

# Can Energy Efficient Architecture Create Eco-Urbanity? Rethinking the Role of the Landscapes In Between

A. Senem Deviren

## Abstract

Cities, defined as the concentration centres of activities and people, are becoming a *symbolic label* for the urban scenes and settings of the past century. Today, regardless of their location on earth – except some natural preservation areas –, we are facing the sprawl of built areas that are creating environments that can generally be called *built environment*, including the buildings and built landscapes. Through this global situation the built environment is increasingly being dominated by the consumption patterns of land and life sources, without having a long term vision for ecological integrations. On the other extreme, for the sake of 'energy efficient architecture' – as it is often called –, we are at the point of turning our buildings into real *machine like objects* that have heavy use of materials and difficulty for maintaining the balance between use and capacity of basic natural processes. Although energy efficiency should be one of the main aims of architecture, we may not be fully aware of the contemporary danger of ecological fragility while we are celebrating the production of *perfected buildings* solely, buildings resulting in the creation of *eco objects* having poor relations with their local site and the wider urban context. Between the *sprawl of the built environment* and the *eco objects*, rethinking the role of the landscapes in between and their design for the potentials of wider ecological benefits, including the chances of social life and the possibility of urbanity, becomes critical.

This study argues for the role of the landscapes in between for the utilization of renewable energy sources and the integration of architecture and landscape, particularly for eco-urbanity, as a potential field for inventions in urban design to help to complete our ecological task.

## Introduction

*The challenge, (...), is to develop 'bridging theories' that would allow us to understand and better represent patterns and processes across the nature-society interface.*

(Potschin & Haines Young 2006, 155)

In the last century, our efforts to make highly climate controlled and comfortable environments with the use of artificial – and extensively energy

consuming – sources for lighting, cooling, heating and ventilation, has separated us from outdoors and the natural environment. As a result of the artificial microclimatic conditions created throughout the past century, we are now mostly spending our time and life indoors and in well *sealed* environments ensuring our comfort. Our location on the earth, seasons, outdoor climatic factors like temperature, wind or humidity have little relevance to our daily routines and living patterns, at least in the northern hemisphere.

Urban areas represent the highest concentration of energy use, and the buildings in them contribute to this energy consumption at the highest rates. According to the statistics in Europe ‘the residential and tertiary sector, the major part of which is buildings, accounts for more than 40 % of final energy consumption in the Community and is expanding, a trend which is bound to increase its energy consumption and hence also its carbon dioxide emissions’ (Directive 2002/91/EC 2003, 1/65). Moreover the statistics in the United States of America show that ‘the buildings sector consumed 39 % of U.S. primary energy in 2006’ and ‘the buildings sector consumed 19.06 quads of delivered energy in 2006. Delivered energy does not include energy lost during production, transmission, and distribution to customers’ (Buildings Energy Data Book 2009, 1–1).

‘Energy efficient architecture’ is one of the movements offered to accelerate solutions to prevent energy consumption and help to provide comfort with increased use of renewable energy sources. Several attempts and resources have been concentrated on how to implement the practical knowledge about the construction of energy efficient buildings. Directives have been put in place for regions or countries to provide rules for regulating conditions and defining limits for practice. The European Council Directive requires ‘construction works and their heating, cooling and ventilation installations to be designed and built in such a way that the amount of energy required in use will be low, having regard to the climatic conditions of the location and the occupants’ (89/106/EEC of 21 December 1988, 11). Yet, the building is still defined as a constructed object. The 2002 Directive defines ‘other essential’ requirements to be met by a building: ‘The measures further to improve the energy performance of buildings should take into account climatic and local conditions as well as indoor climate environment and cost-effectiveness. They should not contravene other essential

requirements concerning buildings such as accessibility, prudence and the intended use of the building' (Directive 2002/91/EC 2003, 1/65). However, the rules and regulations for the construction and renovation of energy efficient buildings only address the reduction in energy consumption and enhancement of energy performances with no reference to the site and the surrounding context of the buildings. Although the directives are necessary, and even though applied, they fall short in defining the contextual parameters to inform ecologically sustainable, energy efficient and livable urban patterns.

