Eco - Revitalisation Tenement Housing Quarters in Szczecin, Poland

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Abstract. The article is trying to answers on question: how the sustainable development influence on designing of revitalization process especially for tenement housing quarters in downtowns of the cities? Residential quarters from the 19-th and early 20-th century are still a major part of existing urban tissue, especially in big cities – same in Poland as in other European countries. Tenement houses were built for middle and lower social classes, and frontal tenement houses had large, comfortable flats, while the annexes had small, sub-standard flats devoid of any amenities. Living conditions and the living environment must be changed now, especially with regard to flats located inside quarters. Proposed to demolish whole inside quarters and to establishment green and recreational areas there is mistake. The sustainable development paradigm changes the view on 19-th century quarters and the ways to improve them. In sustainable development theory: social, economic and ecological problems are equal and deeply intertwined. They all have a significant impact on architecture and thus on spatial and technical arrangements adopted. Ecological aspects present in the revitalisation process have a significant impact on both the planning solutions in big scale and the small scale architectural, technical and material solutions used in particular buildings or flats. Among all the ecological aspects the ones important for architectural design and revitalisation are energy-related, material-related and space-related, or better time-space-related, where the analysis of a whole life cycle is conducted. The presented works of the author and especially the following implementation of an ecological renovation of a Turzyn Quarter in Szczecin are the showcase of the material and non-material benefits for people and environment, which are brought by such an approach to revitalisation.

1. Drawback of housing development from the end of 19th and beginning of 20th century

Many of the European cities have large areas built up with rental buildings built at the turn of the 19th and 20th centuries. (Szczecin, Figure-1). Those buildings were focused on the maximum profit from the rent for housing in these resources. The owner of the building plot built on it in a maximum way to get the largest possible number of apartments for rent with a different standard. The construction of the plot itself resulted from the minimal compliance with the then building regulations, which were different for different cities even in one country. These recipes regulated the height of the building, the multiplicity of courtyards - "wells", the size of entrance gates, technical and sanitary equipment, etc. It should be noted that the regulations were not sufficiently developed in the part concerning hygiene, health, sun exposure, ventilation, or access to green areas. Such regulations caused that the street side of houses had large, high flats, while the apartments in the outbuildings were substandard, with transitive rooms, poorly sunny and ventilated, and with insufficient technical and sanitary equipment. The response to this type of development was the postulates of the First Athens Charter and the modernist movement in
architecture from the 1920s. Le Corbusier proposed to demolish the entire center of Paris, and other apologists of the modernism were thinking similarly.

The main question is, what can and should be done with the resources of downtown tenement buildings from the late nineteenth and early twentieth century?

Figure 1. Characteristic buildings of quarters from 19th and early 20th centuries: quarterly regular outline and trapezoidal and triangular quarters. Source - aerial photograph of Szczecin UM. Arrows denote the quarters described in the article.

After first paragraph, other paragraphs are indented as you can see in this paragraph. After Introduction, divide your article into clearly defined and numbered sections.

2. Sustainable development, and postulates of revitalization of rental housing

In the era of sustainable development, the issues: social, economic and ecological are consistent and also influence planning behaviour in the large urban scale as well as architectural scale. By pauperizing the inhabitants of these structures, it cannot allow the degradation and exclusion of large inner-city areas from the actively living urban structure. The existing structures are a socio-cultural and ecological goods through the built-in resource of energy, raw materials and once generated waste burdening the environment. It is estimated that one square meter of a building constructed in traditional technology has a built-in energy of 5 - 10 GJ, and CO2 of about 0.6 - 0.9 tons. That means the use, adaptation, and revitalization of old structures gives saving energy, materials, environment, and space.

Sustainable development in architecture postulates to minimize the impacts, and thus to draw as little as possible from the environment (raw materials, materials) and make pollutions through waste, gases, etc. To reduce the environmental impact by building activities several goals have been set, measures taken and programs developed. In eco-revitalization the designers must think about:
• Energy – on macroeconomic level the following potentials contributors to renewable energy sources for the next decades will be develop. In micro level reduction of energy consumption by: means of insulation walls and windows, more energy efficient systems of heating and ventilation. Using renewable energy sources. [3]

• Materials – reduction of primary raw materials by minimising and maximising the use of secondary raw materials. Maximising the use of renewable materials. Preventing building and later od demolition waste and stimulating the re-use of building elements. Prefer local materials and products.

• Water and sewage – minimise the use of drinking water by technical and economical solutions. The reuse of cleaning grey water and used of rain water.

• Quality of the built environment – improving the indoor quality of living by using “healthy” materials, well balanced ventilation, heating and cooling systems, use of plants et cetera. Improving the outdoor quality by well thought urban planning with sun and ventilation, and with green areas, ponds etc. Creating a socially accepted environment with daily necessities: nurseries, kindergartens, schools, shops etc. Public spaces and convenient public transport.

