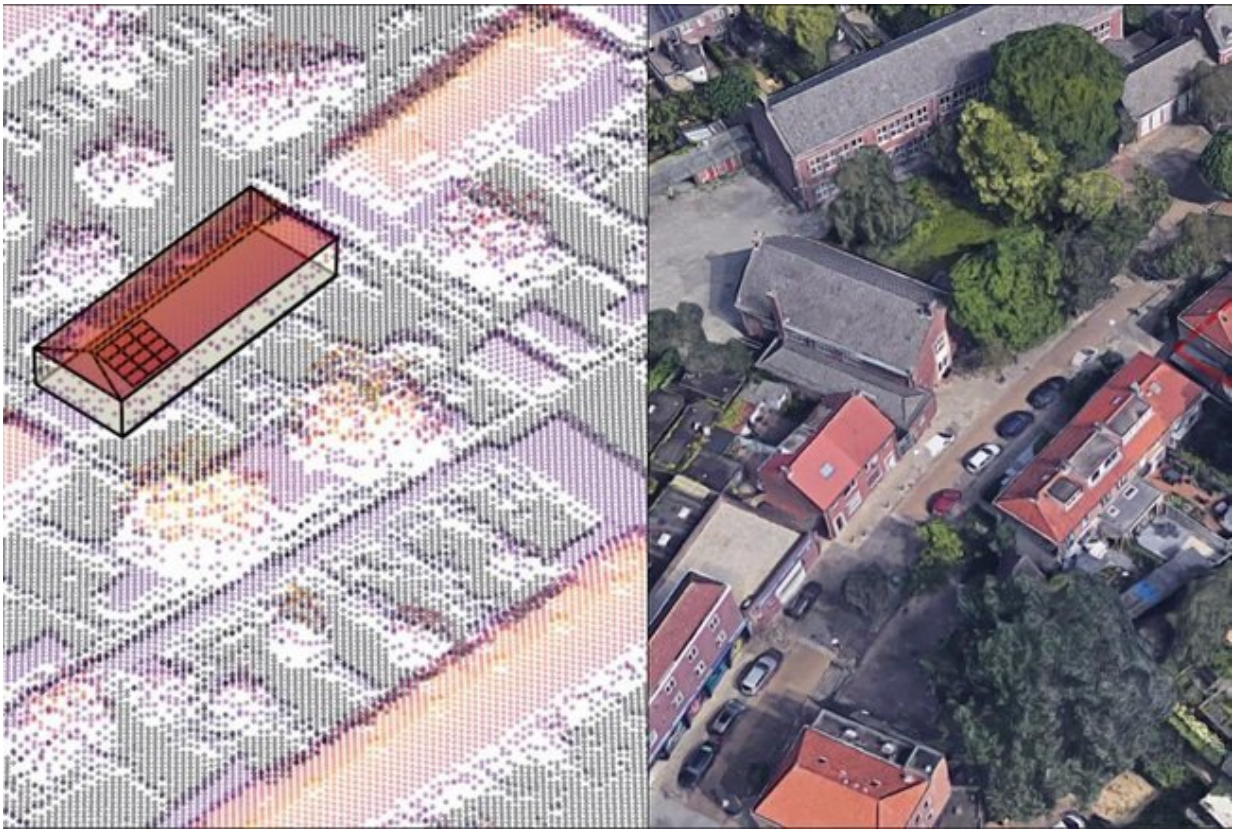
Integrating solar panels in shady places

March 30 2021



Credit: Eindhoven University of Technology

Due to stricter regulations of sustainability, we might see solar panels more often not only on sunny rooftops, but more and more on shaded roofs and facades as well, which brings new challenges in their integration. In his thesis, Ádám Bognár developed a method to simulate solar irradiance based on LiDAR point clouds, leading to better

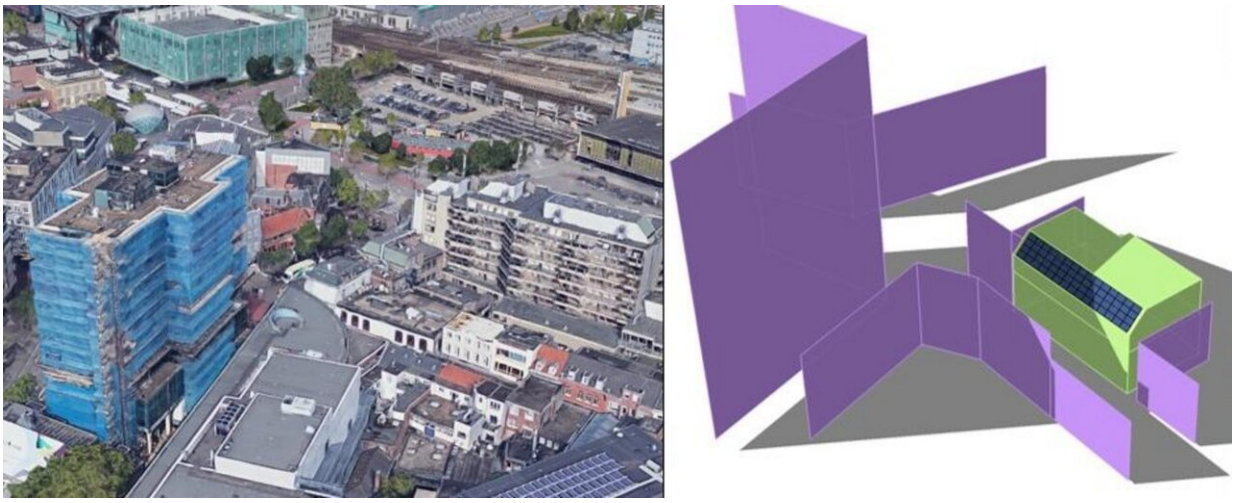
simulation models for the integration of solar panels.

As lowering carbon emissions and increasing comfort levels in buildings are getting higher priority, also due to regulations such as the BENG norm 2021, the ability to design high-performance buildings with on-site renewable energy generation is increasingly in demand.

When designing high-performance buildings, combining building simulations with PV performance simulations is an efficient method to make go/no-go decisions in the early phases of the design and to mark out or optimize design variants. Moreover, the use of simulations has potential to improve the monitoring and fault detection of in-operation PV sites. However, shading and reflections from the surroundings are difficult to model.

Simulating Solar Irradiance

Ádám Bognár used LiDAR point clouds and integrated the resulting simulated irradiance with detailed simulation models of PV systems. He demonstrated the usability and practical value of his newly developed method with a comprehensive case study of a building renovation project in the city center of Eindhoven.



Credit: Eindhoven University of Technology

Bognár's work supports the design of new PV systems and performance monitoring of existing ones. He hopes that the new method can aid the adoption of building-integrated and building-applied PV systems located in environments where shading is common. The software implementation of his work is distributed as free and open-source software on the Building Performance group's GitLab page: https://gitlab.tue.nl/bp-tue/pyrano.

The thesis is titled "PV in urban context—Modeling and simulation strategies for analyzing the performance of shaded PV systems."

Provided by Eindhoven University of Technology