In his critical research on regional and national rules and regulations of the assessment of building energy performance, Burnett criticizes the limited scope offered by the directives for evaluation of a building's total environmental task. His argument is that the 'building eco-labels provide a measure of environmental performance, but greenness in the context of global environmental sustainability is confused by combining scores for building performance with those for external environmental impacts' (Burnett 2007, 36). Concentrating merely on the energy efficiency of buildings is a one dimensional approach to the problem of energy efficiency in urban areas, lacking urban content.

The role of the surrounding context of buildings on the urban climate is a rarely discussed subject among contemporary urbanization issues. As Wee Ng and Keiko (2007) argue, 'enhanced urbanization has an impact on micro-climatic conditions as a result of energy demands of buildings. Furthermore, atmospheric pollution, combined with pollutants emitted from building materials and anthropogenic activities, influence energy behaviour of ventilation and air conditioning in a way that tend to enhance heat island effects. Further to higher sophisticated factors of comfort levels such as thermal load, spatial design, social concerns, there are additional expectations for the energy efficiency of a building for not only reducing environmental impacts but also providing more advanced quality of urban built environment'. Their further arguments focus on the wider impact: 'Current building assessment systems are predominantly focused on improvement in areas of urban ecological restructuring by improving urban spatial heterogeneity and energy efficiency of the building envelope but lack depth of research in other dimensions such as socio-economic concerns and values of

most investors, designers and urban planners' (Wee Ng & Keiko 2007). A multidimensional approach to urban design, with a special focus on natural ways to improve energy efficiency, is missing from the agenda of evaluations.

Energy efficiency in buildings is necessary and important to achieve the goals of ecological living. However, the use of technology for photovoltaic panels, wind turbines, etc. is creating a solely superficial environment of 'eco-architecture', without having roots in ecology in terms of concept and form. Jaros (2007) argues that

{...}today, most stakeholders understand the design, technology, indeed any environmental and particularly the urban dynamics in its medialized form. It is dominated by the visual spectacle of material progress. For the purposes of promotion of awareness and uptake of, for example, new sources of energy, the environmental theories are demonstrated by projecting them out of the places of generation and distribution, and reducing them to a one sided 'model site' out there; e.g. the stakeholders are lectured about a wind turbine. In short, the dynamics of engagement between individuals and their surroundings are taken away from the material site of the encounter. They are 'abstracted' into a demonstration mode specializing in one of the favorite 'objective' parameters, from displays of wind turbines to shows of energy conserving buildings. (Jaros 2007, 85)

The 'medialized' and isolated form of eco-architecture is a clear danger for living places and it has disabilities in creating living relations with the surrounding ecology. Hyde points out that 'the ecology was established as a study of the relationships and interactions between individual organisms and their natural as well as developed environments' (Hyde et al. 2007, 5). It is these mutual interactions and relationships between humans and their built and natural environments that make the ecological contexts.

In his critical book on green architecture, Buchanan (2005) carries this argument up to a higher level. It should be clear by now that green design, though not dauntingly difficult, cannot be achieved by any simplistic or formulaic approach: no single approach is likely to be adequate, let alone appropriate or even applicable, to all situations. Green design goes far beyond merely specifying efficient 'green' products, such as insulation, low-emissivity glass, water-conserving toilets, super-efficient mechanical equipment and non-polluting materials; and also beyond using replenishable, re-

cycled and recyclable materials, recycling all rain and 'grey' water and planting on roofs. Green design both influences the basic design part of a building, especially the cross-section and the elaboration of the outer envelope, and transcends mere energy efficiency and the minimization of pollution. Instead it must attend to a whole range of matters from the technical and ecological, to the economic and social, including even the cultural and spiritual (Buchanan 2005, 19).

