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Urban Building Energy Modeling - Method and Scenario Case Study Schallmoos

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Content

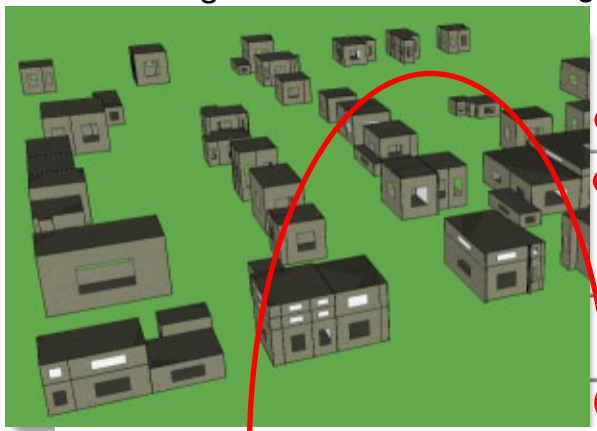
- Method for thermal building modelling in urban districts
- Case Study - Schallmoos
- Discussion

urban building modelling

- Where does the building information come from?
  - ➢modelling based on publicly available data
- Who has the time to model entire urban districts or cities?
  - ➢automated modelling process
- How can the dynamic interactions between sub-models of smart energy systems be modelled?
  - ➢detailed dynamic simulation in IDA ICE
- How is it possible to visualize the simulation results in a clear manner?
  - ➢visualization in Geographical Information Systems (GIS)

Workflow

3D building model



Cadastral plans

scenario definition

thermal simulation

1) data acquisition

2) categorization/ dimensioning

3) building modelling

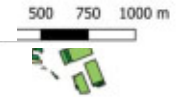
4) dynamic simulation

5) result visualization

scenario evaluation

Land utilization plans

Source: Nageler et al., Novel validated method for GIS based automated dynamic urban building energy simulations, Energy 2017;139:142–154.



