Urban digital twins for renewable energy communities

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Acknowledging the new requirements introduced by the Fit for 55 EU regulations package, there is an urgent need to support private and public bodies in urban energy planning, particularly in the context of Renewable Energy Communities (RECs). The project DT4Energy.com, launched in December 2023, fosters collaboration between research bodies, industry, and public administration to address these challenges by developing Urban Digital Twins that integrate multiple layers of urban data—highly detailed 3D models, building materials and envelope performance, energy system characteristics, and energy use—potentially available from the various involved stakeholders. This model is capable of estimating energy demand and photovoltaic potential at both the single building level and urban scale, allowing for optimized matching between energy supply and demand. As the digital twin evolves, it will incorporate intelligent sensors and advanced data collection tools, enabling real-time monitoring and facilitating the transition from design to effective management of the energy community.

Starting from a developed pilot case study in northern Italy, the project's broader implications for driving the energy transition of urban environments will be discussed, focusing on the development and application of digital twin technology to support the optimized design and management of RECs. Additionally, the potential for energy companies and their partners to become leaders in the energy transition will be explored, highlighting how such initiatives not only enhance the company's capabilities but also demonstrate the transformative potential of digital twin technology in driving technological innovation and sustainable energy practices across urban areas.