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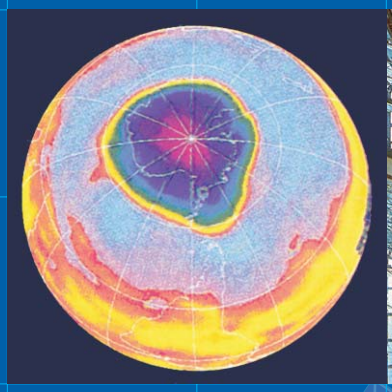

28 - 29 September 2005
Lausanne, Switzerland

cisbat

The Cambridge-MIT Institute

FROM ECOLOGICAL CONSTRUCTION TO SUSTAINABLE URBAN DEVELOPMENT : THE ECOPARC PROJECT IN NEUCHÂTEL (SWITZERLAND)

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ABSTRACT

The present logic of built environment dispersion appears incompatible with the concept of sustainable development. The peripheral expansion of cities is indeed leading to irrational use of ground, growing environmental impact and important infrastructure costs. Looked at from this point of view, the Ecoparc project consists in promoting the sustainable regeneration of an urban wasteland of almost 4 ha, located next to Neuchâtel railway station and notably including the Federal Office of Statistics (FOS) buildings. The design process is based on constant optimization between environmental, socio-cultural and economic criteria, notably by coherent integration of contemporary architectural expression, reduced energy consumption (mobility, infrastructures, buildings) and functional synergies.

RESUME

La logique de dispersion poursuivie actuellement par l'environnement construit apparaît incompatible avec le concept de développement durable. L'étalement urbain conduit en effet à un usage non rationnel du sol, à des impacts environnementaux accrus et à des coûts d'infrastructures importants. Réagissant à ce constat, le projet Ecoparc à Neuchâtel propose à l'inverse la régénération d'une friche urbaine d'environ 4 ha, située à proximité immédiate de la gare de Neuchâtel et incluant notamment les bâtiments de l'Office fédéral de la statistique (OFS). Dans ce sens, le processus de conception vise une optimisation constante entre des critères environnementaux, socioculturels et économiques, notamment par l'intégration cohérente d'une expression architecturale contemporaine, d'une réduction de la consommation énergétique globale et de diverses synergies fonctionnelles.

INTRODUCTION

The vision of equilibrium implied by the concept of sustainability encourages the search for solutions, which are technically appropriate, environmentally undamaging, economically viable and socio-culturally valuable. This objective has many concrete implications and notably challenges the present logic of urban dispersion [1]. The peripheral expansion of cities through the juxtaposition of undefined spaces, characterized by chaotic configurations and separate activities, is indeed leading to the multiple negative effects mentioned above, regarding notably irrational use of ground, growing environmental impact due to an important automobile dependence and large infrastructure costs [2].

With this issue in mind, territorial development planners now foster strategies based on densification principles, using the broadly unused potential existing within already built-up areas. The objective in Switzerland is for example to stabilize ground consumption at 400 m2/pers, which corresponds to the mean in 1995 [3]. The regeneration of urban wastelands will play a crucial role in these strategies because their potential contribution can be estimated at more than 50 % of this target [4].

From this point of view, the Ecoparc project aims to provide a tangible demonstration of these urban densification opportunities, associating notably environmental design innovation, sociocultural revitalization of a derelict area and innovative contribution to the quality of urban life. After some years of planning, the first visible results are appearing in this new neighborhood emerging just next to Neuchâtel railway station.

