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Energy efficiency, diversity of use and design in housing / in relation to office building and mixed functions

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Abstract

The aim of this study was to describe the current directions of development in the areas of theory and practice in subsidised housing, in particular with regard to energy efficiency, diversity of use and design, and to present for discussion recommendations for future programming. Given the dynamism of the last decade, above all in terms of major social, ecological and economic changes, the study comes to the conclusion that in housing as in office construction – and throughout the area of town planning – a change of paradigms has, to some extent, already taken place and can be expected to become even more radical. One consequence of this will be a need for new concepts in the area of housing, too. This applies to the socio-political aspects of the cost efficiency or affordability of living accomodation and to wider dimensions of urban sustainability but also has an impact on the social, aesthetic and urban planning effects of housing complexes that are conceived and designed primarily in a building-centred way.

1./ Energy efficicency as a new key paradigm

Given the enormous importance of energy efficiency for climate protection as well as for new markets and indeed for the entire economy, construction, in particular housing construction, is called upon to play a pioneering role in saving energy and protecting the climate. In Vienna in recent years energy efficiency has been rapidly implemented in the field of subsidised housing, moving from the low energy house as the standard form to the lowest energy house and on to the model of the passive house. It is above all the passive house that, for all those involved (building developers, architects, consultants and, not least importantly, the residents), represents a clear break in the tradition of housing construction and housing, and is heatedly debated by architects and housing practitioners. Apart from questions of its wider acceptance, the necessity for changes in behaviour patterns and, not unimportantly, the effects on building costs, the problems involved in implementing the passive house as a new norm (a measure called for by the EU among others) lie in part in the fact that the response to the goals of climate protection is primarily building based and uses new technologies and inadequately researched and tested industrial products (insulating products, new materials, types of glass etc.). In contrast research into the overall ecological balance including the “pollutants” that result from production and disposal as well as the “grey energy" contained in products and processes is still only at an early stage. To be both sustainable and credible energy efficiency in building must in the medium term adopt a more comprehensive perspective. This approach will also mean applying to the construction of

offices – and to all other sectors of construction – requirements just as stringent as those emerging in the area of housing. This is all the more important as for developers it is not sustainability but the cost aspect that represents the target value for energy efficiency. Other areas, too – in particular mobility – should be more clearly included in an integrated strategy, so as to avoid unfairly imposing the main burden of measures against climate change on construction alone. This touches on one of the important interfaces between housing and a new urban planning that will have to go beyond the optimisation of specific buildings and make a contribution to a far-reaching reorientation of production, mobility and comfort systems.

2./ Diversity of use / flexibility / mix of functions

For decades now mixed functions / diversity of use / flexibility have been called for in almost all urban design competitions and planning processes but only rarely have these qualities been put into practice, and, where they have been implemented, this has only been done in a very limited way. In comparison with the theme of energy efficiency, which is currently ascribed priority, this aspect has remained in the background, both in concrete urban planning concepts and also with regard to the changeability of dwellings as an aid to achieving long-term functional suitability. In the area of housing construction the last one-and-a-half decades have been characterised primarily by differentiation, individual solutions, rich variety in external design, the widespread use of loggias, more generously dimensioned circulation areas and roof top elements, whereas the design of dwelling types and the floor plans, the demands on dwellings as temporary flexible work space, as living space for newly configured households and their long-term suitability for the different needs and everyday rhythms of the members of the household have not been a central theme. This fails to reflect the fact that "households" increasingly no longer reflect a norm but are becoming more uncertain and more "flexible". Given the economic limits to further increases in the floor area of dwellings we must aim for a greater degree of flexibility and diversity of use in buildings, apartments and in (as well as in-between) spatial units and in this way create living space that can be adapted to suit to changing forms of life, families and work. Where the goals are functional optimisation, reduction of the cost of building production by means of new and more flexible prefabrication, comprehensive incorporation of the factor "time" in housing construction (attaching equal importance to running costs, durability, the frequency with which repair work is needed, cleaning and maintenance, conversion and the possibility of recycling), increased typological efforts that are made parallel to or as a complement to individualisation and differentiation seem appropriate. In the area of office construction flexibility of use has become a central paradigm and new impulses are coming from building research and innovation-oriented building production that extend as far as building structures that are independent of any particular function and have floor plans that are by and large completely changeable. Closer investigation should be made into how increased flexibility could be made compatible with the energy requirements of the passive house. As regards mix of functions in small-scale and medium-sized urban planning, which is so relevant in terms of both mobility and urbanity, there is also a need for more profound approaches.

