🏆 *reviewed paper*

Urban Development 2050: Resource Efficiency as Guiding Principle for Rebuilding European Cities

Christof Schremmer, Ursula Mollay, Barbara Saringer-Bory

(DI. Christof Schremmer, M.C.P., ÖIR – Österreichisches Institut für Raumplanung, Franz-Josefs-Kai 27, 1010 Wien, schremmer@oir.at)
(DI. Ursula Mollay, MA MSc, ÖIR – Österreichisches Institut für Raumplanung, Franz-Josefs-Kai 27, 1010 Wien, mollay@oir.at)
(DI. Barbara Saringer-Bory, ÖIR – Österreichisches Institut für Raumplanung, Franz-Josefs-Kai 27, 1010 Wien, saringer@oir.at)

1 ABSTRACT

Results from the FP 7 project SUME (Sustainable Urban Metabolism for Europe) show the long term im¬pacts of urban form and alternative spatial development paths of European metropoles on resource flows such as land consumption and energy consumption (until 2050).

For the first time, the concept of urban metabolism has been used in a spatially explicit way, demonstrating the effects of transformation of urban form on resource flows. By analysing the current and future spatial dis¬tribution of population and jobs, the transport system and urban building technology, impacts have been mo¬delled. The potential effects or resource-oriented urban planning are substantial: the expansion of the agglo¬merations analysed can be reduced altogether, especially in dynamic cities. The fastest growing agglomera¬tions in the group are Munich, Stockholm and Vienna, where the expansion to 2050 can be greatly reduced by -68 %, -57 % and -75 % respectively. This differentiated spatial development pattern has a great impact on the potential to provide and use attractive public transport.

In order to follow these strategic recommendations, it will be essential to develop a cross-sectoral approach in urban development, integrating urban planning, housing policies, energy policies, infrastructure provision and transport policies. Such integrated, coherent approaches for the development of new and existing urban quarters, however, are hardly being found nowadays. This disjunct, sectorial policy approach is presenting the greatest challenge in bringing about a sustainable, resource-oriented restructuring of European cities.

2 SUME APPROACHES

Results from the FP 7 project SUME (Sustainable Urban Metabolism for Europe) show the long term im¬pacts of urban form and alternative spatial development paths of European metropoles on resource flows such as land consumption and energy consumption (until 2050).

For the first time, the concept of urban metabolism has been used in a spatially explicit way. By analysing urban form and transformation pathways and depicting current and future spatial distribution of population and jobs, the transport system and urban building technology, impacts have been modelled. This has been done in four integrated approaches:

(1) Approach 1: In a long-term scenario approach 2050, alternative urban development perspectives (a trend-type versus a resource-minded development path) have been applied in a consistent way for seven case studies (agglomerations of Vienna, Stockholm, Oporto, Newcastle, Athens, Marseille and Munich), providing with the spatial distribution of population and workplaces in 2050. Demographic and economic development dynamics, of course, are the main parameters influencing the potential to change given urban form.

Results from urban develop¬ment scenarios and metabolism models (below) have been integrated. While the scenarios provide the spatial allocation of population and workplaces and estimate the future use of urbanised land, the metabolism models' focus is lying on estimating building- and transport-related energy flows.

The potential effects or resource-oriented urban planning are substantial: the expansion of the agglomerations analysed can be reduced altogether, especially in dynamic cities. The fastest growing agglomerations in the group are Munich, Stockholm and Vienna, where the expansion to 2050 can be greatly reduced by -68 %, -57 % and -75 % respectively. This differentiated spatial development pattern has a great impact on the potential to provide and use attractive public transport.

In four case studies (agglomerations of Vienna, Stockholm, Oporto, Newcastle), a comprehensive application of all four SUME approaches (see below) was performed.

(2) Approach 2: The spatially explicit urban metabolism model allows for systematic simulations of the functional relations between socio-economic developments and their consequences on the urban metabolism. Based on the scenarios´ spatial allocation of population and workplaces, the metabolism models' focus is on estimating building- and transport-related energy flows (for four key case study agglomerations, Vienna, Stockholm, Oporto, Newcastle). The model can be extended to include greenhouse gas (GHG) emissions and other resource and waste flows. The model was designed in a modular, incremental and flexible way in order to be applicable at different levels of spatial and functional aggregation, ranging from the low spatial resolution applied in the SUME cross-city com¬parisons to relatively detailed and data-rich analyses of selected areas within a city.

(3) Approach 3: Since cities are built in a step-by-step way, with larger or smaller development projects changing the existing structures, it is important to understand the projects' individual contributions to the improvement of the overall performance of a city/agglomeration. The Metabolic Impact As¬sessment (MIA) is a novel methodology to evaluate the effect of proposed urban development pro¬jects on the metabolism of a city. It is a decision-support tool geared to analysing and understanding the complex metabolic consequences of new urban projects or urban plans, e. g. in terms of energy flows associated with the project, for heating, cooling and transport.

MIA addresses a common problem found in many cities throughout Europe and elsewhere: Seen in isolation, a project may look quite attractive and contributing to a sustainable performance regarding energy, land use and material use. However, when plugged into the existing urban fabric of buildings and infrastructure, the impact analysis may show a contribution to a worsening of the metabolic performance. Thus, only projects in the right location and with good infrastructure can provide a positive contribution to the overall metabolic performance of a particular city. This is shown in the four case study projects in four cities.

