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Resizing/Re-Seizing the City – Requirements for Diversity

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1 ABSTRACT

Continuous growth and expected shortage of inner city building sites are some of the crucial challenges in Vienna, likewise affecting future social housing policy, organisation of public and individual transport and urban renewal strategies. Currently, each of these problems is addressed through disconnected planning strategies and measures.

This paper will present the concept and future research programme on the issue of Resizing. Resizing will address the dynamic interaction between public space, mobility, user participation and building structures in different city quarters regarding boundary conditions. The objective is to develop integral, long term and multi-optional scenarios which enable holistic redesign for dynamical systems such as neighbourhoods, city districts and urban areas. The notion of the habitat as a dynamical system in constant change, rather than the completed static objects, as traditionally viewed, is crucial to our hypothesis. The role of transport infrastructure and their interdependency with the building structures as well as with their utilizations plays a crucial role in achievement of sustainability aims within urban or periurban context.

Resizing addresses the challenge of growth under the conditions of sufficiency and long term resilience and within a holistic, systemic approach on the level of a neighbourhood, city or region. Re-seizing aims to activate the potentials of existing structures. The real prospective for achieving the aims of low or even zero emission lie in integral, long term scenario approaches for existing build environment. Resizing scenario strategies simultaneously take into account building stock and its inhabitants as well as the material, technical and social infrastructures of the habitat.

The goal of research is to objectify and deepen the knowledge base on the urban communities and further to develop applicable tools and strategic measures for their sustainable redesign based on the scenario/options approach. The investigation will extend beyond the building into habitat and community as well as integration of past use as knowledge base future development.

2 PROBLEM STATEMENT

According to Häußermann, Läpple and Siebel (Häußermann, Läpple, Siebel, 2008) the term city merges completely different realities: expensively growing megacities in Africa, Asia and South America, but also shrinking cities in former DDR and in rural parts of Austria which are contrasted by growth in cities with attractive job markets such as München and Vienna. There are changing former industrial cities like Linz, university cities such as Göttingen and Graz next to newly founded cities for example Brasilia and Chandigarh but also Karlsruhe and St. Pölten. Because the cities in the global perspective develop under vastly unequal conditions of size, economic conditions and prospective development, it is not possible to define one universal theory of urban development. However, European cities under the condition of industialisation in Europe have developed similarly. For 150 years in Europe, as observed by Häußermann, Läpple and Siebel, urban development and growth were interconnected, yet in future, there will be growing and prospering cities next to shrinking and stagnating ones. Within cities, there prosperity and decline will take place simutaneously. (Häußermann, Läpple, Siebel, 2008).

Therefore, the future strategies for achievement of sustainabily aims should move forward from the singular optimisation of thermal- and energetic performance towards more holistic, systemic approach which includes optimisation of infrastructures, connectivity and accessibility.

2.1 The Effects of the transport system

The growth of cities has to be considered in interdependency with the speed of the transport system (Knoflacher, 1996). While public transport due to its efficiency and focus on lines (with clearly defined

access points) was still able to integrate into the urban fabric, the car began to disperse the dense functions and structures, which were mainly divided into small sections. The effects of constant travel time budgets combined with the excellent accessibility of the private car and its high travel speed brought an enormous increase in travel distances (Knoflacher, 1997). Urban sprawl and concentration effects occurred simultaneously and were enhanced by the predominant post-War planning strategy of functionalism. Both factors contributed to a spatial separation of functions.

Urban settlements, as well as natural systems, are more stable the greater the diversity of their functions is (Amt der NÖ Landesregierung, 1988). The vitality of cities or towns (considered as organisms) is depended on reconcilable infrastructure. The speed of individual motorized transport demonstrably leads to the loss of function of many villages (Knoflacher, 1996; Knoflacher, 1997).

2.1.1 The Consequences for the quality of public space

The speed of the car changed public space and its perception by the residents. In addition to the direct transport-related purpose of public (living-)space it is primarily a space for social exchange.

It was further a common-, communication, recreation and adventure space, which provided social closeness and experience of neighbourhood and allowed a complex set of different uses.

