



RE³ASON: A tool for the analysis and optimization of urban energy systems

Kai Mainzer




100ee erneuerbare energie region
Covenant of Mayors
Committed to local sustainable energy
European energy award

Motivation

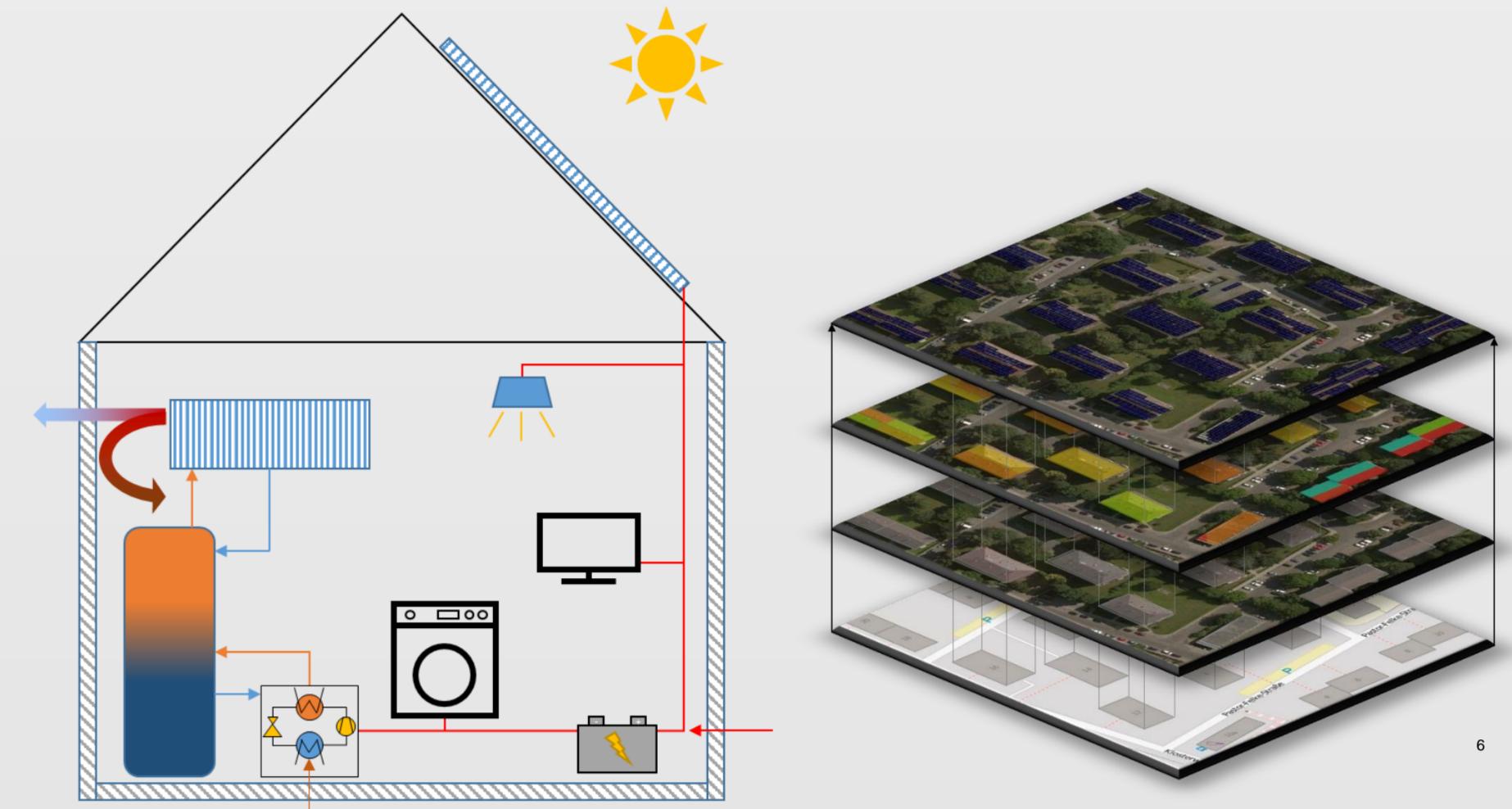


yield: ? kWh/a
cost: ? €

VS.



