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The Renewable Energy City within the City. The Climate Change Oriented Urban Design – Szczecin Green Island

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Abstract

Minimizing energy consumption both at the building scale and the city scale is now a major challenge to civilization. Climate change require us to more decisive measures in this area. Together with the widening globalization, rapid technological development, increasing resource scarcity are set to place intense pressures on national economies in the 21-st century. Nowhere are these challenges being played out more immediately than in the energy sector. Urban management and integrated smart development play crucial role in minimalization of energy consumption and CO_2 production. New approaches in sustainable urban and architectural planning are to be introduced. An important link in this process can be new approach to settlements, that are using new technologies focused on energy self-sufficiency and green footprint. The concept design of Green Islands area in Szczecin/Poland developed by Urbicon Authors' Architecture Studio is a good example of such approach.

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*Keywords:*carbon-neutral economy; climate change; eco-design; eco-corridor; energu self-sufficiency; sustainable urban development;

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1. Introduction

Energy is one of the crucial determinants of the development of cities in the future. The C40 Cities Climate Leadership Group of pioneering megacities points out that because cities account for two thirds of the world's energy consumption and 70 % of global C02 emissions, they will necessarily be the engines of the green economy (C40 2012) and can play a key role as purchasers of locally produced power, thereby opening up the energy market [1].

Environmentally progressive urban design and building practice are currently described using a variety of different tags: "green design", "ecological design", "eco-city", "eco-planning", "environmental planning" or "sustainable design". The intention of the design is to eliminate negative environmental impact completely through skillful, sensitive and technologically advanced design. The architectural manifestations require renewable resources, and connect people with the natural environment. The practice includes aspects like energy consumption for heating, cooling and lighting, but also things like mobility planning and green spaces, social structures within the building, grey energy and so forth. In addition to concern for the tradition; aesthetics of massing, proportion, scale, texture, shadow and light. The facility design team needs to be concerned with long term costs: environmental, economic and human ones. All in all sustainable design is more of a philosophy of a building than perspective of building style. We can say now that: "*The Form Follows Energy*" (and not so much "the Function" as Louis Henry Sullivan used to say). The challenge of modern architecture is to optimize the form of the building in terms of making it self-sufficient in energy supply or near "zero–energy" in energy needs.

The widening globalization, rapid technological development, increasing resource scarcity and climate change are set to place intense pressures on national economies in the 21-st century. Nowhere are these challenges being played out more immediately than in the energy sector, which is being fundamentally transformed because of decarburization requirements and by the emergence of new technologies.

2. Reshaping urban spaces within the city

UN Intergovernmental Panel on Climate Change has noted the relationship between components of the built environment and climate change, reporting that global GHG emissions have grown largely as a result of the following sectors: energy supply, transportation, industry, land use and forestry, agriculture, and buildings [2]. Strategies that aim to reduce atmospheric CO_2 include decreased use of motor vehicles, increased energy efficiency in buildings, and reduced deforestation [3]. Based on these strategies, the current study focuses on three built environmental components: transportation, buildings, and land use (including forestry and agriculture).

About 75% of power generated globally is consumed in cities [4]. Generating city-integrated energy at the site of energy use could substantially contribute to the environmental, economic, and social aspects of urban sustainability. Four characteristic advantages of such distributed energy systems include the ability to (i) offer low to zero carbon emissions, (ii) offset capital-intensive investments for network upgrades, (iii) impart local energy independence and network security, and (iv) motivate social capital and cohesion [5].

2.1. Creating new "Eco-Space" in city centers.

In many cities around the world we are presently witnessing the growth of, and interest in, a range of micro and macro-spatial urban practices that are reshaping urban spaces. But how can have these processes influence the urban planning and urban environment? What kind of spaces can be created within the existing cities? Crucially, it is also to answer: what are the possibilities and limitations in urban transformation of city centers? We can answer that weaknesses of modern cities can be turned into the positive challenges. The heritage of 19th century industrialization era and post war revolution in development of automotive road infrastructure caused many negative changes in cities spatial structure. Nowadays we have to find solution how to redevelop brownfields and over-scaled road systems in a way that they correspond to challenges of sustainability. Many positive examples on this issue has already been implemented in the cities. Unused railway infrastructure or demolished overpasses open new possibilities of development in communication corridors, crossing the downtowns. The infrastructure which has so far generated so far noise, pollution and division of urban space, can be transformed into positive components of the cities - green