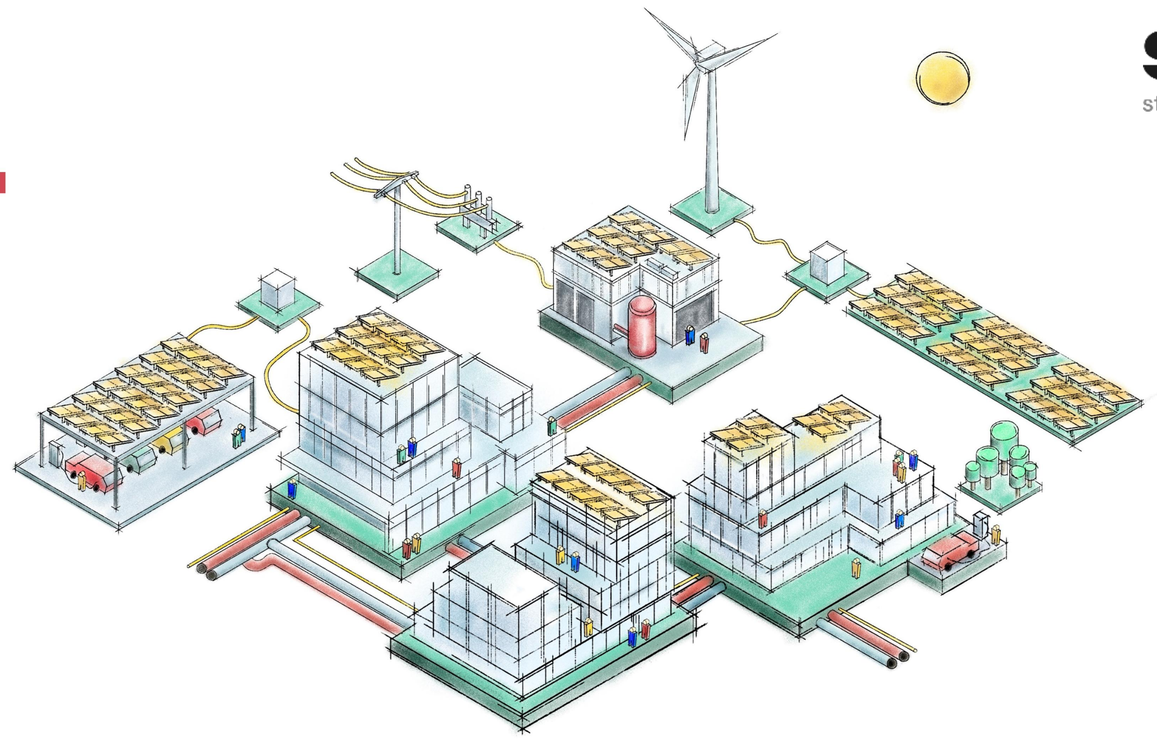
ReSiE

RECHENKERN FÜR DIE SIMULATION VON ENERGIESYSTEMEN

PART OF QUASI

QUARTIER SIMULATION



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OUR PROJECT IS OPEN-SOURCE!

GitHub

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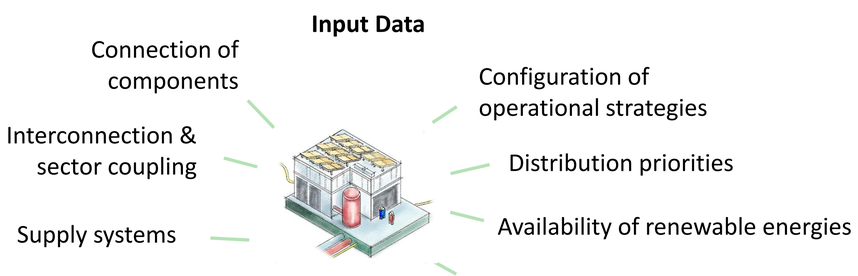
DISTRICT-SCALE ENERGY SYSTEM SIMULATION WITH RESIE

Simulation engine for sector-coupled energy system simulation on the scale of buildings and districts, based on a novel approach

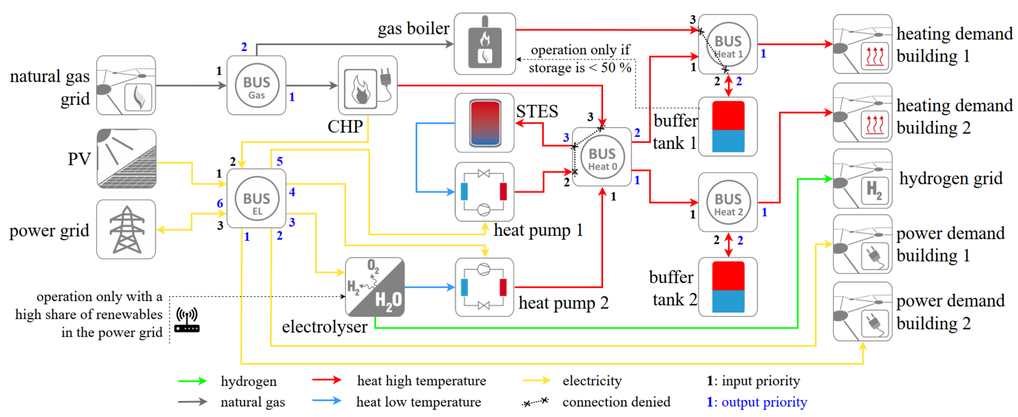
MOTIVATION

- Simulation support for planning and evaluation of energy supply systems at building and district scale
- Low barrier to entry for the usage in early planning phase for new constructions and modernisations
- Realistic physical model of complex thermal systems, such as ground-coupled thermal storages, geothermal probes or collectors
- Rule-based operational strategies as a central basis for resilient system planning