These changes of public space have led to a temporary or permanent exodus from the cities, made possible by the infrastructure built for the car. Living environments that are not excessively endangered by motorized traffic have not only positive effects on social relations but also on the physical development of children (Sauter & Hüttenmoser, 2006; Hüttenmoser, 1996).

The excessive use of individual transport (private cars) corresponds with the individualisation tendencies of the society in general, as shown by the percentage of single households in dense urban areas. In Vienna, the percentage of single households has reached 47 %.

2.1.2 The car enabled a new city dimension

While the urban development (until about the year 1920) in the European cities resulted in structures that required a specific settlement and transport area[1] usage about 50m² per capita and below, the car-oriented urban structures have a specific area demand of about 300-400m² per capita and much further. The traffic area in the city districts of Vienna varies between 14 (“Gründerzeitviertel”) to 50m² (outskirts) per capita.

This enormous land consumption is the result of the large specific area requirements of car traffic compared to other means of transportation promoted by a car-oriented urban development in the last decades characterized by structures with a low-density.

3 SUBJECTS OF INQUIRY

In the course of further research, we will analyse current sectoral planning processes and the factors, which shape them. There is a gap between detailed and short term refurbishment of single buildings and construction of smaller urban developments on one hand, and long term urban development strategies on the other. While Scenario-based planning a well as integrated strategies are widely deployed in a large scale urban planning, these methods can also be transferred to smaller urban areas such as city districts and neighbourhoods and thus enable both highly specific, as well as integral, transsektoral and mid- to long term planning processess. One specific urban district which meets the criteria of transferability and in which different elements of the built environment are present (material and social infrastructures, education, transport, housing and production sites of all age classes) will be chosen for evaluation and subsequent scenario definition. The objective is to find specific limits of growth within the existing and potential new structures under the premise of social sustainability, most notably the notion of intragenerational equity and intergenerational justice concering access to urban resources such as housing, transport, education production and recreation/leisure. It is also crucial to identify all factors shaping the transformation of the city districts such as norms, subsidies and procedures etc. next to relevant actors and stakeholders in order to incorporate these parameters into scenario transfer phases. Research aims for a better understanding of structures and agencies in existing sturctures and processesses and at the same time transfer and development of planning methodology.

[1] Including business, green and water areas

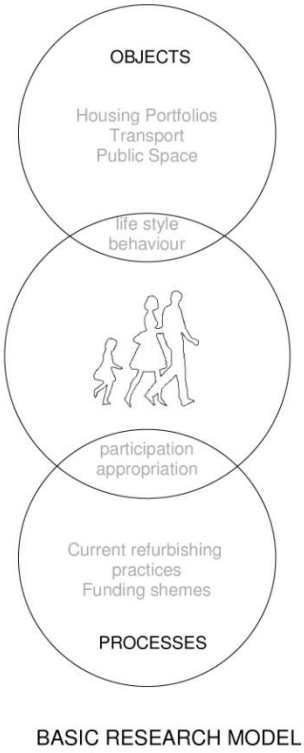

Fig. 1: Basic research model. Basic research is necessary in order to develop both redesign scenarios, as well as to determine the planning approach. The triangular research areas include: objects, users and processes.

4 SYSTEMATIC APPROACH FOR INTEGRATED DEVELOPMENT

In the context of the proposed research, the term social sustainability implies a combination of a view on density in urban quarters with more traditional aspects of sustainability, e.g. energy efficiency of buildings and infrastructures. This has the capacity to bring to light new ways of reaching regeneration and reorganisation of urban quarters.In urban planning, integrated or strategic perspectives are highly valued, and yet specialisation gains increasing importance (Hamedinger et al., 2008). The application of concepts of sustainability in urban planning has, however, led to a widely criticized fragmentation of approaches and measures. Therefore it is necessary to reclaim the importance of an integrated approach under the paradigm of social and cultural sustainability, a paradigm which has, the potential to integrate other aspects of sustainability into one perspective It will emphasise solutions which are not solely based on specialised measures, such as thermal insulation of building surfaces or improvement of public transport, but which combine many measures and thus reduce rebound-effects and achieve higher reductions of CO_2 emission.The notion of the habitat as a dynamical system in constant change, rather than the completed static objects, as traditionally viewed, is crucial to our hypothesis.