3./ “Zeithaltigkeit” / Greater integration of the factor time

Housing in Vienna, in contrast to office building and, above all, to those spaces created for consumption, has shown over the long term that it offers a sound basis for developments and changes, also over longer historical phases. In addition to the value in terms of both experience and practice of the Gründerzeit (late 19th century) fabric, which has been brought up to date in an urban way by means of “gentle urban renewal”, this is also largely true of all the further historical layers of communal and subsidised housing that do not have to be given up for demolition but can be improved to meet contemporary housing standards by means of thermal and energy refurbishment, improvements to services, and the efforts of local district housing information and advice centres. Nevertheless, for subsidised housing, too, the incorporation of time as a factor is currently acquiring relevance in a way that lends it a new significance. Not just in terms of operation and administration but even at the conceptual stage, as regards typology, construction, detailing, choice of materials and execution of construction different dimensions of time – durability, running costs, frequency with which repair work is needed, maintenance, energy-saving, recycling as well as flexibility of use for changing household types and individual needs – will acquire a new importance. We already know that construction costs are a minor factor in relation to the overall cost of a building during its life-span, but this awareness has not yet been properly incorporated in the design and construction of buildings. A more systematic incorporation of the time factor in housing and town planning involves various different dimensions: the time frame of climatic change and energy resources, the dynamics of global migration, the structural effects of global financial and economic crises, the time frames of project-related sustainability (including recycling, the convertability and suitability of building structures for later improvements / additions).

4./ Digital revolution: the use of the computer and electronic communication in architecture, building production and operation

Digitalisation, or, to put it more general way, the use of computers and electronic communication in the production of housing as well as in using and running it has not yet been contextually analysed and reflected upon. With regard to the sum of these effects one can correctly speak of a digital revolution that goes beyond the use of the computer as a tool and affects the areas of building technology, housing and architecture in a new way (which is only gradually becoming apparent) and sweepingly transforms them. On the basis of a worked out and realisable strategy the digital revolution offers enormous potential for creating efficient processes and instruments (prognoses, scenarios, complex quantifications, transfer of knowledge, monitoring, evaluation) to rationalise the areas of design, building construction and operation, and, above all, for sustainable development also.

5./ Design: a “digitally affective” trend in housing architecture

Architecture, and in particular housing, plays an important role in shaping Vienna's international image. Starting from a level of quality that was already remarkable, in the last 15 years a clear differentiation and increase in complexity has taken place: in the

overall configuration of buildings, in the external appearance (the use of colour, roundings, emotive elements, angles), in new solutions for entrance and ground floor zones (piloti, cantilevers, “bridge motifs”), in the use and design of loggias and massive roof-top elements. Like in the development of architecture in general the aesthetics of housing have also been affected by new technological and social developments: medialisation /aestheticisation as an effect of the considerably more widespread (both socio-economically and socio-culturally) production and consumption of "new images", products/goods and life-styles; the ability offered by the computer to produce richer forms with relatively little expenditure; and the fashionable trend of applying computer generated aesthetics directly to architecture (e.g. in facades based on the pattern of bar codes or similar random forms). The general intention is to animate, enrich emotionally, dynamise visually, and attempts to compensate for the “coldness” ascribed to technology using technical – digital – means . The tendency to employ increasingly stronger aesthetic stimuli frequently does not allow the question of the concrete useful value of the elements employed or the cost of maintaining and renovating them to be raised. Conflicting demands – as well as regulations that are less than optimal – clash with each other at numerous interfaces – energy efficiency, building costs, the concrete practical value of formally developed architecture elements. Compared with the vigorous implementation of a broad "desire for effect" (Marie-Luise Angerer), climatically appropriate, intensively planted and soft surfaced open spaces (that can be used by all the residents), vertical planting and ecologically effective “green roofs” lag clearly behind. Furthermore, it remains to be seen whether the global financial crisis will lead to a more profound rethinking – i.e. to something other than just the return to a “new simplicity”– in the world of architecture, too.

6./ Costs and affordability: squaring the circle

Continually rising building costs and the need to include additional expenditure for energy efficiency within the existing frameworks for financing and subsidies, aggravated by the current financial and economic crisis and its looming socio-economical effects, have once again placed the theme of affordable and cost-efficient subsidised dwellings on the agenda. The demands made by architects and the media for “more and better architecture” conflict with the position of developers, who call for a reduction of what they see as an imbalance in favour of architectural design in the practice of housing subsidy in Vienna. Compared with earlier phases recent housing in Vienna does indeed convey the impression of a “culture of pampering” and, to some extent, of “the production of luxury”. However subsidised housing in Vienna has never been just a “social service for the poor” but a contribution to the quality of living space and of life “for all”, a major factor in the appearance of the city and one of the factors that creates and supports Vienna's image. In this sense subsidised housing essentially operates within a narrow area bordered on the one side by the negative effects of “large amounts” – the impression (which should be avoided) of monotony, banality and cheapness in housing complexes and the effect of this on the appearance of the city – and on the other side by the respective architectural aspirations, which in the mainstream currently tend toward formal differentiation, at times even eccentricity. “Squaring the circle” is at present made difficult because, in terms of both data and willingness, the building sector is still light years away from compiling precise details about the relationship between market dynamics,

building costs and running costs – in the form of long-term meaningful data and time series about building defects, durability of materials and building parts, maintenance costs, wear and tear, cleaning, vandalism, repair, and refurbishement. In view of the “digital revolution” and the “necessity to save money”in many public and private areas of the economy, it is about time to tackle the “backwardness” of the production of buildings as compared to most other areas of industrial production (something that has been a topic for decades). The use of the computer and increasingly refined programmes make it possible, even in a more decentralized area such as housing production, to gradually achieve a higher degree of rationality and efficiency.

