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Energy management and planning in smart cities

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Abstract— A smart city is a sustainable and efficient urban centre that provides a high quality of life to its inhabitants through optimal management of its resources. Energy management is one of the most demanding issues within such urban centres owing to the complexity of the energy systems and their vital role. Therefore, significant attention and effort need to be dedicated to this problem. Modelling and simulation are the major tools commonly used to assess the technological and policy impacts of smart solutions, as well as to plan the best ways of shifting from current cities to smarter ones.
This paper reviews energy-related work on planning and operation models within the smart city by classifying their scope into five main intervention areas: generation, storage, infrastructure, facilities, and transport. More-complex urban energy models integrating more than one intervention area are also reviewed, outlining their advantages and limitations, existing trends and challenges, and some relevant applications. Lastly, a methodology for developing an improved energy model in the smart-city context is proposed, along with some additional final recommendations.

Index Terms— Smart City; Renewable Sources; Energy Storage; Smart Grid; Distributed Energy Resources; Transport Systems.

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