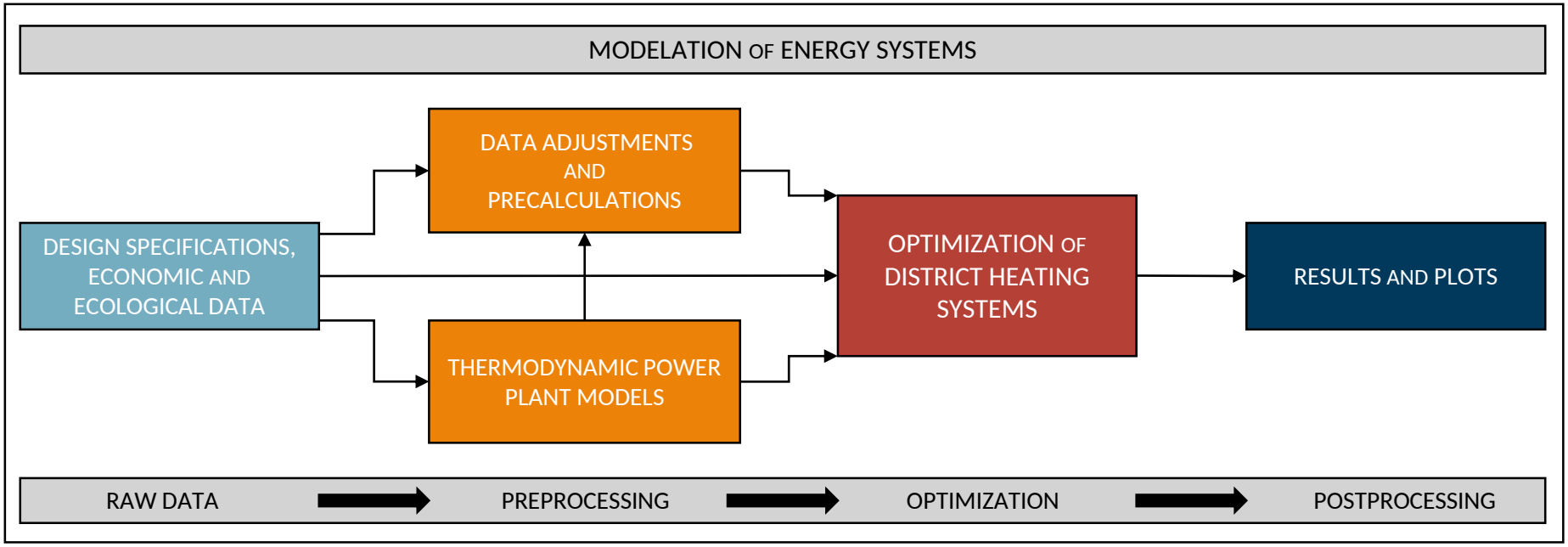
ZNES Zentrum für nachhaltige Energiesysteme
Hochschule | Europa-Universität Flensburg

