Symbiotic Districts: Innovative design strategies for local energy production and resource self-reliance at neighborhood scale

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In a context of growing efforts to develop sustainability strategies, one of the main challenges is the promotion of value creation and well-being with the use of fewer resources. In this perspective, how can we design attractive urban neighborhoods generating endogenous economic activity and promoting a social and cultural momentum while reducing the consumption of non-renewable resources and moving towards self-reliance on local energy? The answer to this question requires major changes in the way we consider energy in the construction sector. This will be achieved first by transcending the scale of the single building and then by including a greater number of design parameters, moving well beyond basic issues related to the building’s heat and electricity consumption.

The research project Symbiotic Districts aims to fill this gap in current research by developing a new design and calculation methodology. This research examines the scientific, technical, urban development and architectural dimensions that foster local energy production and resource self-reliance at neighborhood scale. The transposition to the field of urban and architectural planning of tools used in industrial ecology allows the integration of energy issues related to habitat, activities, infrastructure, mobility and food. This approach is thus positioned at the intersection of disciplines that focus on technical aspects (industrial ecology) and others that focus on design and implementation strategies (architectural and urban planning).

The research project Symbiotic Districts tests various urban and architectural scenarios elaborated for three case studies of urban neighborhoods currently being developed in Switzerland. The evaluation is based on criteria of renewable energy production and storage, industrial symbioses and urban agriculture, as well as sustainable consumption and transportation systems. The analysis relies on iterative optimization methods based on calculation models. This framework allows to generalize the methodology developed in this project and to formulate recommendations for replication in other urban district projects.