Eco-District Eco-Life. Geopolitics of the resources and general considerations about future urbanization

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Abstract. The discussion will touch the Eco-District settlement for the future of urbanization. The presentation intends to summarize few key aspects of the topic on the fundamental element of the Eco-District strategy. The author will present three important study cases: Hammarby Lake City and Växjö in Sweden and Aarhus in Denmark. The study will explain the theory, the best practice cases, and the necessary culture and management based on social participation. The paper will touch the Multi-Scale Approach, the Multi-Layer Planning, and Smart-Node.

1. Introduction
The intention of this paper is to propose a general overview of the strategy of Eco-District for the future urbanization in the direction of a possible strategy to create an Eco-Life. Eco-Life in our definition is a comprehensive strategy which includes many disciplines, only partially technical, but mostly strategical and which involves crossing strategies. At the beginning of our research, we assumed that one of the objectives was to preserve the human being for the future generation. But after several considerations, we did not consider this point valid anymore. It is definitely necessary to consider the whole environment as a goal of sustainability. For this reason, in our perspective and as a partial conclusion of our study, the technologies and the numbers are not the fundamental issue of the discussion concerning the Eco-Life. Management, people, idea, and processes are much more important and radical in every future strategy for the preservation of human and non-human life.

Our proposal is to introduce the concept of Eco-District for the future of urbanization. Since we do not consider realistically the idea of Eco-City in all its different acceptations (green city, sustainable city, etc.) and since we accept the necessity to pursue the goal of ecological life, the only appropriate strategy in this historical moment is to move forward in three different directions: Eco-Village, Eco-Town, and Eco-District. The first two concepts will be not analysed here, but they are the objective of a much larger publication made by us [1]. For the third topic, the Eco-District, the importance is particularly remarkable for the reason that the urbanization in the recent years is the main trend in the world with regard to the housing models of human beings. This process is irreversible and without a realistic and feasible strategy of energy saving and especially social planning it will be impossible to sustain an “appropriate future” for human being.
2. Methods
Our study denies the possibility to solve the issue of sustainability in the contemporary and future life based on technical solution only. Technologies are only tools to reach a much more complex plan. For this reason, the main perspective of this study will consider the geo-politics as a key vision to analyse the complexity and the connection between the different problems involved in the future of sustainable life. Another very important point of view we follow during the investigation on the Eco-Village is the key discipline of ecological economy, which intends to combine the human economy and natural ecosystem. The traditional neo-liberist economy demonstrates the weakness of the system created in the past thirty years. According to several authors [2, 3], the possibility of changes is not only possible but extremely effective and it works at the local scale very well.

A very important point in our investigation concerns what we have called Multi-Scale Approach (MSA) in other publications [1, 4]. MSA could be described as a problem-solving methodology according to the local condition, involved in the deciding several factors like economy, climate, local culture, local technologies, and so on. The final strategy, technologies, and processes adopted in the specific intervention depend on the local characteristics and on specific factors which arise in the local situation.

All investigations on this research were based on literature review in different languages (Italian, English, French, Chinese, and German), interviews with experts and designers, on-site investigation particularly in Sweden, Italy, and China, and, finally, on our professional practice as architecture designers, urban planners, and building site managers.

The analysis of our data is based on scientific review of all the materials investigated during over 10 years of research in order to give a knowledge of possible solutions for the realization of Eco-District in the direction of creating a possible strategy to realize a Zero-Carbon city. This is a very high standard but necessary goal for the relatively near future such as China 2050 [5].

3. Results
Our analysis demonstrates the impossibility to reach a realistic Green-City based on traditional neo-liberist economy and on the existing trend. The consumption of energy, use of space, problem of transportation and management of wastes, the necessity of resources, food, and water as well as water waste treatment are excessive. All the processes to discuss about the sustainable city are based on the concept of “greenwashing”. The recent congress about sustainable city process in Tianjin, China (2019 World Intelligence Congress: Intelligent New Era: Evolution, Strategy and Opportunity) was clearly remarking the complete absence of an economic plan for the future to compensate the immense investment of the Chinese government in the area of sustainable city. Despite the immense efforts, there is no realistic strategic plan that has been made for the economic returns on the investments made in the past.

We must remark that reconversion of the existing city in Green-City is a necessity for the real future. It is not only a dream, but an object of the immense investments from different governments and municipalities around the world. Yet, no specific roadmap has been made at the city level. The situation is totally different with the reconversion of Eco-District such as residential district.

An Eco-District is a compound based on the radical reduction of non-renewable energy and waste. Limited in a certain dimension, it could be self-sufficient, not in absolute terms, but at least regarding certain issues like water, green and, in certain conditions, food and energy. Every Eco-District works only if it solves the problem of connection with the large-scale provisioning of food and water. This is why in every theoretical and practical consideration about Eco-District; it will be always necessary to think in terms of global scale. In a general concept, an Eco-District should be an autonomous entity, connected with smart node, a multilayer connection with the rest of the city. In Eco-District, we should notice that it is necessary to try generating a model to let the residential compound be completely independent in terms of energy use and waste recycling. This is valid at the local level, but it will be basically impossible to separate the Eco-District from the rest of the world. The strategy to connect a single Eco-District to the surrounding will be touched later in this paper.
Now it will be important to briefly illustrate few cases which are key examples of real sustainable districts.

**Case 1. Hammarby Lake City, Sweden**

Hammarby Sjöstad can be translated as Hammarby Lake City. It is located in Sweden, in Stockholm’s South Island. It was for many years one of the most advanced examples of Eco-Districts, where the accurate processes of waste management, sustainable buildings design, social participation, and quality of the environment were evident. The district is connected with the rest of the city with a city tram and very comfortable pedestrians and bicycle lanes. The roads are wide and comfortable, but in the daily life they are mostly empty, because the choice of the local people is to participate with their own efforts for the quality of the community. The overall project has an extremely high quality of the design; a low density is one of the characteristics of the urban planning. The abundant presence of water and wetland is a key point in the design of the environment. The passive design of the building is a key element in the whole process.