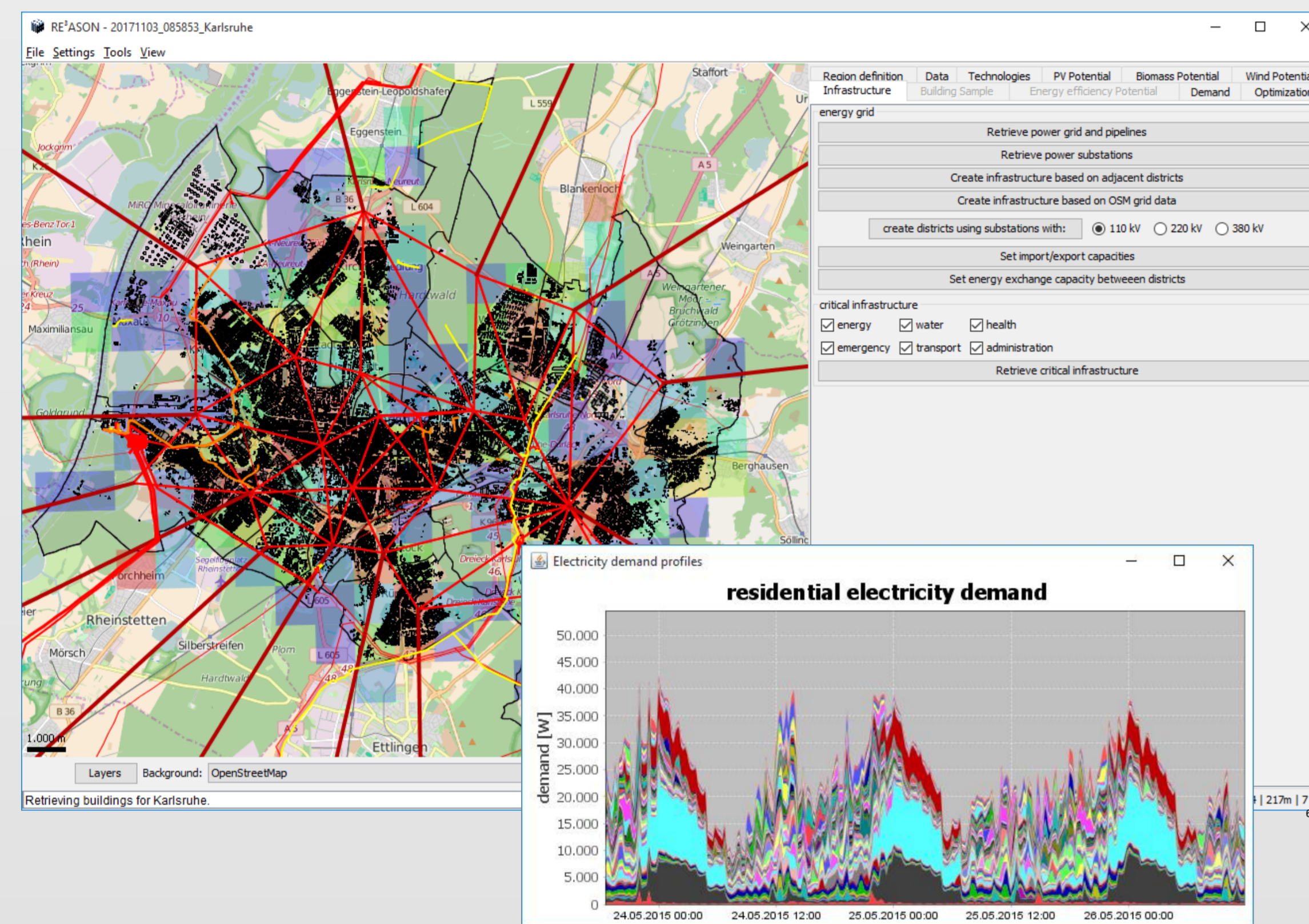
The exact potential, the costs and which alternatives are best suited is unknown or expensive to assess



System complexity due to interactions between different technologies, buildings and sectors
Techno-economic evaluation of individual and combined measures necessary

- Cities pursue sustainability goals
- Energy concepts are required
- Potential for renewable energies and energy efficiency improvement in cities