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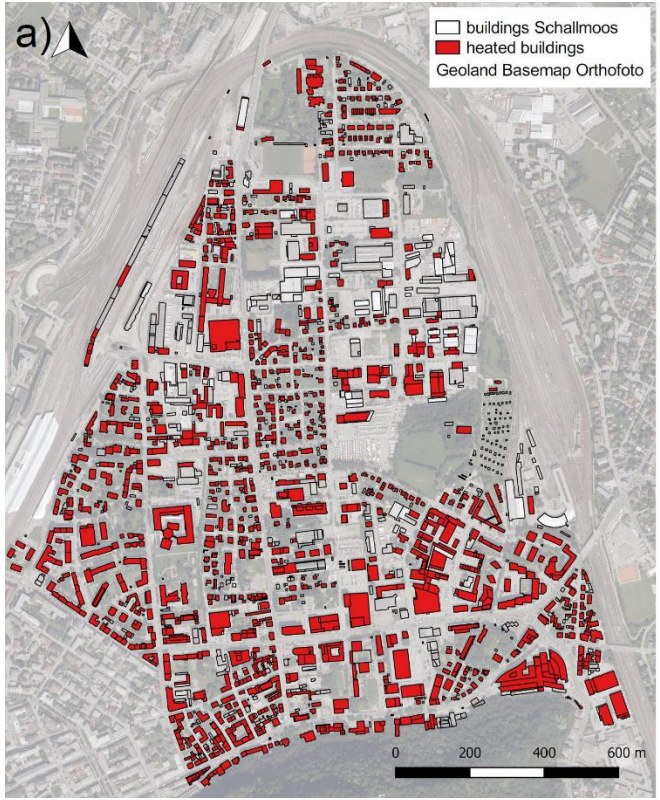
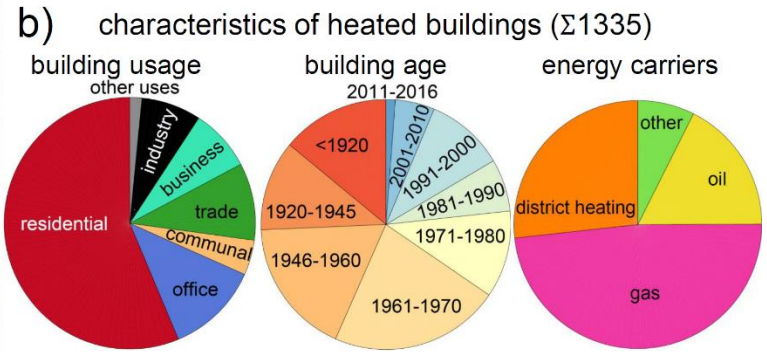
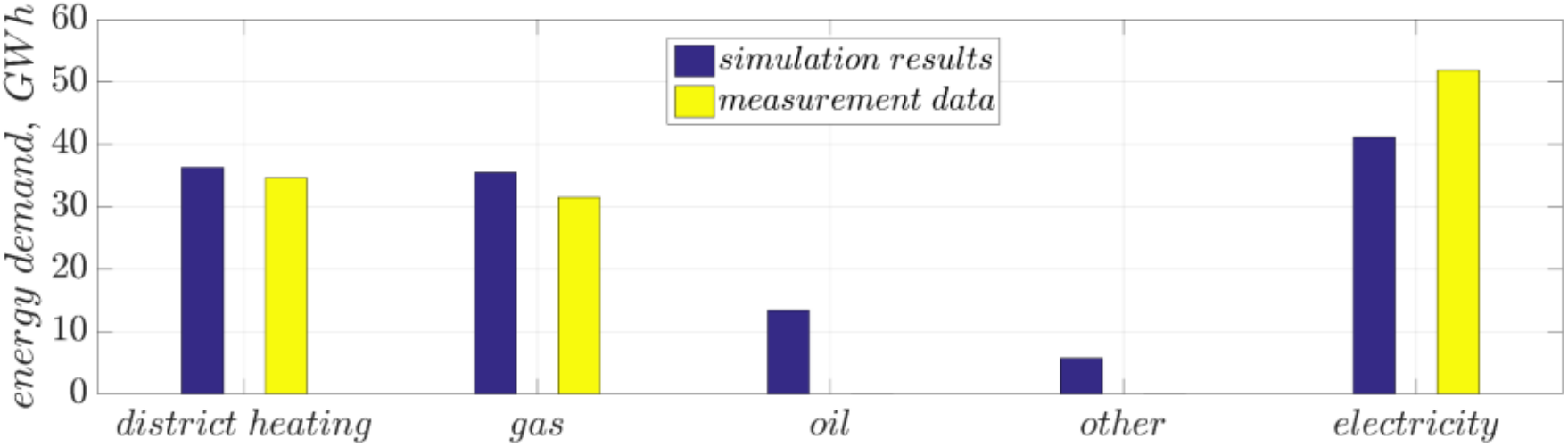
Case Study - Schallmoos



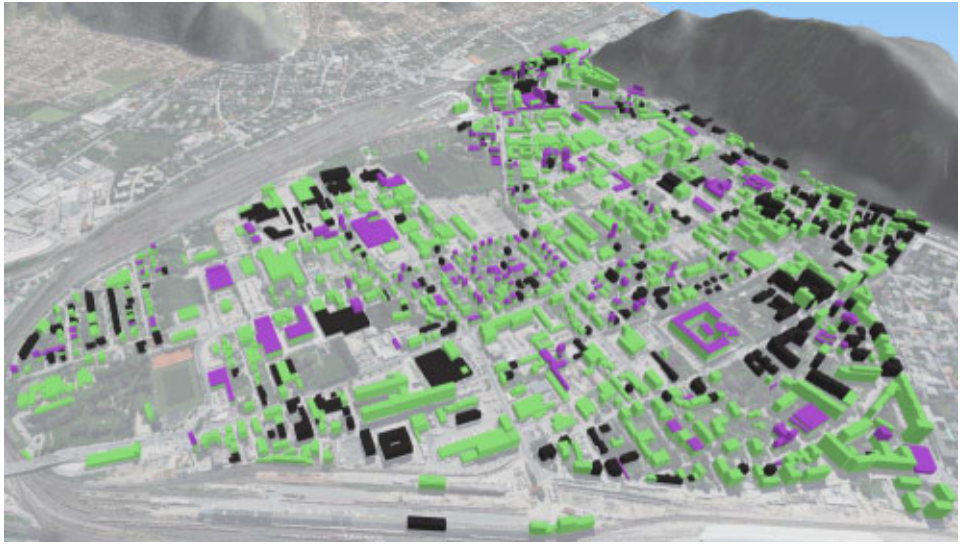


Validation of the status quo (2014)