Under the pressures of globalization and uncontrolled sprawl of built environments, the question of how to plan, design and build ecologically sustainable, energy saving and livable urban areas, is one of the most complex and problematic issues of our age. My argument is that the problem is still in the depths, where the 'building' is seen as a ground for innovation, and the surrounding 'landscape' is seen only as a complementary component, allowing open space for transportation, recreation, social gathering, visual and physical access to nature, but rarely as the intertwined part of energy and climate conscious design of the building, let alone its vital potential for creating an ecological balance between the natural and built environment for eco-urbanity. This study will explore the current discourses on in-between spaces in urban contexts and contemporary research on the role of the landscape in between for the utilization of renewable energy sources and creating natural microclimatic conditions for further social purposes. The integration of architecture and landscape, as a potential field for creating the conditions of eco-urbanity, will be the concern of the wider frame of this exploration.

## The wider frame: Integration of architecture and landscape

*A designer has always been also a teacher, in a position to inform and influence the client. With the present environmental mess it is even more important that we help to guide the intervention of design with nature and mankind. We must enlarge our own areas of knowledge, and at the same time redirect our ways of working.*

(Papanek 1995, 10)

New environmentally challenging projects require collaboration between landscape and architecture in a more coordinated way than the established division of labour among specializations would allow; new production

technologies oblige continuity between design and production; and globally expanded practices necessitate malleable project management to better fit different development cultures. Other calls focus on addressing new audiences in new ways. Underprivileged and underrepresented groups require that architects abandon the security of traditional patronage and develop new kinds of agency (Sarkis 2009, 93). When we talk about the integration of architecture and landscape, the issue is not only the problem of integrating vegetation and terrain with buildings, or green parks with building groups in an urban context. It has a broader meaning including the concept of connectedness in nature. As Wines argues, 'mankind has always been a fundamental part of ecological structure, and its architecture and commerce (prior to the Machine Age at least) frequently provided essential contexts for the survival of plants and animals' (Wines & Jodidio 2000, 72). According to similar views supporting the integration of ecology and architecture, architecture is no longer seen as an isolated entity, but must be considered within the context of this expanding environment. If open spaces in urban contexts were to be seen and utilized as landscapes in between – a living part of the larger surrounding landscape – they could provide multifunctional and multidimensional potentials for contacts and interactions between society, architecture and the natural context.

The rapidly increasing concentration of people in urban areas along with the focus on improving quality of life, and revitalizing city centres, has led to increased attention to the quality of open urban spaces (Nikolopoulou & Spyros 2007, 3691). The ongoing global urbanization process, however, involves an unsustainable use of natural systems and creates numerous problems both within and outside cities. Thompson (2002) offers that 'an exploration of what we should be demanding from urban open space in the 21st century: what are the social and spatial implications of new lifestyles, value systems, attitudes to nature and sustainability, and what models for future city life will accommodate these?' (Thompson 2002, 59). These questions require sophisticated thinking. Within this sophisticated frame of thought, the landscapes in between could help to remind us of the potentials provided by micro open spaces and to think about ways of improving our connectedness to nature.

The integration of architecture and landscape becomes inevitable and inescapable in order to create the landscapes in between which can work as interfaces between society and nature. What is suggested here is a full integration of architecture and landscape, both in theory and practice, to create a vision and inform the urban design strategies for ecological balance and increase the level of livability.

## The role of the landscapes in between for eco urbanity

*What is happening to the once-beautiful landscape is an enormous catastrophe for which the future will curse us. If there is future. Most contemporary architecture has forgotten the age-old lesson of design which took nature, climate and the elements into consideration.* (Papanek 1995, 10)

*The great microclimates of the past were created through intuition, common sense, and an intimate connection to the seasons. We don't need complex computer models or data graphs, but rather a sympathetic understanding and appreciation of how the sun moves through the heavens. Sometimes, all that is required is time and patience. Just walk outside and observe the position of sun.* (Sullivan 2002, xvi)

The critical task in urban design is to explore the ways to achieve ecologically sustainable, comfortable, energy efficient and livable contexts without extensive use of technology and resources. My proposal is that often neglected and unconsidered spaces between the buildings – the in-between spaces, when considered as living parts of the larger surrounding landscape, could contribute to the achievement of this critical task; the main purpose should be to transform the neglected in-between spaces into multi-potential landscapes.