4.1 Boundary conditions

4.1.1 The impacts of urban growth

Till the 19th century cities could only grow within the border of the carrying capacity of their accessible environment. If the so-called “ecological footprint” of the city was exceeded by overexploitation of natural and/or human resources, the urban development came to a collapse (Knoflacher, 2010). With the availability of cheap and abundantly available external energy from coal, oil and gas for steamships, railways, car traffic and airplanes, cities grew much further than in their past. (Source) In year 2008 the share of urban population has passed 50 % of the global population (UNO, 2008). This is only possible as long as the whole globe can be used as the life supporting system for cities and cheap fossil fuel for the transport system is available. (Source) The analysis of available resources, the bearing capacity of fertile ground, atmosphere and the ecosystem was exceeded already many years ago as the report to the Club of Rome 1972 and 30 years after have proved (Meadows, 1972; Meadows, 2004).

As far as these scenarios are concerned, also strategies like "De-urbanization of cities" are imaginable where cultivation and issues like self-growing of food products could be part of a resizing process and today's sealed areas of traffic lanes have to be converted into fertile ground.

4.1.2 The metabolism of cities

The so called antropogenic metabolism of cities includes all material stocks owned or stored in private households or needed for its functioning. The antropogenic storage, being approximated to 350-400 Mg/capita consists to the largest amount of building residues and infrastructures (Rechberger, 2009). With the constantly increasing consumption of goods, growing cites and infrastructures, the related extraction of raw materials is also increasing and we will presumably soon be facing the limits of natural deposits. Seen in this light, the cities with its building stock and infrastructure will represent valuable resource of materials in the future (Rechberger, 2011).

The material flow balance for the city of Vienna shows slight accumulation of materials in the city (input slightliy larger than output) which implies on growth of material storage (Brunner, Rechberger, 2002).With the increased refurbishment activities in the future years even more materials will be entering the stock. The current refurbishment scenarios do not take into account the increase of material storage in the antrophosphere, nor the upcoming of the waste these materials will produce in the end – for those materials do not disapperar but remain in the cities to leave them as building waste . With the decreasing economic life duration of the buildings, the upcoming of the building waste is consequently increasing. Current refurbishment practices based on non-renewable resources have therefore double effect – the large rucksack on grey energy for the production of the insulation material (polystyrol) and upcomminig of hardly degradable or reusable materials on the other hand, at not very long life duration rates (40 years). For new incoming material flows, the construction methods need to be developed in order to enable easy and economic assesiblty, dismantling, extractability and reusability; as well the end of life in "final sink".

4.1.3 Buildings and CO_2 emissions

Austria is a forerunner in "green building" through largest density of passive hauses worldwide (Paula, Zillner, 2009). 70 % - 90 % of new housing construction receives a form of housing subsity. The housing subsidy has much sharper requironments on thermal building performance than the building code, the subsidy sum depends on the aimed building performance quality, which again is based on the EU categorisation-guideline (Energy Building Perfomance Directive). In the year 2000 the Thewosan (Thermal-Energetic Housing Refurbishment) subsidy was introduced, with aim to reduce the CO_2 emissions, use of non-renewable energy sources, and finally heatig costs. The introduction of this subsidy resulted in increased refurbishment activity in the following years.

The city of Vienna has own climate protection programme (KliP), in framework of which the Thewosan was launched, with following spheres of activities: Energy seizure, energy use (special focus on buildings), mobility and city structure, agriculture, public relations. The evaluation of the first KliP programme (1999 - 2010) shows that the main CO_2 emission originator in Vienna is traffic (Jamek, Mader, 2011). Also on national level in the period form 1990 till 2010 the traffic sector shows the largest increase in energy consumption by 76 %. The end-energy consumption by sector is allotted with 33 % to traffic, 28 % to industry and 26 % to private households; further 11 % to services and 2 % to agriculture (Umweltbundesamt, 2012). Traffic, next to industry plays not only crucial role in the energy consumption, but also as major originator of the CO_2 emissions.

