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Urban Planning and Environmental Dimension: The Sustainable Quarter

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Abstract

Our contribution aims at thinking over the subject of the environmentally sustainable quarter, placing it within the wider scientific and technical background that links the impact of the environmental dimension in contemporary town planning to the emergency of the unsolved question of urban suburbs, that is showing all its problematic nature and impossibility of postponement in the upgrading of the existing town, in the light of the more and more urging themes of environmental sustainability, that identify the precondition for a suitable intervention in the compact town. Town planning logics of these urban areas, that are quantitatively prevailing on the dimensions taken by the settlements built in Italy during the second postwar period, are strongly related to the research works of the modern movement in architecture and town planning, that assigned to the quarter a vital role in town planning and building. It is for this reason that some features are proposed to debate, that sustainable quarters should have in order to address requalification planning choices of the existing towns and/or of the reconstruction/construction from the beginning.

1 Town planning and environmental dimension

The western economic model which was asserted with the industrial revolution produces a great balance alteration of ecosystems and a large-scale environmental change. The intake of pollutants in the air and in the water, wood cutting, desertification of large territories and coast erosion, town and infrastructures development constitute the causes of global risks also at the scale of the Town Plan. As a result of these changes, Town and Regional Planning have started an epistemological revision by stating a more and more environmental dimension of the regulations of Town and Territory. It is in towns that 50% of the world population lives - in Europe this percentage goes up to 80% - and present demographic trends allow us to predict that, in a ten-year period, this percentage will reach 60% of the total. Towns require huge quantities of resources and export, in their turn, as much huge quantities of waste contributing to earth heating, by determining an impact on the environment beyond their physical boundaries with repercussions on entire nations and on the whole planet. For this reason, the fight for sustainable development, for a healthier world, fair and durable from the view point of the environment, is to be fought in towns to a great extent. The energy issue is to be faced strategically both from the top - energy planning at national level and field planning - and with a bottom-up approach, that, starting from the definition of good practices and control procedures of energy consumption of building bodies, by the enforcement of the fundamental Directive 2002/91/CE on energy Certificate of buildings, allows gradually reducing the impact created by small and large settlement units. In fact, even though towns occupy only 2% of the earth surface, they are responsible

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for about three quarters of the global emissions of carbon oxide of anthropic origin. The revision of the classical economism-based targeting of the dynamics of transformation demands the search for new settlement models and the identification of more environmentally sustainable planning logics. In fact, in the last years, classic economy is considering its disciplinary statutes, produced by modernity, and some theoretic assumptions have changed in timid operational facts - see ethical banks, the debate on environmental damage assessment, the birth of the third sector (non-profit bodies: associations, foundations, committees, clubs, mutual aid associations, onlus (Non-Commercial Bodies and Non-Profit Organizations of Social Utility), volunteers organizations, social cooperatives, amateur sport associations, social promotion associations, fund raising, business circles), which anyway indicate an important trend which can be still the object of speculation in several directions. Aware of the triple importance of the sustainability, that can be reached by joining the three economic, social and environmental components, and of their complex interactions, it is the latter that is focused on in order to trace useful elements to create new physical planning logics. The realism at the basis of these changes needs a thinking over the scale to assign to these plans. In the second postwar period, most town settlements - about 70% of residential building heritage in Italy inhabited by 80% of the population - were realized following the logics of town planning and architecture of the modern movement, which were characterized by the search for the smallest functional elements, for the smallest meeting unit and of the largest meeting unit, in a quite mechanistic process that starts from the housing, passes through the building, configures quarters and assembles the latter in pieces of towns. In the light of these reflections, the quarter's scale seems to constitute the meeting point between the largest architectural unit and the smallest urban one. The latter has its own inner complexity. That is why searching for environmental sustainability features linked to this dimensional scale could determine coherence with the genetic code of these town parts, with a greater possibility of success in its carrying out.