With the exception of planned and designed urban parks, squares and streets, the character of the in-between spaces occurring between largely anonymous, ill-proportioned, randomly-built buildings in the urban contexts, are often spontaneous, unplanned and unexpected in character. The size, location, position, spatial definition, structure and materials constituting them vary greatly. The transformation of these spaces into living landscapes thus requires a multi-dimensional thinking and design process in order to achieve the critical task of livable urban



contexts and energy efficiency utilizing renewable energy sources and ecologically benign technologies.

As Golden argues, 'rapid urbanization is transforming landscapes from native vegetation to an engineered infrastructure that impacts the urban climate system by various dynamic systems, including reductions of evapotranspiration and increases in thermal-storage capacity' (Golden 2003). One of the benefits of the transformation of in-between spaces into living landscapes is their contribution to creating microclimatic environments and energy savings. 'Compared to open spaces / landscapes the complex surface structure of urban areas creates an environment with special microclimatic characteristics, which have a dominant effect on the energy balance of the human body' (Gulyas et al. 2006 , 1713). The effect of microclimatic environments is not only important for human health but they also have wider effects on energy savings in urban contexts. They affect outdoor and indoor thermal comfort and energy use for heating and cooling, and contribute to reducing the level of CO<sub>2</sub> emissions.

The energy efficiency that could be obtained through microclimates created by in-between landscapes is one of the important, but rarely discussed topics in urban design research. Steemers argues that 'it is self-evident that the energy performance of buildings is related to the climate, and similarly the performance of an urban building is dependent on the urban microclimate. More than ever, the city defines a microclimate which is the context to which building design must respond and within which occupants must be considered' (Steemers 2003, 1). The further argument points out that 'there is a need for an understanding of comfort, not only indoors and as a function of the climate, but also outdoors and as a function of the urban microclimate. Outdoor comfort is shown to be less narrowly defined than indoor, and thus the urban microclimate can be seen as an intermediate environment between indoor and the wider climate. Thus, one might speculate that an outdoor microclimate that is comfortable is one that is more likely to offer an amenable environment for low energy building strategies' (Steemers 2003, 1). The landscapes in between the buildings can thus serve as potential life affirming areas where urban microclimate can be modified and regulated by these naturally conditioned spaces.



Some recent research shows that ‘energy consumption of buildings is related to factors of urban climate such as solar loads, wind flow patterns and external air temperature. Improvements in urban microclimate should therefore, have direct and indirect consequences on energy savings’ (De la Flora et al. 2006, 1238). They further argue that ‘the great diversity of characteristics of the open spaces surrounding buildings can modify general energy balances and consequently affect thermal performance. Furthermore, the complexity of urban configurations and annual or seasonal changes can also alter the influence of the climate over building heating and cooling demands. It has been demonstrated however, that buildings themselves are also able to modify the microclimate. A well-known consequence of this is the “heat island effect”. For all of these reasons, each one of the mechanisms of heat transfer through the building envelope requires specific study, taking into account both the building and its environment’ (De la Flora et al. 2006, 1238). Thus, the utilization of renewable energy sources through the transformation of the surrounding in-between landscapes could be a step in the strategy for eco-urbanity, both for existing and new urban areas. As Johansson argues, ‘in the urban environment, a comfortable climate is important for well-being and to attract people to public spaces’ (Johansson 2006, 1326). The transformation of in-between spaces into living landscapes thus not only contributes to creating microclimatic environments but also provides potential habitats to preserve biodiversity and allows different activities to be carried out and social interaction to take place.