4.2 Structural changes of buildings, infrastructure & life style

The rate of new construction for housing in Austria is approximately 1 % per year (2,200 housing units/year) (Lechner, 2010). Within this context, the existing stock offers the main medium for implemetation of measurements for achievement of sustainability.

The existing buildings have traditionally been connected to very long life duration (50 to 200 years) and as such to stability and persisency. The actual death rate of buildings in Vienna is almost neglectable, differenty from other European cities. Eventhough longlasting, the building stock has been undergoing multiple structural and functional changes throughout the lifecycle. The changes in historical housing stock ranges from the smaller but numerous retrofits of sanitary infrastructure (Basenawohnung), functional retrofit

(merging of housing units), attic conversions and since the end of 90ies the increased activity in thermal refurbishment. While the retrofit of buildings was a peripheral area of the construction industry in the 70ies, more than 50 % of the construction works are nowadays related to existing structures. Therefore measures as maintenance, repairs, modernization and/or reconstruction play a more and more important role in the construction industry (Däuber, 2007).

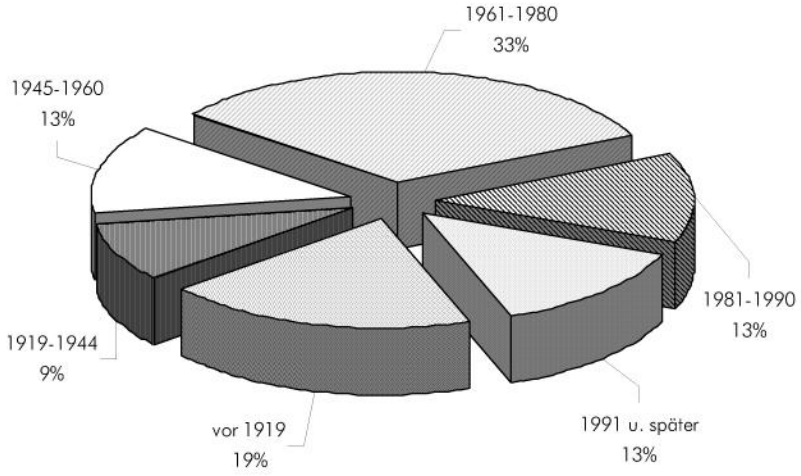

Fig. 2: Housing stock in Austria according to building period in 2002. (Statistik Austria Wohnungen 2000 in: Czerny et al, 2002)

Through public policy and number of subsidies (e.g. Thewosan) the thermal refurbishment played crucial role in the general retrofit of existing buildings. The main re-construction measurement was the refurbishment of building envelope through application of ETICS (External Thermal Insulation Composite Systems); due to the costs based largely on polystyrene insulating core. We argue that current building technologies of the thermal refurbishment of building envelope have low potential for further reduction of emission.