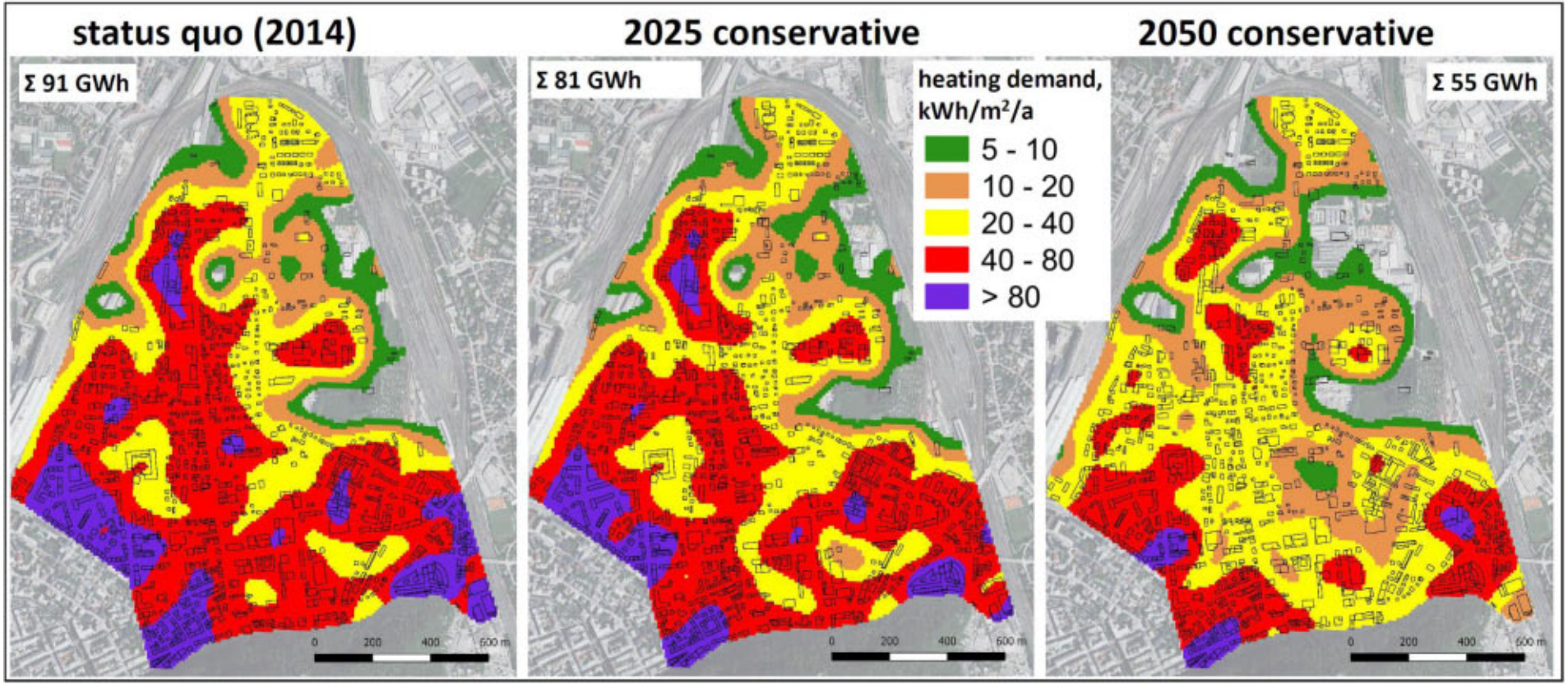


Simulation scenarios for 2025 and 2050

- Conservative
- Ambitious
- Renewable
- Ambitious/renewable
- Substitution gas with district heating
- Acceleration district heating