**Case 2. Växjö city, Sweden**

Växjö is the seat of Växjö Municipality, Kronoberg County, Sweden. The municipality of Växjö covers an area of 1924.81 km² and has around 83,000 inhabitants. Nearly 64,200 people live in the city and the rest live in the countryside or smaller adjacent urban areas.

Växjö is known as the greenest city in Europe. It won the Best Environmental Practice in Baltic Cities Award 2007 in the category of sustainable energy management. By 2010, it had reduced the fossil CO₂ emissions by 50 percent per capita compared to 1993. The goal is to reduce the fossil CO₂ emissions by 70 percent per capita by 2025 compared to 1993. In addition, Växjö Municipality has carried out many environmental projects, both private and public, including beautiful parks and green areas for people to enjoy.

Currently, the per capita carbon emission of Växjö is only 3.5 tons per year, the lowest among European cities. A sustainable city, not only means that it has a sustainable energy, water and waste management systems, eco-buildings and community and a green vehicle program to reduce greenhouse gas effects, but also means that it should have dynamic and continuous economic development. In addition, it should enjoy a healthy political life, education, medical care, welfare, gender equality, and many other areas, which have the potential to save energy and reduce greenhouse gas effects. Växjö is striving for such a standard Eco-City and Eco-District [6].

**Case 3. Aarhus, Denmark**

The district heating in Aarhus covers 95 percent of the total need for heating in the city. By 2030, 100 percent of the heat production is based on carbon-neutral biofuel and waste. As for wind power, the Aarhus area has the world’s highest concentration of wind power companies, which generate not less than 87 percent of the combined turnover in Denmark’s wind power industry.

The cases illustrated above work very well, but we should remember the necessity to integrate every Eco-District with the rest of the territory. A separate entity does not work well and there is no possibility of having an Eco-District without the connection at the bigger scale. For this reason, it is necessary always to consider a large-scale strategy for the regional/local transportation and linkage based on “smart node” and use the “green transportation”. In several countries, this is a key strategy. In the European context, for example, by 2050 the majority of medium-distance passenger transport, about 300 kilometres and beyond, should go by rail. By 2030, 30 percent of road freight over 300 kilometres should shift to other modes such as rail or waterborne transport, and more than 50 percent by 2050. By 2030, a fully functional and EU-wide core network of transport corridors should be organized, ensuring facilities for efficient transfer between transport modes (TEN-T core network), with a high-quality high-capacity network and a corresponding set of information services. By 2050, all core network airports should be connected to the rail network, preferably high-speed. By 2020, the framework for a European multimodal transport information, management, and payment system
should be established. An interesting strategy will be the policy to move towards full application of “user pays” and “polluter pays” principles. For urban transport, a big shift should be made to cleaner cars and cleaner fuels. 50 percent shift away from conventionally fuelled cars should be made by 2030, phasing them out in cities by 2050. The use of ‘conventionally fuelled’ cars in urban transport should be halved by 2030 and phased out in cities by 2050. Essential CO$_2$-free movement of goods in major urban centres should be achieved by 2030.

Still this is not enough. A fundamental issue in our discussion is what can be called Multi-Layer and Smart-Node theory. In another publication [1], we described this issue more extensively. In short, it concerns the necessity to integrate compound, district, city regions, and countries in a series of complex networks and nodes, which connect the different points in a “smart way” to let people easily exchange transportation systems between buses, subways, trains, and cars. In a very general point of view, we can illustrate these layers according to three logics: 1) physical layers, 2) time, and 3) function.

In addition, we can consider at least seven different possible layers.
- Layer 1: Local level (bottom layer). Pedestrian, bicycle, and tricycle.
- Layer 2: District level. Bus, filo-bus, tram, and cable car.
- Layer 3: City level. Subway, tram, and city train.
- Layer 4: Bio-regional level. Low-middle speed train, MTR, and city train.
- Layer 5: Regional level. High speed train and airplane.
- Layer 6: National level. High speed train, long distance train, and airplane.
- Layer 7: International level (top level). Long distance train and airplane.

What is probably the most important aspect in all these considerations is the social participation. The concept illustrated above is partially based on governmental intervention, investment, and management, but this is not enough. According to our investigation, the social consciousness and social participation is a fundamental element in the success of every possible Eco-District (and Eco-Village) or egalitarian community in general.

Figures 1 and 2 present two simple diagrams, which should at the same time summarize all the elements which are included in the discussion of the Eco-Village.

![Figure 1](image_url)
4. Conclusion

As a result of progressive urbanization, there is an urgent need to propose a concrete and feasible strategy for sustainability of the future cities. Several publications and researches propose the idea of Green City, or Sustainable City, concepts that we personally do consider neither feasible nor scientific. The concrete and suitable proposal to let the contemporary city become more and progressively sustainable could be related to planning, design, and realization of what we can define Eco-District as a sustainable settlement, limited in size, with a mixed-use functions, with appropriate technologies (MSA) able to reduce energy consumption and even reach Zero-Energy or Energy-Plus settlement goal. Several examples around the world propose some models which can be replicated accordingly to different strategies and financial models. The complexity of these settlements does not concern only the technologies — which could be very simple or very complex according to the local conditions, but also mostly related to the conceptual framework which has to be created for case by case. In this paper, we propose a possible Logic Map which could be useful in the conceptualization of these settlements.

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