

## Data-based Optimization of Energy Systems

KIT's Startup greenventory Offers Data and Software for Utilities, Grid Operators, Cities, and Districts



Automated detection and inventorying of energy systems using photovoltaic facilities as an example. (Photo: Google Maps/greenventory)

**greenventory brings the energy transition into cities: The startup offers utilities, grid operators, and municipalities highly resolved data and software tools for forward-looking planning of sustainable energy systems. The system for automated inventorying, analysis, and optimization made by greenventory considers electricity, heat, and mobility. The high-tech company is a spinoff of Karlsruhe Institute of Technology (KIT) and Fraunhofer Institute for Solar Energy Systems ISE. For their innovative ideas, the young founders have already received several prizes.**

Thanks to greenventory, latest findings in energy economics are directly brought to companies, cities, and quarters. The mission of the startup company based in Freiburg is “data-driven decision support in energy planning.” The data and software tools made by greenventory enable spatially and temporally highly resolved automated inventorying, analysis, and optimization of customer-specific energy systems. In this way, utilities, grid operators, and municipalities can reach their energy and climate targets more easily, faster, and at less cost.



KIT Energy Center: Having future in mind

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### Additional material:

“greenventory – Data-driven Decision Support in Energy Planning“ – Data sheet:  
<https://www.sek.kit.edu/downloads/Datenblatt-greenventory-en.pdf>

## Holistic Systems Analysis: Heat, Electricity, and Mobility

The software automatically compiles various data sources, such as satellite images, statistical data, climate data, and IoT data. Subsequently, it analyzes the data with AI algorithms, enriches them, and links them to energy simulation models. In this way, the software creates a specific, spatially and temporally highly resolved database for the energy system. This database contains all energy-relevant building parameters and includes the grid infrastructure and the potentials for photovoltaics, wind power, and biomass. Synthetic profiles take into account energy consumption and production. In a holistic system analysis, greenventory considers heat, electricity, and mobility together. "Our customers are presented customized solutions as to how they can use energy more efficiently, increase the share of renewables, and transparently communicate these improvement potentials," says Dr. Kai Mainzer, former head of the Renewable Energies and Energy Efficiency Group of the Institute for Industrial Production (IIP) of KIT, who is one of the founders of the startup.

The database provided by greenventory may serve as a basis for time series-based grid planning: Companies and municipalities can consider technology scenarios and future supply concepts in planning in an early phase. Later grid reinforcement may not be required. Planners and owners of real estates may define own target criteria, such as CO<sub>2</sub> neutrality. By means of an optimization calculation, the most cost-effective transformation path towards the target desired can then be calculated for each building. Energy supply and climate protection concepts for e.g. production locations, dealer networks or districts can be generated in less time at far increased quality.

## Innovative Startup – Several Prizes

The software developed by greenventory has already been used successfully in more than 20 projects with utilities, grid operators, and cities. The founders received a number of prizes for their innovative ideas: For his dissertation "Analyse und Optimierung urbaner Energiesysteme – Entwicklung und Anwendung eines übertragbaren Modellierungswerkzeugs zur nachhaltigen Systemgestaltung" (analysis and optimization of urban energy systems – development and application of a transferable modeling tool for sustainable system development), Mainzer received the UMSICHT science prize 2019 from the Verein zur Förderung der Umwelt-, Sicherheits- und Energietechnik e. V. and the dissertation award 2019 of the Society for Operations Research e.V. (GOR). The doctoral thesis written by Dr. Sven Killinger "Anlagenscharfe Simulation der Photovoltaik-Leistung basierend auf Referenzmessungen und Geodaten" (plant-specific simulation of photovoltaics power based on reference measurements and geodata) was granted the Sparkasse Environmental Award 2018. All

three founders of greenventory, Dr. Kai Mainzer, Dr. David Fischer, and Dr. Sven Killinger, were also granted the first prize of the MakeltMatter Award 2019 of ElektrizitätsWerke Schönau (EWS) and the Freiburg startup platform Smart Green Accelerator. This prize is granted to startups contributing innovative technical ideas to the energy transition and taking into account aspects of a decentralized energy system.

For further information, click the digital press kit for Hannover Messe: <https://www.sek.kit.edu/english/5026.php>

More about the KIT Energy Center: <http://www.energy.kit.edu>

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