INPUT

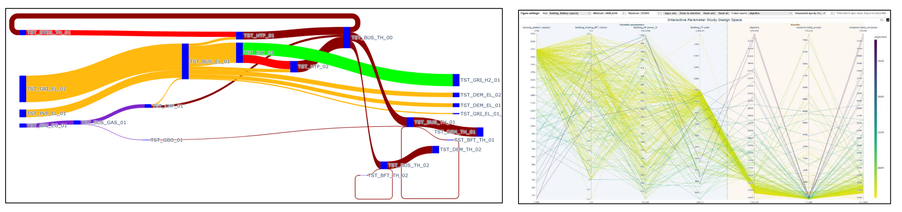


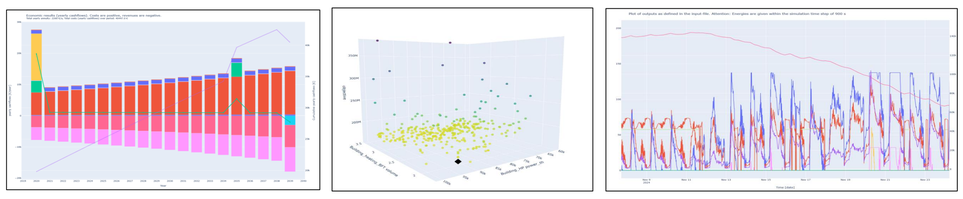
Input of components, their connections and dimensions via SUSI as well as parameters of the operational strategies being used e.g. dynamic temperature-dependent distribution priorities or load/unloading hysteresis of energy storages.



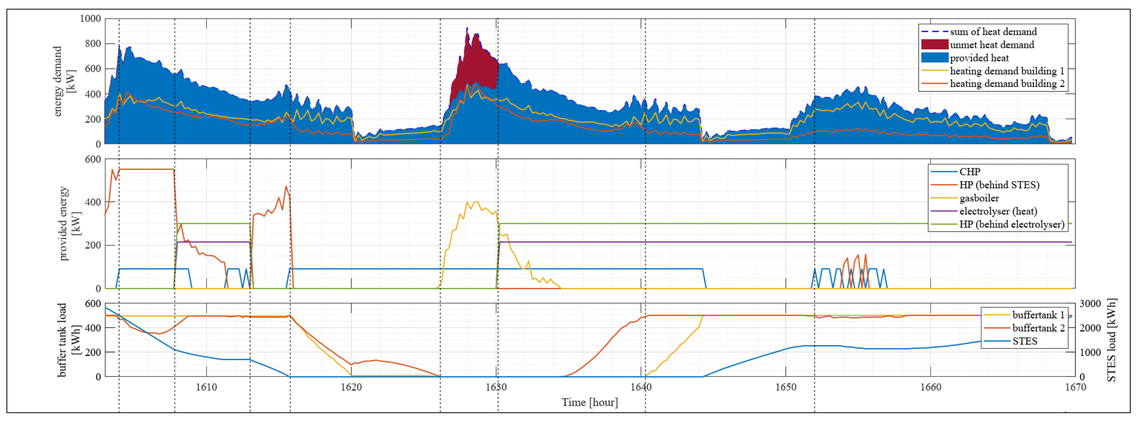
EXEMPLARY RESULTS

Integrated carbon footprint analysis, economic assessment using **VDI 2067,** energy flow diagram and black-box optimization, sensitivity analysis and automated parameter variation.

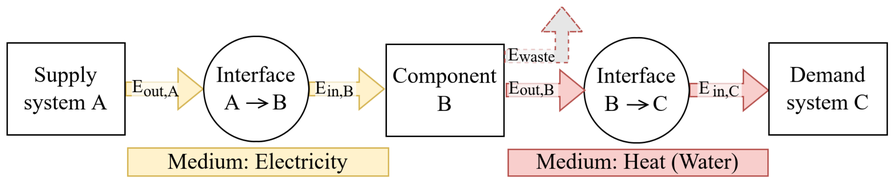




Exemplary analysis of three days at the start of march with an empty seasonal thermal storage



NOVEL MODELLING APPROACH



- Connections between components are abstracted as interfaces
- This allows flow of information (energy, power limits, temperature, etc.) without explicit dependencies on the implementation of the individual components
- Buses handle the energy management at junctions with multiple entries/exits

Closed calculation of the entire system (without LSE/LinOpt/MILP)

→ **No linearization** necessary

→ No restrictions for component modelling (enables, for example, finite volume models for Pit & geothermal collector)

→ Operational strategies can be clearly defined (state-based)

→ Optimization via black box approach thanks to high-performance programming language Julia

Simulation is executed for every time step

The order of the steps in the simulation is modified using, among other factors, the operational strategy and the connection of the components with a specially designed **algorithm**

→ The flow of information between the components is secured even in the case of mutual dependency

Base order of steps in simulation

Component category

Simulation step	fixed sources & sinks	bus	transformer	storage	flexible sources & sinks
control					
process					
potential					
load					

→ Every component is mapped to a category

→ Every category has pre-defined simulation steps

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