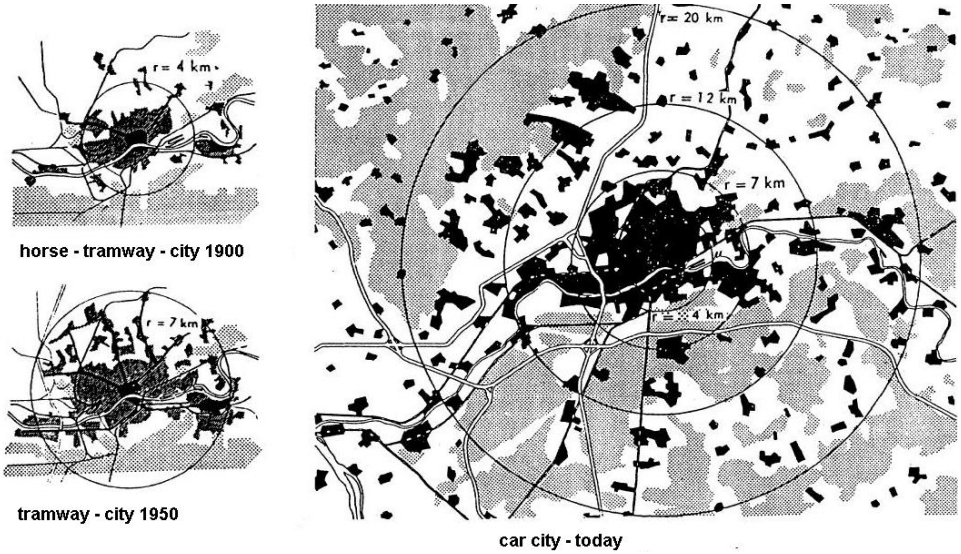

Fig. 3: The city at 1900, 1950 and today ("car city"). The settlement structures were expanded by the first means of public transport, enlarging the zone of influence into the hinterland. Ultimately high speed public and private transport pushed the city borders even further and enabled urban sprawl. This extensive construction of infrastructure coincided with separation of functions and the triumph of the car (Wortmann, 1985; Macoun et.al., 2010).

The studies of refurbished homes have shown, that through the refurbishment the lifestyle of the homeowners also changes and shifted from the energy conserving attitude (e.g. through lack of central heating only the living-room is heated) towards energy consuming attitude (heating of entire apartment) (Korjenic, Bednar, 2010) which leads to discrepancy in prediction of actual end-energy consumption and in some cases even to increased energy consumption.

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Further on, the sizes of housing floor space has constantly been increasing; as well as the number of single households. Average floor space of dwellings has increased from the 88.8 m² in year 1997 to 98.2m², in year 2007; with considerable rize in the size of house owner dwellings from 116.5m² in year 1997 to 132.8 m² (2007). In 2007 in 35 % of the Austrian dwellings lived only one person (of these 43 % men and 57 % women), the rise compared with 1997 (30 %) was considerable. In Vienna the part of single-dwellings was 46 % (of these 39 % persons in the age of 60 or more years) (Statistik Austria, 2007).

In terms of measueremnts for climate protection, this leads to conclusion that eventhough the efficiency of HVAC techonologies and building performance is increasing, so is the general consumption of the floor area; which again leads to intensified resources-consumtion (energy, materials and land).

4.3 Scenario development

In Vienna, we can also observe a gap between strategic planning at the scale of the city and the actual processes of implementation. For instance, one of the goals of the Viennese strategic plan for city development is the principle "city of short distances". This strategic document however is not obligatory, in fact, it has no legal consequences. The following planning processes are divided by disciplinary and sectoral boundaries. Scenarios at the scale of built environment in neighbourhoods, to include the stage of scenario transfer, both into visions, such as strategic planning but also into instruments as well as actors, who shape the field. As this method requieres several (for instance 2-6) scenarios, different aspects of sustainability can be evaluated. As our focus lies in social and cultural sustainability , the principle of diversity and inclusion is therefore relevant for all elements of the built environment (Housing, pducation, social and material infrastuctures, transport and production) at the scale of local neighbourhood.

4.3.1 Diversity, inclusion, intergenerational justice and intragenerational equity

Hopfner and Zakrzewski point out that first global declarations on sustainable development (Report of the World Commission on Environment and development in year 1987 and Rio declaration in year 1992) clearly link sustainability to intergenerational justice and equity (Hopfner, Zakrzewski, 2012). This moral dimention of sustainability thus at a level of the city district addresses the question of access to urban ressources such as housing, amenities and transport. In terms of intragenerational equity social mobility and equality of opportunity must also be addressed. Social housing policy can prevent segregation or enhance it, school organisation can provide equal opportunity or deepen it, transport strategies can take into account users with different abilities or it can privilege only certain types of mobility.

4.3.2 Aspects of resilience

Resilience can be understood as the ability of a system to return to a stable state following a strong perturbation caused by failure, disaster or attack (IP, 2011; Patterson et.al., 2007; Hawes & Reed, 2006). The Community and Regional Resilience Institute defines resilience as “The capability to anticipate risk, limit impact, and bounce back rapidly through survival, adaptability, evolution, and growth in the face of turbulent change” (Plodinec, 2009; Amdal, 2010). According to Murray-Tuite (Murray-Tuite, 2006) a resilient transportation system has ten properties: redundancy, diversity, efficiency, autonomous components, strength, adaptability, collaboration, (Godschalk, 2002), mobility (Victoria Transport Policy Institute, 2005), safety, and the ability to recover quickly (Murray-Tuite, 2006).