7./ Consequences for urban planning

While the architecture of housing – which is obviously more diverse than that of office buildings – has developed its own dynamics of typologies, forms and symbols, the interfaces to urban planning are articulated in a far less clear way. In the context of an overall development that has been subject to little reflection new "hybrid urban spaces" have been created that in terms of local design and functional qualities (social and cultural demands, medium and long-term suitability for use, also taking into account climatic change and warming), as well as in terms of their large-scale spatial qualities (the quality of new urban districts as places to linger in, their image, identity and atmosphere) are ambivalent and, in part, are the subject of heated discussions. If high annual housing production in the area of subsidised housing is projected for the next few years, an accompanying fundamental examination of the relationship between housing form / architecture and urban ensembles and urban planning concepts seems all the more vital. A clearly more urban and at the same time more ecological spatial character for new housing locations could more strongly encourage individual architectural designs and better accentuate their effect in an attractive urban setting. Urban spaces that are sustainable in ecological, social and urban culture terms and that combine high residential quality, urbanity and suitability as a location for businesses of different sizes require detailed work on configurations, because climate change and warming as well as the likely far-reaching economic and social changes will require higher quality and lasting, more cost-effective concepts. In the larger context of urban planning the themes of energy efficiency (as a part of efficient use of resources), functional diversity / flexibility / mixed uses and design will have to be strengthened, expanded, and, in part , completely worked out anew.

8./ Programme for an experimental and practice-based initiative

As the result of the present study the following focal points for deeper thematic investigation and strategic programming have been identified:

A.: The current strategy in the area of energy efficiency in the unit “building” (low energy, building / passive house) should be expanded by adding three groups of themes: expanded sustainability (A.1); increased integration of time as a factor (A.2); diversity of use , flexibility and mix of functions (A.3). As a starting point workgroups made up of the relevant public and private protagonists could be formed that would combine research and practical experience and continuously consolidate it in workshops and conferences.

B.: The enormous technological advances made in building materials, components and processing technologies with the aim of increasing energy efficiency **–** and far beyond this in the areas of facade elements, glass, prefabrication and fitting – should be combined in a know-how pool and presented annually at a trade fair that would initially make its impact at a regional level and, from Vienna, would exert an influence on neighbouring countries and large cities, strengthening Vienna's position as a knowledge centre for products and services

The coupling of two of the themes described under "A" could form the focus of the fair, in terms of which the products presented, technologies / processes, the state of research and experience from practice could be selected: (A.1.) expanded sustainability, (A.2) Zeithaltigkeit / stronger integration of the factor of time, (A.3) diversity of use and flexibilty..

As a local competence centre the specialist fair should should communicate innovative and specialised products and services from the Vienna region. There are limits to the research, evaluation and marketing work that small and medium-sized firms in particular can undertake in developing such products and services but, especially when used locally, they can offer considerable gains in terms of cost effectiveness, efficiency, ecological transport, consulting, service , exchange and disposal.

C.: The entire complex of those areas remaining open in the passive house concept and the testing of new integrative approaches in the conception of buildings and urban planning (see also A and B) could be concentrated in a larger pilot project. The basic thesis is that the degree of effectiveness and the costs of new concepts can only be evaluated within the larger spatial context of a special building project. The goal is to test innovations and relevant alternatives in practice, before defining new regulations and standardised subsidy programmes.

In developing and testing innovative typologies and optimising them cost-intensive elements such as loggia types, common rooms, wet room groups, maisonettes and circulation systems should be examined. Cost reduction and optimisation of use in construction and building production by employing new systems of prefabrication, re-usability and recycling would be particularly important. Here particular significance is attached to the erection of model buildings as an experiment, as well as to concrete examination and tests.

The implementation of this new urban district with its focussed typological variations by a number of different developers, architects and building contractors should be accompanied by intensive monitoring and evaluation studies.

Viennese housing has a high social quality and a world-wide image. A special building project of this kind could – in a joint effort between the building industry, the Wiener Wirtschaftsförderung (Vienna Business Agency), business subsidies and all the relevant bodies – develop and strengthen Vienna's excellent position in the areas of subsidised housing, sustainability and new, climate-responsive urban planning concepts.