2 Identifying environmental sustainability criteria: a method suggestion

Which features should a quarter have in order to be defined as environmentally more sustainable? In order to sketch a first partial answer, strongly connoted by effectiveness, some significant realizations could be analyzed with the aim of extracting their distinctive features. This methodological approach is based on the basic belief in the formalization of the techniques in the praxis. In fact, they represent the synthesis between scientific research and the questions made by the established community to the territory planner. Hence, starting from the analysis of some European typical and/or paradigmatic realizations, some recurring elements, that are not much linked to the contexts that have structured and addressed planning logics of sustainable requalification of the existing and/or new building have been chosen. After the choice of the quarters, their analysis has been made by a reading grid, which has underlined their environmental sustainability features, in order to obtain a comparative analysis aiming at achieving a synthesis of the sustainability criteria implemented in the town and building plan of requalification and/or of the new building. The quarters to analyze have been identified using the following criteria: quarters recently realized, around 2000; quarters applying typical and/or paradigmatic sustainability paradigms; Europeans quarters, in order to have an exhaustive survey of the conditions of our continent; already and not yet realized quarters, during their planning stage, in order to obtain clearly identifiable implementary choices; according to these simple criteria, the selected and analyzed quarters have been as follows:

- *Vauban* quarter (Fribourg - Germany) (38 ha - 5.000 inab - 2800 dwellings - fig. nr. 1); *Solar Siedlung* quarter (Fribourg - Germany) (1,2 ha); *Rieselfeld* quarter (Fribourg - Germany) (250 inha - 10.000 ab); *Kronsberg* quarter (Hannover - Germany) (150 ha - 6600 ab - 3000 dwellings); *Bed Zed* quarter (London - Great Britain) (1,7 ha - 244 inab - dwellings 82 - fig. nr. 2); *Nieuw Terbregge*

quarter (Rotterdam - Holland) (21,5 ha - 860 dwellings - fig. nr. 3); *Viikki* quarter (Helsinki - Finland) (1.100 ha 13.000 inab); *BO01* quarter (Malmö - Sweden) (30ha - 2000 inab).

Fig. 1 - Plan of Vauban Quarter - Fribourg and view of residences

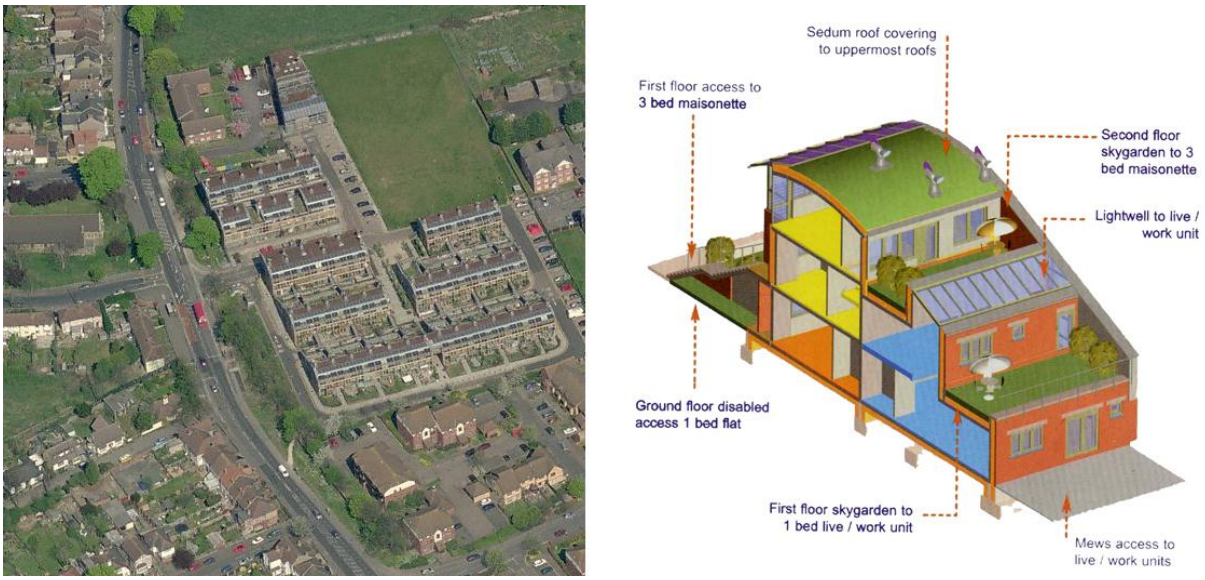

Fig. 2 – Aerial view of Bed Zed Quarter - London and cutaway isometric view of residences

Fig. 3 - Aerial view of Nieuw Terbregge Quarter - Rotterdam

After choosing the quarters, the phase of analysis followed. It was made by dwelling upon the features of sustainability and upon how quarters' real buildings had been implemented. The following step was the drawing up of an analysis card, that was structured with a reading grid, in order to make it easier to identify the single quarters' features first and then their mutual comparison.