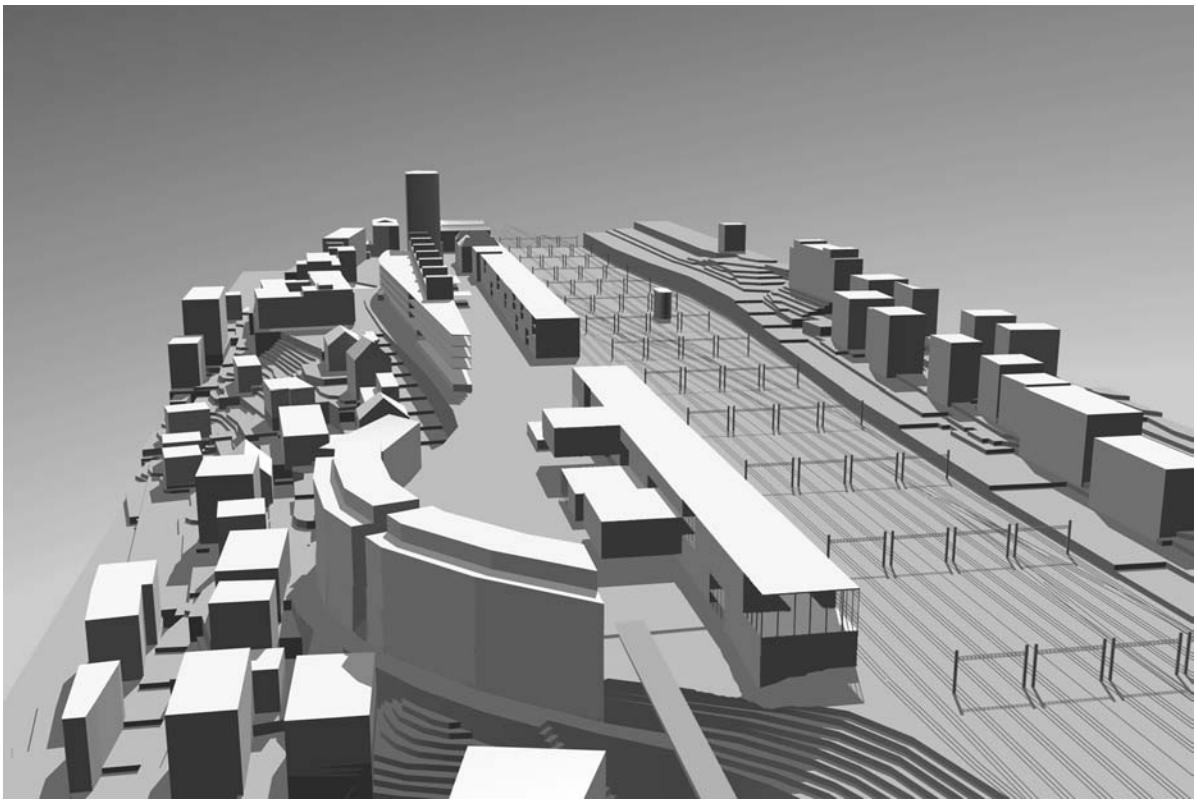

Figure 1 : View of the Ecoparc Project (document Bauart)

URBAN AND ARCHITECTURAL CONCEPT

From the initial competition to a sustainable urban project

The potential of this area was brought to the fore in 1990, when Bauart won the competition to design the FOS building, as well as the densification of the surrounding area. In 1994, the local authorities confirmed the vision of the architects, conferring the status of "strategic development pole" on this portion of the city.

Concurrently with the realization of the first FOS building, Bauart was mandated by landowners for the elaboration of an architectural project to ensure the coherent development of this strategic area. This FOS building constitutes a strong impulsion towards the project of a new urban area and an emblematic example of ecological construction. Considering the potential of this specific situation, Bauart invited fifteen key figures (representing notably the FOS, the Swiss Railways Company, the EPFL, the Canton, the City and the University of Neuchâtel) to elaborate some strategic guidelines for the development of this sector with sustainability as the main theme. This working group hatched the Ecoparc concept, which is simultaneously a *pilot project* for sustainable regeneration and an *association* aiming at the promotion of built environment sustainability [5].

The Ecoparc project involves very diversified functions, including lofts in old industrial structures, various new housing schemes (social mixing), administrative area and schools (functional mixing). In terms of building potential, the regeneration of this area gives the opportunity for developing almost 85'000 m^2 (including the FOS buildings).

