

iCity: Intelligente Stadt

Explorative project: Multi-Scale Urban Scenario Interface (MUSI) Web-based software system for strategic low-CO₂ energy planning

Project management: Prof. Dr. Volker Coors, Prof. Dr. Bastian Schröter
 Project partners: None – Explorative project
 Project duration: 01.01.2018 - 31.03.2021

1. Context and task

The aim of MUSI is the conception and development of an innovative, web-based and intuitive software system for strategic, low-carbon planning of urban districts. 3D city models are used as a data basis, which can analyze the feasibility of building renovation measures on the one hand and the integration of renewable energies, notably rooftop PV, including their grid-bound distribution on the other.

2. Procedure and methods

MUSI work packages built on the existing energy simulation platform SimStadt, which allows the detailed assessment of buildings' energetic performance or photovoltaic rooftop potentials based on 3D CityGML models. On the one hand, a customizable economic analysis was added to the pre-existing workflows for rooftop PV and building refurbishment measures, allowing the evaluation of amortization periods, total investment, or Levelized Cost Of Electricity (LCOE) for single buildings and whole city quarters. On the other hand, scenarios planning and displaying of the above-mentioned results were made accessible via a web browser by utilizing SimStadt API, an open-source 3D geospatial visualization library, and 3D Portrayal Service (3DPS).



Fig. 1: Visualization options.

3. Results

- A web-based application that explores and visualizes building-specific simulation results based on 3D city models and an intuitive graphical user interface. It requires no prior installation of software.
- The possibility for municipalities, urban planners, project developers, or utilities to model costs and potentials of a renewable energy and energy efficiency measures for a few buildings up to an entire city, without sacrificing calculation accuracy.

Conclusion

MUSI makes intuitive, low-cost and low-effort scenario planning of energy efficiency and renewable energy technologies accessible to urban planners, climate protection managers, utilities or other stakeholders by moving a hitherto desktop-based application to a web browser, developing an intuitive graphical user interface, and adding crucial economic information. The implemented solutions can be applied anywhere as long as 3D building model data is available.



Ein Projekt der
Hochschule für Technik Stuttgart



Contact
 Prof. Dr. Volker Coors
volker.coors@hft-stuttgart.de
 Prof. Dr. Bastian Schröter
bastian.schroeter@hft-stuttgart.de