Generic District Heating System Model

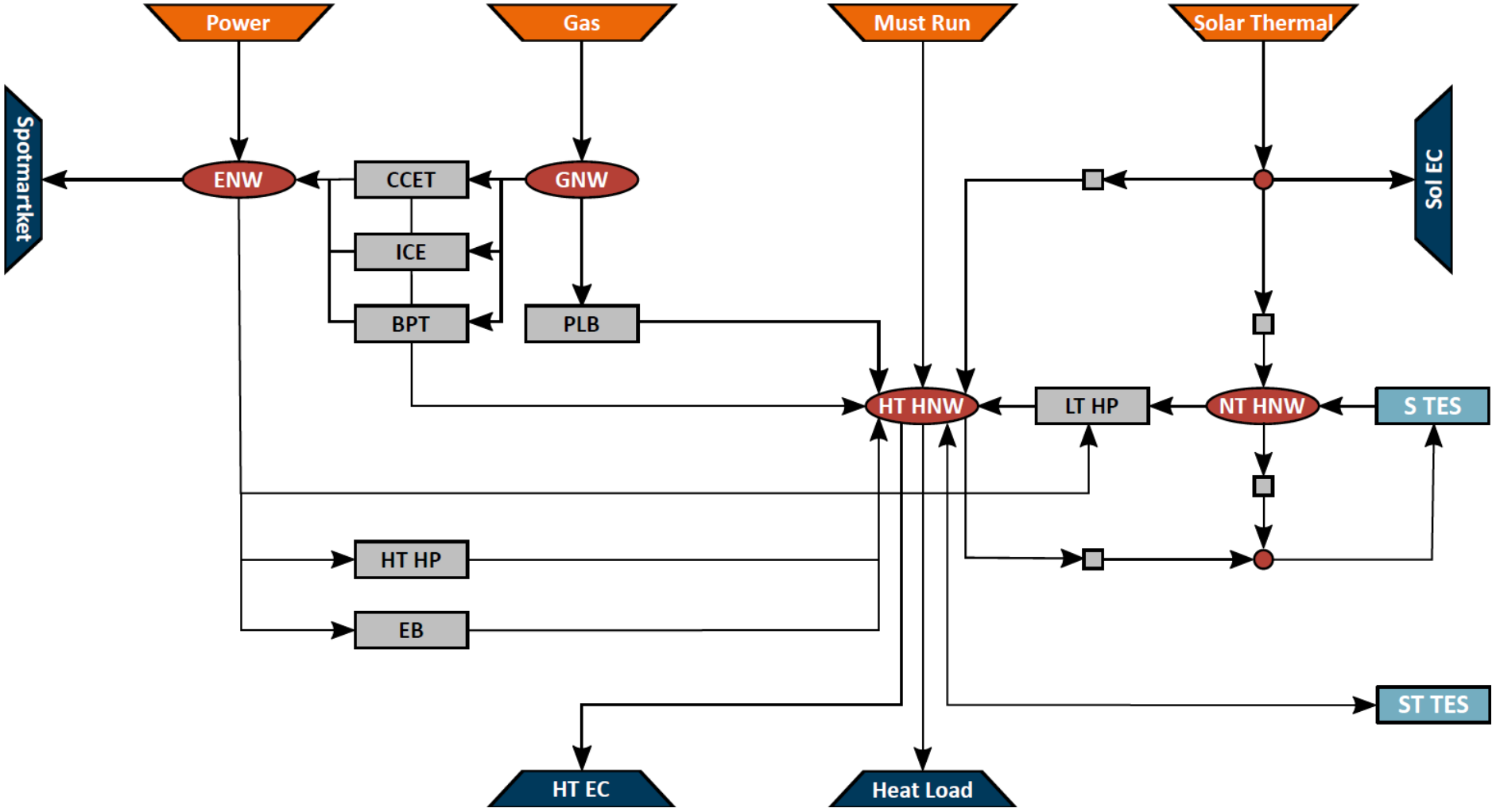
Structure and properties of the generic district heating system model

