

Energy Atlas: Geographic Information Systems-Based Energy Analysis and Planning Tool

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Abstract : Due to an increase in living standards along with global population growth and a trend of urbanization, municipalities and regions are faced with an ever rising energy demand. A challenge has arisen for cities around the world to modify the energy supply chain in order to reduce its consumption and CO₂ emissions. The aim of our work is the development of a computational-analytical platform for dynamic support in decision-making and the determination of economic and technical indicators of energy efficiency in a smart city, named Energy Atlas. Similar products in this field focus on a narrower approach, whereas in order to achieve its aim, this platform encompasses a wider spectrum of beneficial and important information for energy planning on a local or regional scale. GIS based interactive maps provide an extensive database on the potential, use and supply of energy and renewable energy sources along with climate, transport and spatial data of the selected municipality. Beneficiaries of Energy atlas are local communities, companies, investors, contractors as well as residents. The Energy Atlas platform consists of three modules named E-Planning, E-Indicators and E-Cooperation. The E-Planning module is a comprehensive data service, which represents a support towards optimal decision-making and offers a sum of solutions and feasibility of measures and their effects in the area of efficient use of energy and renewable energy sources. The E-Indicators module identifies, collects and develops optimal data and key performance indicators and develops an analytical application service for dynamic support in managing a smart city in regards to energy use and sustainable environment. In order to support cooperation and direct involvement of citizens of the smart city, the E-cooperation is developed with the purpose of integrating the interdisciplinary and sociological aspects of energy end-users. Interaction of all the above-described modules contributes to regional development because it enables for a precise assessment of the current situation, strategic planning, detection of potential future difficulties and also the possibility of public involvement in decision-making. From the implementation of the technology in Slovenian municipalities of Ljubljana, Piran, and Novo mesto, there is evidence to suggest that the set goals are to be achieved to a great extent. Such thorough urban energy planning tool is viewed as an important piece of the puzzle towards achieving a low-carbon society, circular economy and therefore, sustainable society.

Keywords : circular economy, energy atlas, energy management, energy planning, low-carbon society

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