Although their presence has an important role to play in the urbanity of contemporary urban settlements, the spaces between the buildings are often neglected because of ownership confusions and disagreements. On the other hand, ‘if the significance of spaces of indeterminacy is not effectively demonstrated, we lose the opportunity to provide resistance to destructive urban interventions. Common traits may exist in these spaces. However, they are inherently site specific and their characteristics will inevitably differ from each other, making them highly unique and reflective of the local culture. Such spaces are people-oriented. They are democratic spaces where users and participants can identify with and even take psychological possession of without the need for legal ownership’ (Lim 2001). Jones (2007) argues that

spaces between buildings often form the backdrop of the urban landscape but play a fundamental role in creating a framework for a city. The challenge for urban designers and landscape architects alike is to make the informal 'chunks' of a city work together to bring buildings to life. (...) Awkward spaces could be described as points of emergence, not emergence into the city but emergence into somewhere else. Like portals or black holes they offer the chance to glimpse at the 'other' space of the city. (...) Awkward spaces emerge at each level of the city's organization and are essential for the holistic planning and design of a self-regulating urban system. (Jones 2007, 71)

In-between landscapes bring nature into close proximity with people. The interactions and relationships between self and environment become visible in the outdoors surrounding our buildings, or the landscapes in between. They offer spatial structures that allow multiplicity of choices for pedestrians to flow and encounter, thus also contributing to social cohesion.

New and nearby outdoor spaces for varying functions such as play, gardening, sports and social gathering can be generated through the adaptive reuse and transformation of leftover in-between spaces into living landscapes. With their multi-potential functions, the landscapes in between could become spaces of narratives, where hybrid and spontaneous behaviour, intimacy, playfulness and exploration are possible and experienced within the urban context. As Lim (2001) points out, 'the unexpected can sometimes be realized in the transformation of the cracks and gaps from dead zones to extraordinary vibrant sites. Together, these spaces are more than life-theatres: they offer the potential to become effective instruments of contemporary intellectual, artistic, cultural and sociological discourses. Here, much creative energies are generated. Unstructured interdisciplinary ideas, concepts and notions collide with and constantly undergo a process of fragmergration – a cyclical state of fragmentation and integration – that shift minds in and out of confusion and clarity' (Lim 2001). Hence, the landscapes in between can work as concentration patterns and connective tissues of the urban context; they can become learning and acting environments of the residents where urban culture is displayed, shared, consolidated and augmented (Figure 1).

Figure 1. The 'City Beach' in Graz, Austria, August 2009



(Author's photo)

## Concluding remarks

*Ecology and notions of sustainability are at the core of the landscape architecture. The problem is that ecology is not enough. (...) What we now need to do is to combine ecology, community and art into a cohesive whole and, by using this triadic relationship as a framework, explore, examine and test the coherence of our definition of the human/nature relationship and our emerging Utopias.* (Hopkins 1999, 206)

The current discourses on urban design theory mostly deal with different dimensions of social, visual, functional, morphological and economic characters which have a large impact on the formation of urban places. Yet, the potentials of micro-urban environments, which can be generated by the transformation of in-between spaces into living landscapes, do not have much influence on informing practice. Without prototypes or classified typologies, these spaces are open to change and mobility, and their spon-

taneous and dynamic character offers a fruitful arena for micro-environment design using the potentials of increased density and interconnectedness between society, nature and urban context.

In our globalized world, consumption patterns are wide-spread in every sense of the term and we may be on the point of losing the ability of how to think about and design the *concentration patterns* and *connective tissues* that can have the potential to be utilized for sharing the limited sources on this earth in an environmentally beneficial manner. It is the ideas that have the power to transform landscapes. In order to achieve the living conditions of eco-urbanity, one of the major tasks of new energy efficient architecture should be not simply to satisfy the requirements prescribed by 'building directives'; nor even merely to create a 'green architecture' 'in harmony with nature'; but the task should rather be through exploring the micro-cosmic human-nature interfaces, to push the limits and explore ways to create the spatial living conditions and sensibilities to work with the cycles and dynamic structure of interconnected macro-natures of the cosmos.

If our ultimate aim is to meet our ecological responsibilities, our challenge as architects is to remember and to re-learn to think and work in an interdisciplinary manner, and continue to develop strategies for transforming the neglected urban spaces into parts of daily life, making them living landscapes, where architecture and landscape intermesh and organize them to work together for connecting the concentrated pattern of buildings to the wider living context providing the possibility of eco-urbanity.

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140 A. Senem Deviren

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