Flensburg, 05.05.2021

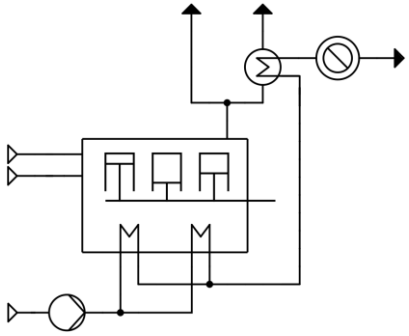
Workflow: Generic Heat System Model

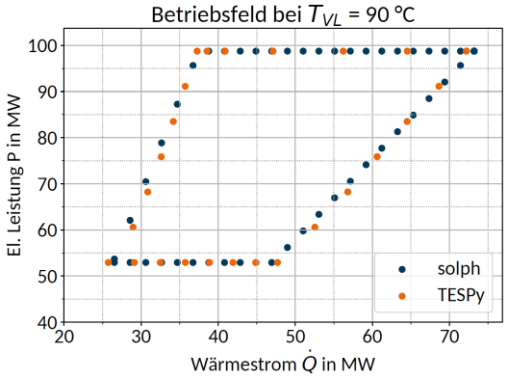


Generic Heat System Model



Thermodynamic Power Plant Models



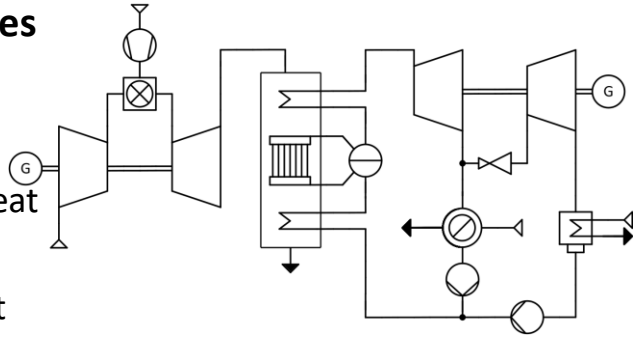


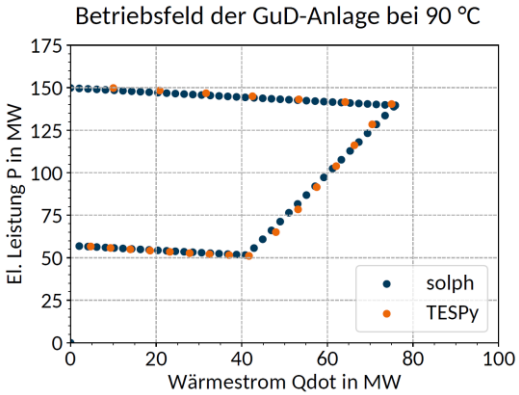
Internal Combustion Engine

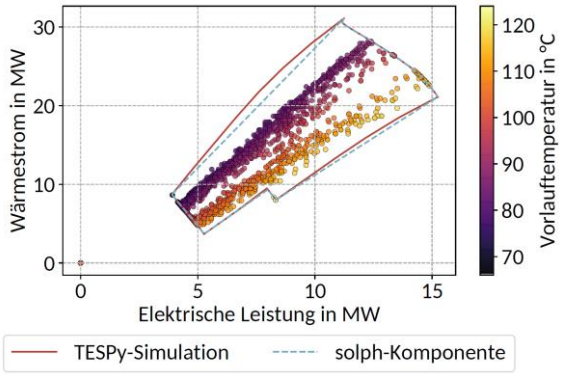
- Gas engine
- Flue gas cooling
- Bypass

Combined Cycle Extraction Turbines

- Combined gas and steam power system
- Exhaust gas recovery in the waste heat boiler
- Extraction circuit in the steam circuit

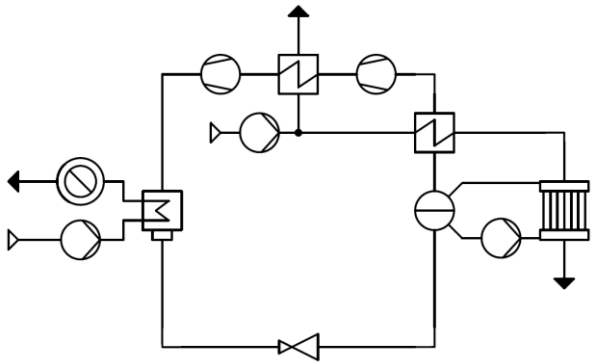






Heat Pump

- Type: Water heat pump
- Refrigerant: Ammonia
- Superheating with two-stage intercooling



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High-temperature heat pumps in district heating systems

Technology perspective for short- and medium-term use in multivalent systems

Flensburg, 05.05.2021

Objective and methodology

Objective

- Technology assessment

  → Which concepts are particularly attractive under which conditions?

Methodology

- Evaluation approach

  → Operationally optimized plant deployment

  → Investment calculation to evaluate probability realization

  → Calculating hourly emissions of the district heating system in comparison to the overall energy system as a measure of system beneficiary