The spaces and structures existing in the city for years are easier to accept by local communities. The social and neighbourly relations that have arisen over the 100 years of functioning of these structures were important. The municipal authorities of many cities, who tried to organize revitalization without cooperation with residents, found out about it. Residents of Kreuzberg (Berlin), Copenhagen or Vienna actively fought to defend such quarters with the municipal authorities who wanted to drastically demolish the existing tissue in the 1970s and 1980s. The effect of these clashes with the inhabitants is a change in the proceedings in the field of a revitalization of the rental-housing development from the 19th century. The drastic demolition was abandoned for soft revitalization. (Figure-2). In Berlin, a 12-point codex of soft revitalization was developed [4 – p. 142]. Since the end of the 1990s is no dilemma whether to partially or completely demolished, as well making small adjustments inside quarter buildings - a gentle revitalization.

**Figure 2.** Evolution of the method of modernization of downtown development. Source [2]

3. Cutaway - modelling of the outbuilding interior
Only minor adjustments outbuilding is appropriate and consistent with "soft" regeneration, and thereby sustainable development. Such actions make easiest to gain acceptance inhabitants, which is the
guarantee of the success of revitalization processes. These small adjustments to the existing buildings have been identified as "cutaway" of cubature.

The reason for the decision to demolish can be:
- low usefulness of the object in its existing form (outbuildings, toilets, laundries in the yards);
- poor technical condition of the building;
- improvement of lighting of the interior or buildings by direct sunlight;
- improving the ventilation of the interior (yard).

To order the above demands, it should not demolish whole outbuildings, it could enough demolish small parties of them. To improve the ventilation of small backyards - wells, it enough to demolish a part of the outbuilding on the ground floor to connect neighboring interiors. This will allow air movement and optically increase the yard. To improve the lighting of the yard and the elevation of tenement houses enclosing it with sunlight it can demolish a fragment of the highest stores of outbuilding from the south. It is necessary to create computer spatial models and analyze the incidence of sunlight into the interior of buildings on the days of spring and autumn equinox - 21/03 and 23/09. Based on the location of the sun on these days, in the afternoon hours, design decisions related to the correction of the amount of individual outbuilding should be taken. It is not always necessary to lower the outbuilding by one or more stores. Often is a "terraced" reduction is sufficient, where we lower (remove) parts of the building on subsequent floors. Created in this way terraced surfaces of flat-roofs allow for designing green roofs – terraces (Figure-3a/3b).

![Figure 3](image)

**Figure 3** a) - the principle of demolishing the "fault" of the victim allows to properly illuminate neighboring buildings and courtyards (elaboration of the author); b) - demolition of the part of the outbuilding on the ground floor level in order to improve the ventilation of the interior, photo of the Turzyński quarter Source [2]

4. Szczecin experience in the design of the ecological revitalization of the downtown tenement buildings

In years 1996 - 2007, a demonstration project of ecological renovation of the "Turzyński" quarter was carried out in Szczecin. Revitalization was the first and only one demonstration revitalization in Poland, for which the city of Szczecin received the Minister of Construction award. The author of the project was the Studio A-4 from Szczecin, and the adviser in the field of the environment-friendly building was the author with the team of scientists from the West Pomeranian University of Technology in Szczecin. [2] Described above principles of sustainable construction and soft revitalization have been applied in this revitalization. The aspects related to proper lighting of sunny apartments have been improved (in accordance with the Polish norm - 1.5 hours during the day for 21.03. Or 23.09.) and also with energy, water and sewage, building materials, ventilation and functionality of flats (Figure 4 and 5). After a few years, observing the lives of residents in these spaces is indicated that no significant mistakes were made. Author opinion is that the interiors of the courtyards are too large inside the quarter, which results in the
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ymity of residents similar to that which occurs in modern urban settlements. Author thinks that the backyards should be separated even by openwork fences so that the number of residents per one yard does not exceed 100, that is about 25 - 30 families, what is a maximum of two tenements with outbuildings. This would improve the social relations of the inhabitants of this quarter (Figure-4 – red line). Currently, housing communities play a much greater role in the decision-making process. This forces designers to make greater consultations of proposed solutions in the design process. Co-participation designing becomes a necessity.

![Figure 4](image1.png)

**Figure 4.** Design of revitalisation of the Turzyński quarter together with the ecological levels of pro-ecological solutions, as well as the additional division of previously created interiors. Source [2]

![Figure 5](image2.png)

**Figure 5.** View of a set of flat liquid solar collectors on stands - area 26 m² in a tenement house renovated in the years 1997-1998 at Str. Pocztowa 28 and flat liquid collectors over the team of outbuildings at Str.Małkowskiego in Szczecin. Source [2]

5. **Conclusions**

The design of revitalization of the existing downtown residential quarters from the turn of the 19th and 20th centuries based on the theory of sustainable development is not an algorithm of design solutions. The goals and priorities presented in this concept are different from the traditional design process. The social, economic and ecological aspects should be solved complementarity and in accordance with the assumptions of sustainable development.

The housing resources from the turn of the 19th and 20th centuries should be revitalized in order to adapt them to modern requirements, but not demolished. Protection should not only be historical and cultural but also for ecological and socio-psychological reasons. Accepted space, known, "owned" by
residents is a value that must be taken into account in the process of revitalization design. The existing social, neighborly and interpersonal bonds are also a value that must be protected. Such an approach precludes drastic demolition of interiors, and encourages "soft" revitalization. Designing by soft cutaways meets both social and ecological principles in striving to adapt the nineteenth-century structures to modern requirements. The growing role of Housing Communities will force decisionmakers and designers to design a co-participant. Designing the revitalization of inhabited structures requires a completely different design procedure.

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