The grid was structured in three subjects: the first, in which relevant data of the quarter, like localization, realization year, planner, extension, population, are reported; the second, in which the quarter's features are described; the third, in which the sustainability criteria applied in the realization are reported.

From the analysis and from the cards' filling, the sustainability features implemented in the quarters have been clarified.

From the comparative reading of the cards some recurring synthesis features emerged having little link with the specificity of the cases analyzed:
- compactness of the settlement;
- high residential density;
- not too much high stores' number;
- use of line and open-court building typologies;
- presence of a functional mix (residential blocks, productive activities, tertiary);
- suitable equipment of services;
- high quality of open spaces;
- care for the weak;
- protection and supply of open spaces;
- minimization of the use of private transport;
- efficient public transport;

- priority and protection of pedestrian and cycle mobility (gentle mobility);
- control of energy consumption;
- use of alternative - solar, photovoltaic, Aeolian - energy resources;
- presence of low consumption buildings;
- use of eco-compatible materials;
- rationalization of the use of natural resources (water, soil);
- reduction of - air, noise, soil, water - pollution levels;
- reduction of waste production;
- increase of waste separation;
- maximization of recycling.

To order this list, it is possible to group together the composing elements in four macrocategories: *morphological and functional organization*; *emission control*; *waste cycle*; *energy consumption*. *Morphological and functional organization* of the quarter. This term implies the set of buildings and of open, public and private, open space, and their technical features, from which factors such as quarter ventilation, surface water run-off, insolation, mobility, citizens' guidance ability as well as energy performances of the buildings, since performances are strongly influenced by the overall arrangement. It takes a remarkable importance, since both aesthetic and environmental properties of the quarter and the satisfaction level of residents' needs depend on it. In order that a quarter presents an efficient morphological and functional organization, it has to be characterized by a high compactness. A compact settlement is the contrary of urban spreading, that brings about an abnormal soil occupation and has the advantage of improving quality and accessibility to the services available to residents, of favoring the vitality of the local activities, of giving back residential roads a spacial identity and a complexity that is typical of the urban road, where slow mobility, vehicular one and activities live together in a various and harmonious mix, in order to generate an increasing of the settlement security, by passive surveillance, too. There are two ways to obtain a high residential density. The former is to realize high buildings, having the fault of generating settlements, that are characterized by an excessive over-crowding and by an extraneousness of the inhabitants due to the high number of people living in each building, that reaches considerable dimensions, thus generating not few difficulties even in its management. The latter is to hypothesize a settlement made of urban blocks allowing reaching high density values, offering a greater conviviality, and higher security and sustainability. Among the different types of blocks, the ones that particularly suit our aim are *staggered blocks*, also known as *solar blocks*, since they guarantee the settlement microclimate. In this kind of block, roads and public spaces are oriented according to summer and winter ventilation. Roads are oriented according to the East-West and North-South axes, which pedestrian paths, separated by vehicular ones, are carried out serving buildings (fig. nr. 4).

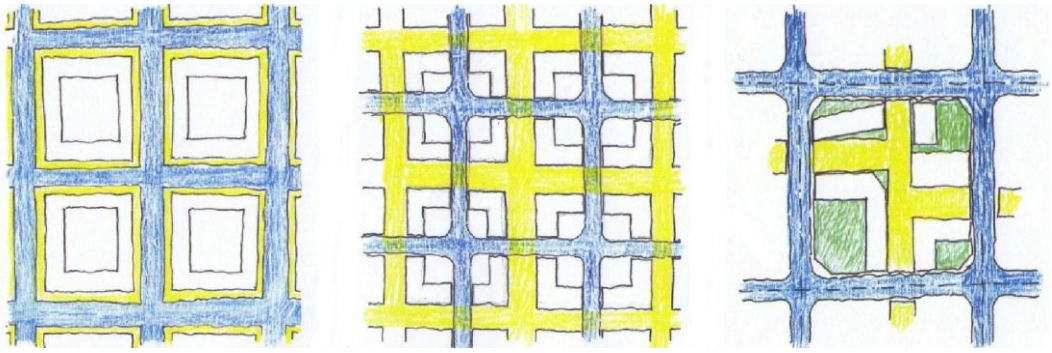

Fig. 4 – Scheme of the blocks: in the first case, the pedestrian network is placed in the same seat of the vehicular one; in the second case, the pedestrian network is dual to the vehicular one, but separate from it; in the third case

– solar blocks – pedestrian paths are integrated with the building types, differentiated according to position and orientation, proposed by Dierna S., Orlandi F. *Buone pratiche per il quartiere ecologico* (Good Practices for the Environmentally Friendly Quarter), Alinea, Florence, 2005.