Progressive emergence of a new neighborhood

This site also benefits from many important key aspects. In terms of localization, it is situated on an artificial plateau, which offers a favorable orientation. In terms of mobility, it occupies a strategic position, already connected with the public transport (trains, buses and urban funicular) and pedestrian networks.

Between 2000 and 2004 an extension of the main FOS building, consisting of a 15-story tower and providing an urban landmark, was erected, as well as three housing blocks in the east part of the site. The conception of these buildings globally follows the sustainable principles of the first FOS building, including new parameters related to their specific scale, typology and function.

These five realizations already confer visibility to the emerging neighborhood. They will be followed in the years to come by the construction of a second group of apartment buildings, a school center (music academy and business high school) and a multi-functional building with administrative and commercial areas.

Figures 2-3 : Views of the apartment buildings (photos Y. André)

INTEGRATION OF SUSTAINABILITY INTO THE DESIGN PROCESS

Holistic, interdisciplinary and evaluative approach

Beyond the territorial and functional aspects, the operational integration of sustainability criteria has to involve a holistic approach, simultaneously taking into account environmental, socio-cultural and economic issues.

Based on interdisciplinary monitoring, the simultaneous consideration of these multiple issues is made possible by a first evaluation for each criterion, and then by an optimizing synthesis leading progressively to dynamic integration into the design process. The project benefits in this way from the setting-up of a specific indicator-system conceived as a tool to support the decision-making process [4].

Socio-cultural issues

Quality of life is one of the main objectives of the project, in order to produce a credible alternative to peripheral localization. Quality of life is conceived comprehensively here to conciliate social mixing with housing privacy. Table 1 presents the different socio-cultural criteria that are integrated practically into the project development.

Socio-cultural aspects	
1.1. Community	Potential of social mixing through housing diversity (cf. fig. 4) Public urban areas Public cultural areas (for example ground level of FOS tower)
1.2. Facilities	Spatial identity and urban landscape favoring user orientation Housing privacy
1.3. Exploitation	Functional mixing (housing, working and school areas) Direct accessibility of transport public and urban services Accessibility for people with reduced mobility
1.3. Comfort and health	Thermal, visual and acoustic comfort Quality of outdoor spaces (vegetation, urban furniture, etc.)

Table 1 : Socio-cultural aspects of the Ecoparc project relating to SIA 112/1 [6]

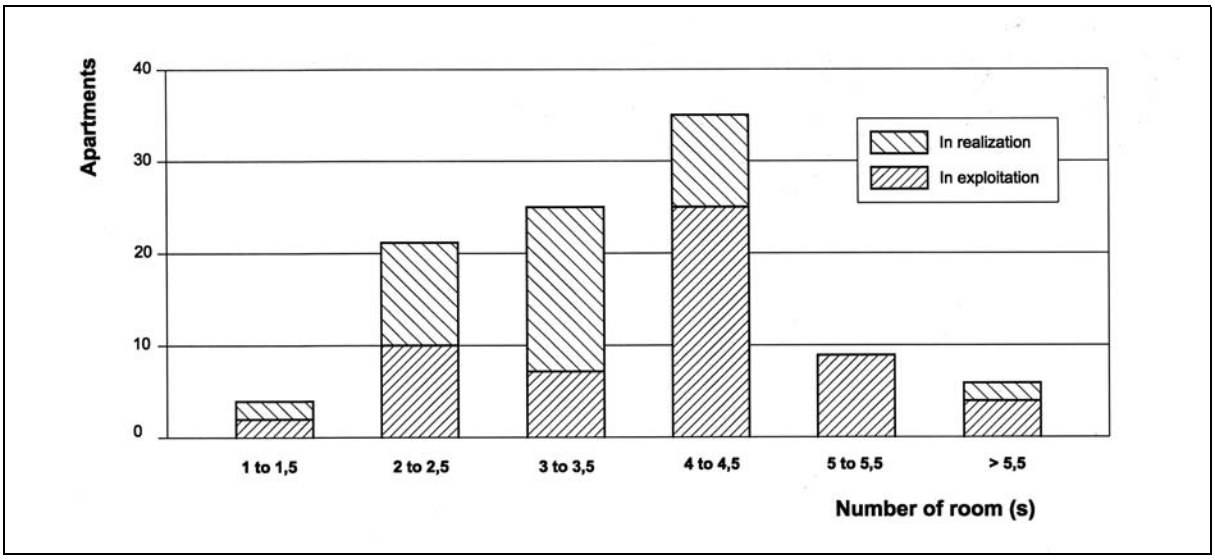

Figure 4 : Diversity of housing typology, contributing to social mixing (data Bauart)