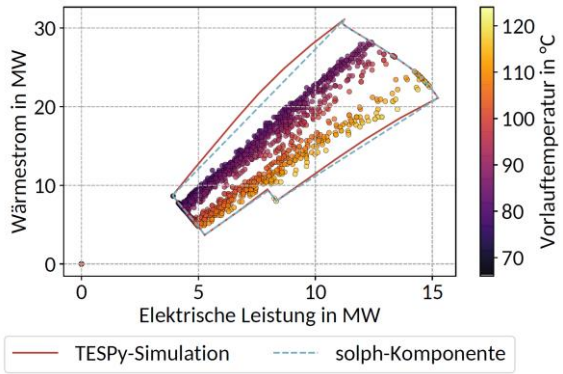
Methodology

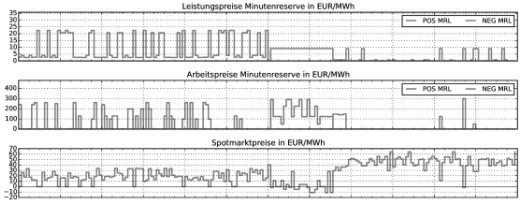
General workflow

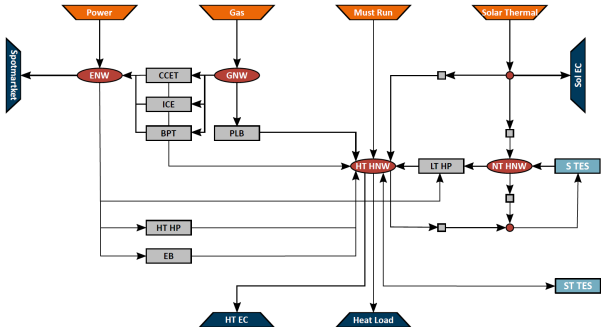
Input Data
- Characteristics
- Time series

Simulation
- Unit commitment optimization

Output Data
- Unit commitment time series
- Economical and ecological results







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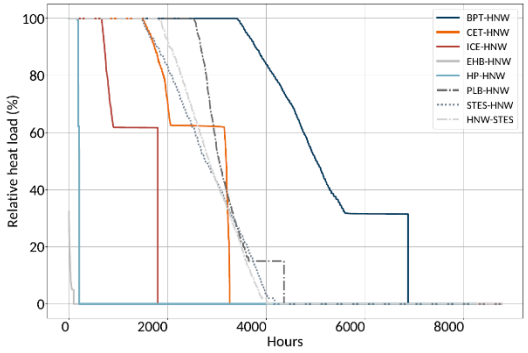
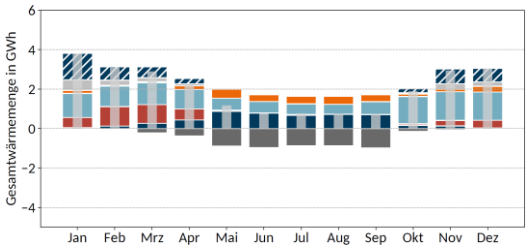
open energy modeling framework

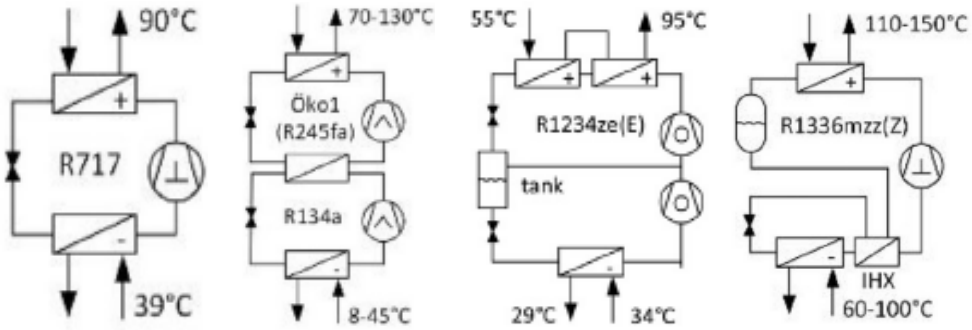




Work packages

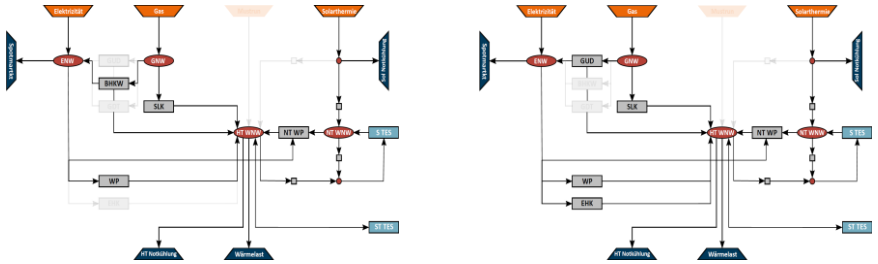
Work package 1

- Plant topologies
- Refrigerant
- Operating characteristics



Work package 2

- Embedding options
- Multivalent supply structures
- Plant operation



Work package 3

- Comparison between the various plant concepts
- Future scenarios