Block configuration has to make pedestrian and cycle mobility easier and schedule restricted traffic areas for vehicular mobility, allowing stopping only to residents. Margins should be easily noticeable by users, with a clear identification of the different functions in order to make inhabitants orient better. The most suitable building typologies are line or block typologies with a maximum of two or four stories, organized in an open-court building fabric. An efficient morphological and functional organization is strongly influenced by a suitable arrangement of public and green areas. The former should be easily accessible (generally they should be at a distance of more than 500 meters from residents) and characterized by a high planning, realization and management quality. They should generate centrality and their organization should attract people in order that they are driven to social integration, to communication so to contribute to strengthen the sense of solidarity and of belonging to places. Green areas, on the contrary, should configure suitable ecological belts both to protect the most valuable areas from the naturalistic view point and to contribute to the improvement of the quarter's life quality. Their positive influence on microclimate is well known, since they affect shading in summer contributing to air cooling and humidification and contribute to block ventilation in winter. Vegetation plays a fundamental role also in relation to mitigation of noise and air pollution. A great attention shall be given to the functional mix of the activities, trying to integrate residential and productive functions in the same built-it fabric, if possible also in the same building. *Emission control*: environmentally sustainable quarters should be characterized by spaces destined to meeting and games, far from the most busy thoroughfares and not closed by high buildings so to allow ventilation. In busy areas, plant barriers should be generally used in order to reduce noise and build a separation between pedestrian and vehicular networks, and buildings should have projections in order to avoid the noise reverberation phenomenon. *Waste cycle*: environmentally sustainable quarters tend to a substantial decrease in per capita waste production. In fact, with the increase in consumption by the population, the quantity of waste produced has proportionally grown, strongly linked also to consumer life styles that have dominated in last decades. They promote waste separation, aiming at an objective that claims at least 30% of the total in order to minimize turning to dumps also through the maximum urban waste recycling and by realizing composting plants on the spot, that will reuse compost heap for the production of high quality compost. *Energy consumptions*: this aspect represents the one in which encouraging results have not yet been achieved. From a recent survey made by the World Bank on consumptions, it was ascertained that they are constantly increasing and the greatest part of them is due to building operation. It is thought that the impact reaches 40%. Hence, in order to limit energy consumptions, action should be taken on buildings and on the optimization of energy and bioclimatic aspects of the quarter, which are strictly connected. Buildings' arrangement has to be configured in order to maximize natural lighting, solar contribution in winter months and ventilation. Buildings must be planned as real energy production plants. Technologies more frequently used are airy double-layer glazed walls - allowing an efficient heat insulation - ventilation chimneys - having the task of optimizing natural ventilation - garden roofs - offering a helpful system to increase urban green areas as well as reducing temperature range between winter and summer - photovoltaic panels - integrated in buildings' coverings and in the elements of street furniture - heat solar panels - for the production of hot water.

3 Some closing considerations

Requalifying existing structures to improve sustainability, in planning logics will mean giving importance to accurate technical choices, directed towards the responsible use of resources and of energy, reducing of polluting emissions, protecting against environmental risks, giving performance