Economic issues

In operational phases, the economic issues play a central role. Economic viability and optimization of maintenance charges are fundamental objectives for investors and planners. In the perspective of sustainability, the approach tries to reach these aims notably by promoting long-term considerations and functional synergies. This strategy led for example to a strong reduction of carpark size (cf. fig. 5), which is environmentally and financially significant, and to the implementation of two different schools in the same building, which corresponds to the same functionality with a surface reduction of more than 20 % (concept of shared spaces).

On another scale, the Ecoparc project indirectly contributes to reinforcing local economic potential. This can be seen in particular from the significant human density of the area, which is almost 406 pers/ha, much higher than the mean of the city of Neuchâtel (97 pers/ha) and strongly confirming its vocation as a strategic development pole [4].

Economic criteria	
2.1. Building substance	Optimal use of site potential (density) Building flexibility
2.2. Investment costs	Investment costs management Reduction of external costs by environmental management
2.3. Exploitation costs	Reduction of exploitation costs by environmental management Functional synergies between different users

Table 2 : Economic aspects of the Ecoparc project relating to SIA 112/1 [6]

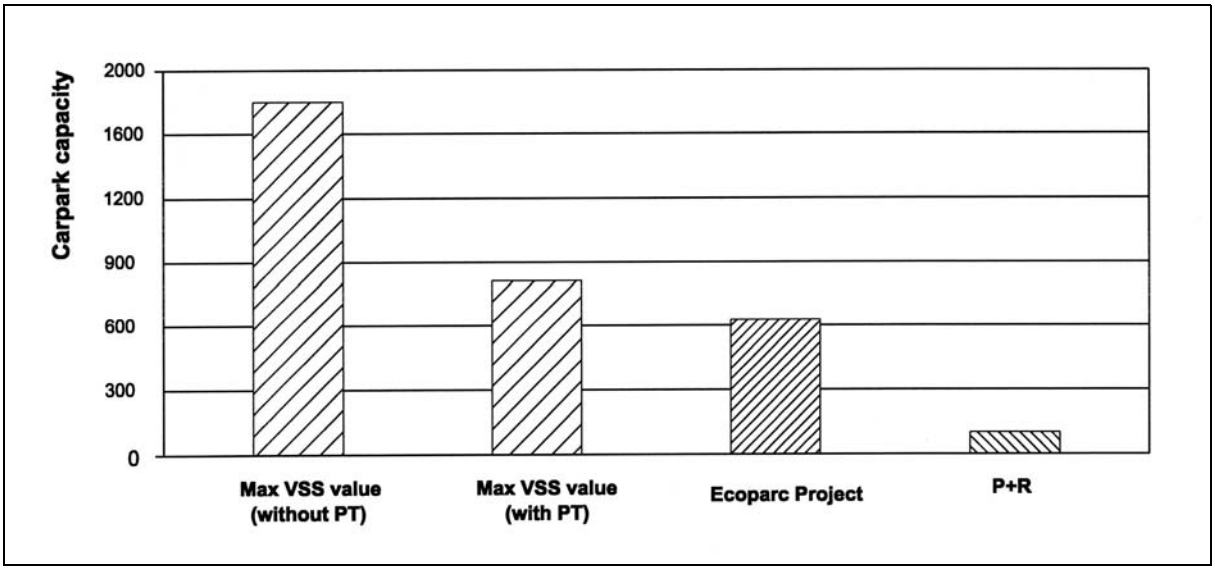

Figure 5 : Optimization of carpark size (VSS values taken from [7]).