With the rapid growth of cities according to area expansion and population and the increasing global interdependencies in the financial and energy sector the concept of resilience is becoming more and more important. In transport and city planning resilience is often reduced to short-term natural disasters, although the different types of structures and the interaction between built structures and users under consideration of changing boundary conditions should be taken into account.

The resilience of a city is directly connected to the type of transport infrastructure. A dense and attractive network for walking and cycling affects the flexibility in case of disturbance and thus the degree of resilience. Non motorized traffic requires no external energy for their movement and the cost of maintaining these infrastructures is relatively low.

4.3.3 The organization of parking cars – the key factor in the resizing process

The linking of parking space and housing (or other uses) is codified in the building regulations of the federal states. With the commitment to provide one parking space per residential unit people are not only forced to own a car, but also - depending on the distance from the apartment to the parking space – forced to use it. Other forms of urban-mobility thus remain without a chance. Although the obligation for the provision of a parking place can be fulfilled up to a 500m distance to the assigned object, by default, it is built as close as possible. Parking the car in collective garages allows the opportunity to reuse public space for many purposes. 70 % of today's lanes in side-roads would be superfluous (Knoflacher, 1996).

4.3.4 Re-seizing the City – Recapturing of public space – the necessary beginning

The changing boundary conditions of the last 10 years (demographic change, fuel prices, etc.) as well as the effects of transport policy over the past 40 years led to a population growth in the city of Vienna. Measures to improve the quality of public space were done at the same time (Stadt Wien, 2012).

Although a consistent, effective, area-wide conceptual extension of gentrification of public space is missing to date, a decline in the degree of motorization between 2002 and 2008 by around 4 %, based on the improvement of public transport and cycling infrastructure and the implementation of a consistent parking management was achieved. This initiates a potential for the usage of public space in its original diversity and is a necessary starting point for the resizing process in the city.

5 CONCLUSIONS

The notion of reaching sustainability of built environment through increasing of efficiency needs to be questioned, since basically it is founded in the neoclassical economical theory based on constant growth. Through rapidly growing consumption, ownership of ever more goods, increasing area of living space per capita, anthrophogenic material storage is growing and consequently the natural reserves are decreasing.

In the future more material will be provided in the cities, than in the natural environment. The refurbishment strategies have also largeliy relied on the extraction of materials form nature and its depositing in the material storage of the city. On the one hand the resources for this type of refurbishment will soon be limited, on the other will cause the upcoming of the waste as outcome in the long term scenario.

The strategies that solemnly rely on the increasing of efficiency have been shown as not successful: despite the ever more efficient HVAC technologies and building hull performance the energy demand of household has constantly been increasing. Similarliy in the efficiency improvement of the car transport, at the fuel intensity improvement of 100 %; there is the rebound effect of 44 % km more driven (Ajanovic, 2011).

The crucial question in achievement of sustainability is the question of lifestyle – the better the building performance the higher (in terms of consumption) the lifestyle. Therefore a concept of "progressive efficiency" (Harris et al, 2008) – increase of the efficiency along with the intensity of energy use together with active actions towards energy conserving is porposed as a way towards more sufficient instead of efficient life style. However to achieve this level of awareness, intensive participative processes involving users (occupants), planners, industry and political decision makers are necessary. "The question is how much sacrifice is avoidable, how much is necessary, and how much we are willing to accept" (Harris et al, 2008).

Further research is needed in order to objectify and deepen the knowledge on the existing city disticts on the principle of integrated urban development for existing city districts, with the emphasis on social and cultural sustainability. The principle of intragenerational equity und intragenerational justice are therefore crucial when defining future use and development of local neighbourhood resources which include housing, social infrastructure, education, production and transport.

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