qualities to built forms and to open areas. Urban areas where town planning-environmental requalification could be more easily implemented are urban suburbs, metropolitan areas and urbanized countrysides. They are the nonplaces where the paradigm of sustainable requalification shall be applied more, since they are characterized by a widespread decay and by poor quality of equipment and services, but at the same time also because they are in the search of new planning paradigms in order to be autonomously and effectively marked and be distinguished by consolidated areas of the historic center of the same settlement. To this aim, urban features could be valorized, that cannot be traced in the consolidated town and that are based on the difference of the place, enhancing the presence of some resources instead of emphasizing and/or trying to fill the lack of certain features, in a word, pointing at (environmental?) separation, which is complementary to the town center. More than in any other places, in town, metropolitan and distributed suburbs, there are signs telling the territory's recent agricultural history or the protoindustrial history. In the requalification plan, instead of the continuation of these origins, present signs should be interpreted as a resource to use for the birth of new configurations. New environmental qualification needs of the town pose new town problems ranging from the relation system to the enlargement to the different availability of spaces. A fundamental element to achieve urban quality is the town planning, architectural, building plan, which has to seize new quality indicators on which planning choices of physical space could be based, in order to start an improvement of the morphological and enjoyable quality both of town fabrics and of buildings. A not less important role can be played by technological innovation, aiming at applying the principles of bio-architecture, of sustainable building, of eco-efficiency of the building forms. From the analysis of the quarters chosen, it appears that the multiplying effect of environmental sustainability is reached by coordinating building scale choices with town planning choices. The dimension of the quarter allows taking advantage of the system effect, that can be considered a town planning-building complying unit, that can be easily controlled and with the possibility of making processes realization, management and control systems (e.g. water and energy consumption, noise pollution, waste separation, plant use in outer spaces, inhabitants and stakeholders involvement, etc.) real and easy to monitor, and, furthermore, to verify the effects on town changes, taking into account cultural, social and economic dynamics. In order to reach this objective, Town Planning disciplinary knowledge is strongly involved, both in the so-called acquisitions of tradition, but also and above all in disciplinary innovation acquisitions, that, within the classical discipline of physical planning, are trying to combine an environmental dimension that, inevitably, is innovating knowledge and will have an impact also on implementation techniques in praxis. In the last years, we are witnesses of the introduction of sustainability rules in town building regulations - very short-term achievable objectives. These are useful measures, of course, but not enough to generate remarkable results, if they are not included in a town scale plane logic - longer term achievable objectives -, and above all, quarter scale plane logic - shorter term achievable objectives -, generating a multiplying effect having as a consequence a remarkable increase in environmental sustainability. The obligations introduced by the European Directive 42/2001 on Strategic Environmental Assessment have been acknowledged by the Italian regulations in the Environment Consolidation Act, that introduces procedures subordinating plans and programs' effectiveness to the environmental compatibility verification of the scheduled interventions. At town and sub-town scale, too, they represent a further signal of the strengthening of the planning environmental dimension, although, in the existing town frame, the weak point of the indicator sets adds other doubts and makes it little effective, where the stake of sustainability is higher. As a reference model for a more sustainable human settlement from the environmental view point, compact town comes overbearingly up again in contrast with the dispersion settlement model settlements were aiming at in the last decades. Sustainability dictates have brought about also a change in town planning standards with the birth of the so-called environment-town planning standards, that, as well as replacing outdated standards of the old rules, allow realizing a suitable dimensioning of the settlement weights and of environmental supply. Among the new standards introduced, mention should be given to: the definition of parameters expressing the environmental carrying capacity,

reaching a redefinition of the old indexes, integrating them with the soil permeability index and with resource consumption indicators; the definition of parameters expressing town planning carrying capacity, measured in terms of mobility load and on the infrastructure system; the new function of green belts, that are no more ornamental, but instrumental, with the location of environmental corridors, in order to improve life quality and microclimate; the dimensioning of naturalistic equipment in order to mitigate the effects of noise pollution and in relation to the settlement typologies to protect; the definition of soil and polluted waters' reclamation typologies; the definition of ameliorative rules for sewer and waterworks systems in order to increase their compatibility with environmental aspects; the definition of availability levels of the big conversion areas. If the traditional Plan is aimed at halting the physical decay – as if this decay did not come out of socioeconomic causes – by intervening on the effects and not on the causes, the new Plan has to be grounded on building procedures resulting from the integration of traditional town planning analyses with cycle analyses, from the knowledge of the limits of urban growth, from the consideration that a settlement is a living urban system, from the self-determination of local communities, from urban quality.

Town planning becomes a part of a more articulated and complex planning process, paying attention to built-up elements and to the interaction between system and environment (from town to anthropized territory). The possibilities of intervention on the environment must stem from its transformability, that is from its susceptibility to change, which can be conceived as evolving, in other words restoring. In the first case, the intervention must be carried out on altered balances, so to activate redressing dynamics by taking into account that in a complex system the relationship between cause and effect is not always directly predictable. In the second case, the regression of direct and indirect causes which have caused decay must be brought on (landscape and environmental restoration). The new rules for the environment promote ecological standards reaching values of even 50% of the landed surfaces of private green areas; they limit the percentage of public and private waterproofed surfaces; they pursue the ecological compatibility of production activities in agricultural areas. The new axioms of physical planning shift from a urbanocentric - additive expansion - and quantity vision - growth without development -, to the integration between built town and nature; they aim at reducing soil consumption and natural resources, at designing a system of urban and territorial parks and gardens, at verifying the waters cycle, at reclaiming and requalifying existing - ancient and new - urban fabrics and at actively protecting (valorising) historical and architectonic and landscape and environmental resources, so outlining the main objectives of quality planning).

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