Environmental issues

Among the project's multiple environmental issues (cf. Table 3), the reduction of energy consumption appears as one of the most crucial. On the territorial scale, the densification of an urban wasteland leads to low energy consumption for the mobility of users, as research and the values of FOS census tend to show [8].

Environmental criteria	
3.1. Material	Life-cycle analyses included in the decision process Minimized use of polluting substances
3.2. Energy consumption	Reduction of energy use for heating Reduction of electricity use Integration of renewable energy devices
3.3. Ground, landscape	Optimal density Green surfaces favoring biodiversity
3.4. Infrastructure	Valorization of public transports (PT) Optimization of carpark size including "Park & Ride" concept (cf. fig. 5) Ecological water management

Table 3 : Environmental aspects of the Ecoparc project relating to SIA 112/1 [6]

On the urban scale, the optimization of carpark size, whose capacity corresponds to almost 69 % of the maximal authorized size, also contributes to limiting automobile travel (cf. fig. 5). On the building scale, the project involves a strong reduction of energy use for heating and electricity and the integration of renewable energy devices (solar and wood-burning heating).

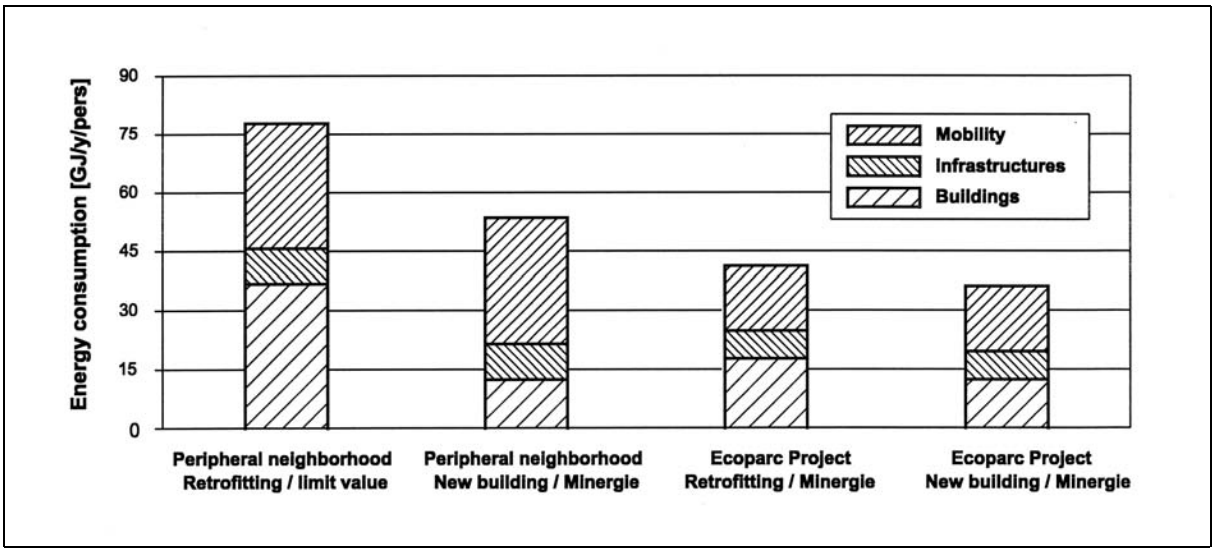

Figure 6 : Global energy consumption for a user living in a peripheral neighborhood and in the Ecoparc housing (mobility values taken from [8]).

DISCUSSION

The search for constant optimization between environmental, socio-cultural and economic criteria involves a holistic, interdisciplinary and evaluative approach. In operational phases, cooperative communication between the different project partners, the local authorities and the planners appears as an essential condition for the development of such a complex and long-term operation.

The project philosophy has also to be extended and passed on to users living and working in the Ecoparc neighborhood. In this perspective, a research program is presently being developed with the support of the Federal Office of Housing [9]

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