Scenario comparison



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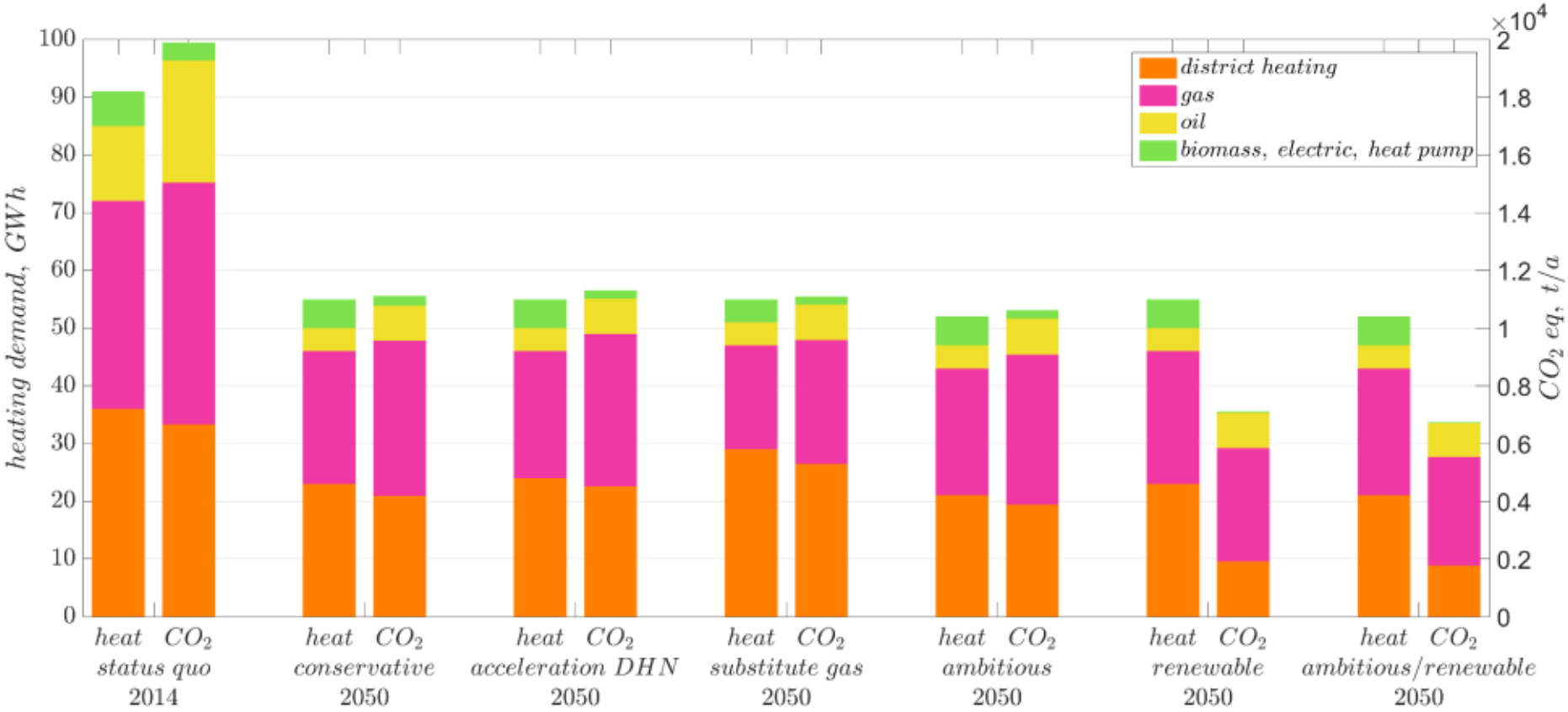

Acknowledgement

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Discussion

- Fields of application of physical urban building energy modelling approaches
  - Calculation of the energy demand
  - Retrofit scenarios
  - Densification scenarios
  - Temporal course of the heating and cooling load
  - Climate change scenarios
  - Thermal comfort analysis
  - model the dynamic interactions between buildings and smart energy systems in districts

computational expensive