Transferable methods for the analysis of urban energy systems

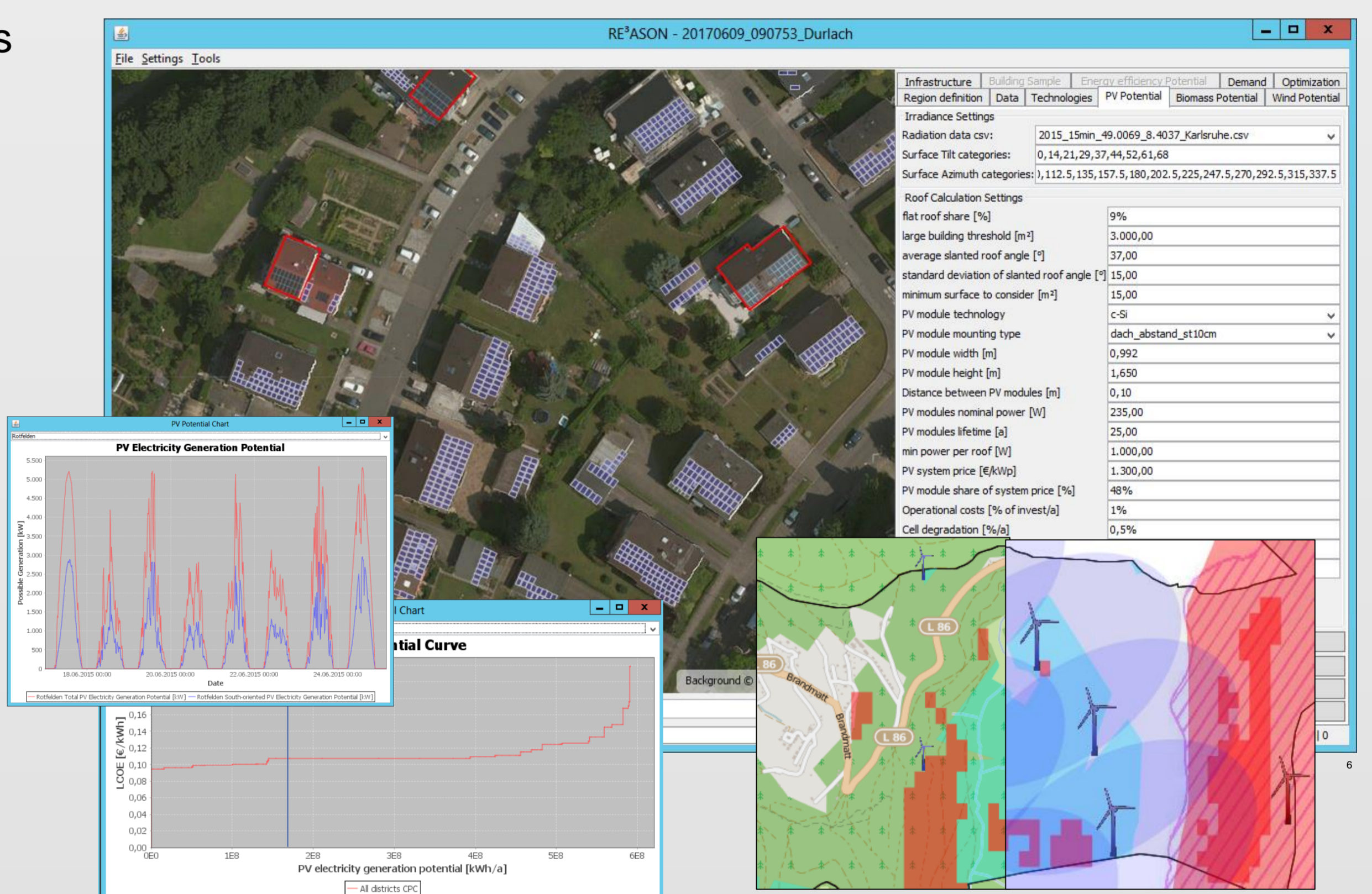


The RE³ASON* model enables automated analysis of:

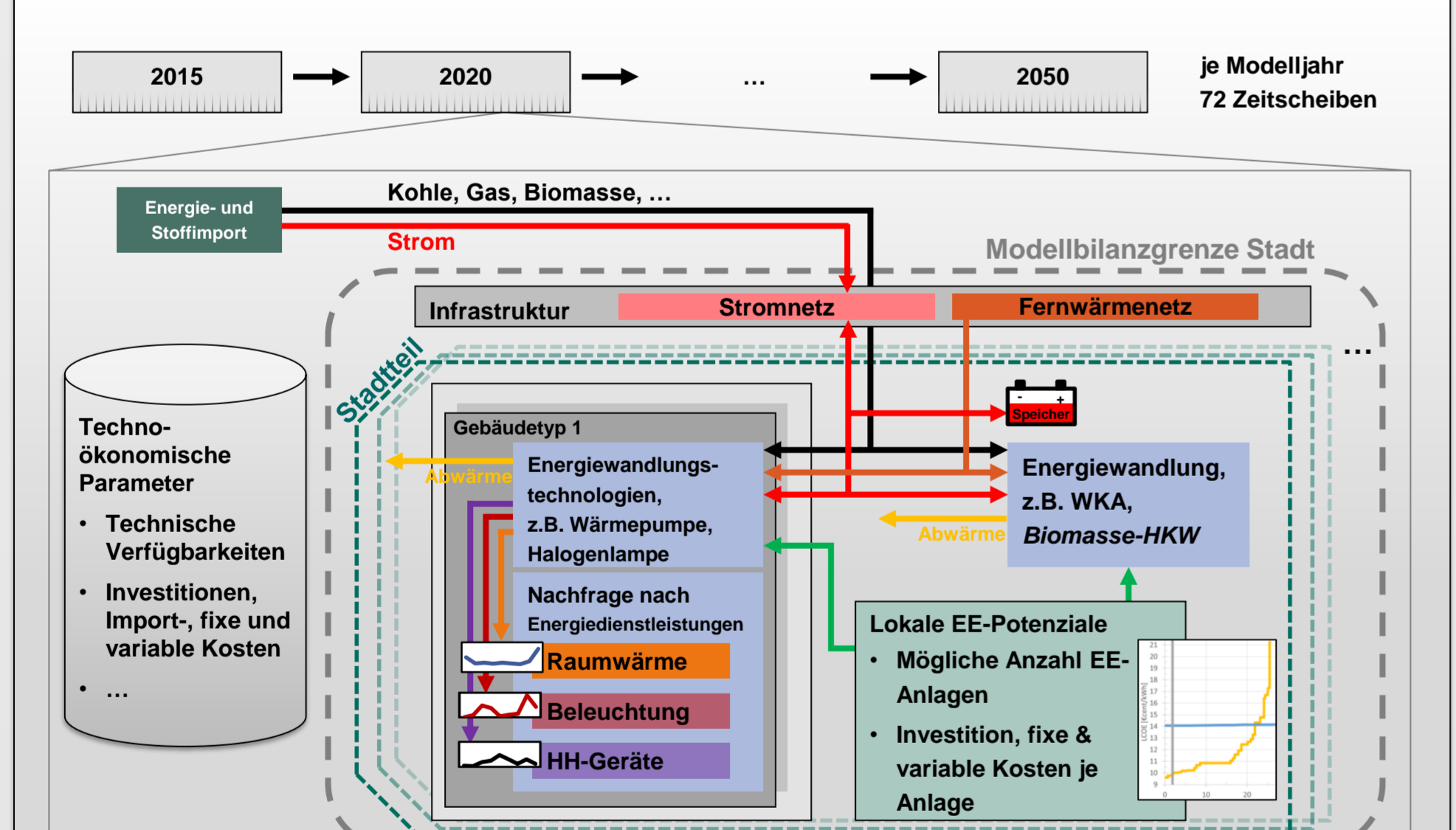
- Infrastructure,
- building stock,
- electric
- and heat demand.

In addition, the costs and potentials for local renewable energies can be calculated using an integrated GIS:

- wind power
- photovoltaics
- biomass



Techno-economical optimization of the urban energy system

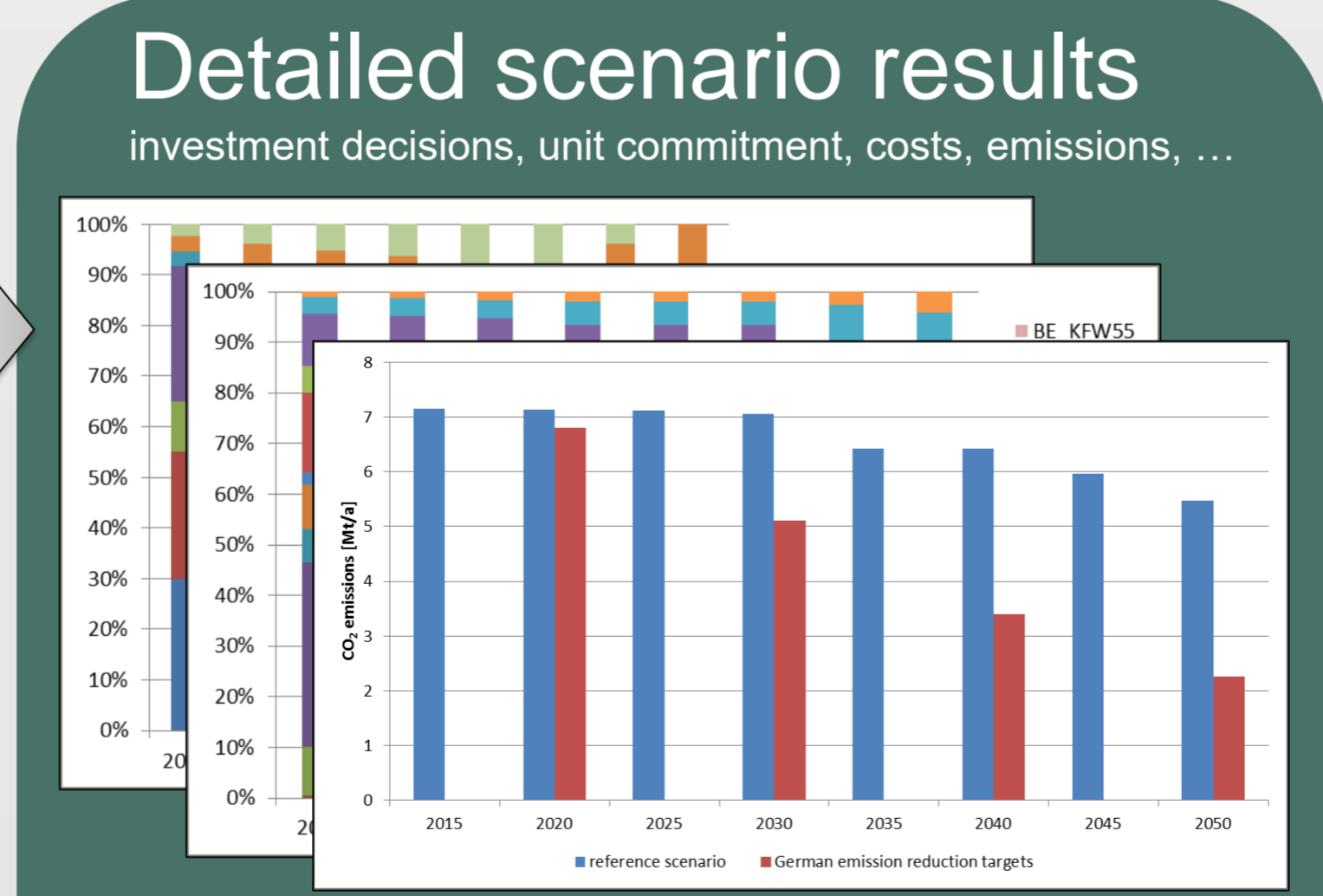


Techno-ökonomische Parameter

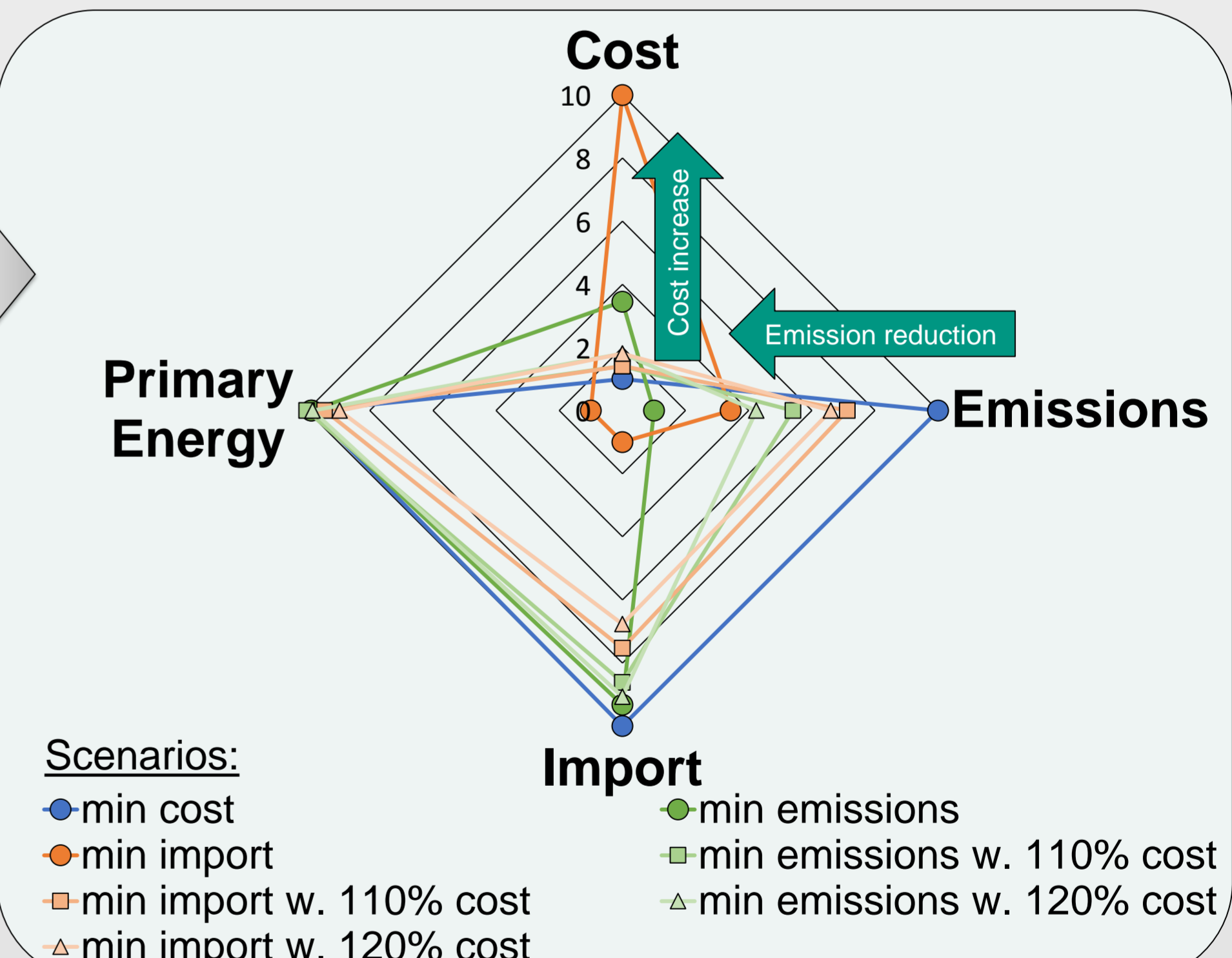
- Technische Verfügbarkeiten
- Investitionen, Import-, fixe und variable Kosten

Detailed scenario results

investment decisions, unit commitment, costs, emissions, ...



Scenario comparison



Scenarios:

- min cost
- min import
- min import w. 110% cost
- min import w. 120% cost
- min emissions
- min emissions w. 110% cost
- min emissions w. 120% cost

➢ Explore Trade-offs:
E.g. significant emission reduction can be achieved with only minor increase in costs

Results include:

- Required investments for energy generation & use
- Optimal degree of renewable energy utilization
- Reasonable technology combinations
- Development of costs, emissions, energy import and primary energy consumption for different emission reduction and cost scenarios

*RE³ASON: Renewable Energies and Energy Efficiency Analysis and System Optimization

Literature

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Graphics:

¹<http://www.covenantofmayors.eu>, ²<http://www.100-ee.de/>, ³<http://www.european-energy-award.de/>, ⁴<https://bioenergiesdorf.fnr.de/>, ⁵<http://commons.wikimedia.org>, ⁶Own depiction with map data from OpenStreetMap and Bing Maps

Contact: kai.mainzer@kit.edu