(4) Approach 4: Urban agglomerations' development processes are very complex. Many factors inter¬sect to generate the spatial pattern that we see in the built environment today. Hence also the proces¬ses, actors and their respective rationales were under scrutiny in the SUME project: 'producers' of the urban fabric, such as landowners, developers and investors, are important players, but they are not the only actors who matter: 'consumers' are also crucial. This group includes individuals and companies who use buildings and spaces in cities, not just the inhabitants of homes and offices, but also visitors to the city, whether for work, shopping or recreation. Sustainable, re¬source-oriented ur¬ban development policies need to understand these complex interactions of pro¬ducers and con¬sumers, and will have to be integrated urban policy packages, addressing both sides and – as has been shown in the analyses of the four case study cities – will have to be coherent over different policy sectors and municipal boundaries.

3 SPATIALLY EXPLICIT METABOLISM MODELLING

Urban metabolism encompasses all flows of energy and material resources of a city or agglomeration; in SUME the relationship between urban form and urban metabolism has been analysed in a long-term development perspective to 2050. It is about the contribution of urban development and reconstruction towards more resource-efficient cities. With the majority of the global population living in urban areas, the question of how existing cities can be rebuilt in more resource-efficient and climate protecting way, is key to our common future. If global efforts to address climate change are to be successful, they will need to integrate city requirements and environmental management capacities (UNEP/UN Habitat 2009).

The urban metabolism concept investigates the biophysical interaction between a society and its environment, by accounting for resource use (energy, materials, land, etc.) and outputs to the environment, and linking these with social, economic and technical parameters. Here, the concept of urban metabolism for the first time is being used in a spatially explicit way, demonstra¬ting the impact of urban form on resource flows, by analysing the spatial distribution of population and jobs, the transport system and urban building technology. This is performed in a long-term scenario approach, projecting the urban development perspectives of seven European urban agglomerations. For four of these agglomerations, a spatially explicit metabolism model has been developed and applied.

Urban forms have been developing over periods throughout history, and can be changed substantially only over longer periods and/or through dynamic restructuring. In search for the potential to reduce urban resour¬ce consumption, the SUME project estimates the potential to transform urban building and spatial

structures to 2050 by applying alternative spatial development policies for a given demographic and economic develop¬ment path. Urban agglomerations in Europe show extremely different spatial dimensions: some are compact and confined; many are fragmented and spread out spatially. Urban transport systems are of very different qualities: some with attractive, well integrated public transport provision; some with reliance on individual transport. Technical building standards – often related to the period of construction – also vary widely, adding to the impact of greatly different climatic conditions. All these differentiations are included in the term 'urban form' as it is used here.

BASE and SUME scenarios – the space for action in seven agglomerations

In the SUME project two different storylines are at the core of two urban development scenarios elaborated for seven cities: a BASE scenario, understood as a continuation of urban develop¬ment policies supporting past spatial development trends; and a SUME scenario, defined as a path of sustainable spatial development. The 'space for action', as referred to in this project, is the choice between these two scenarios, meaning whether or not the SUME principles are being applied in urban development over an extended period. The SUME scenarios – geared to improve urban resource efficiency – are guided by the so-called 'four SUME principles'* for future urban development:

- Principle 1: Spatially focused densification: Promoting a minimum density standard for any new quarter and redevelopment of existing low-density quarters in areas with attractive, high-level public transport
- Principle 2: High-density development only with access to high-quality public transport: Focusing new high-density developments exclusively in areas close to public transport networks (especially those with job and service functions)
- Principle 3: Functional mix in urban quarters: Providing a mix of functions (i. e. residential, jobs and services) in close proximity to each other at the local level, allowing for short-distance access
- Principle 4: Combine urban development and building (object) reconstruction: Improving the thermal quality of buildings and using the opportunity to improve the spatial qualities of urban quarters[1]

* To increase the impact, these principles should be applied in combination with each other.

It seems clear that the importance and potential impact of each of the four principles depends on the current urban form of the respective city. The varying range of potential future improve¬ments in terms of land use and energy consumption is analysed in the subsequent case study cities presented below.

4 RESULTS FROM URBAN DEVELOPMENT SCENARIOS AND METABOLIC MODELLING

4.1 Urban development scenarios in 2050

Urban development scenarios have been elaborated for the so called Urban Morphological Zones (UMZs[2]) of different cities. Comparing the urban development scenarios shows that there is a great potential to impact urban form over time if a consistent set of policies is being applied, as assumed in the SUME scenarios, and if there is some growth. It is important to note that growing cities have a great¬er opportunity to improve existing spatial structures than stagnating agglom¬erations (comparing BASE and SUME scenarios). Therefore, the case study cities with substantial growth perspectives (especially Stockholm UMZ and Vienna UMZ, but also Marseille UMZ and Munich UMZ) show the greatest differences between the alternative scenario futures – there, spatial planning decisions will have a major impact on future metabolic performance.

Comparing BASE and SUME scenarios also shows that the differential between the policy sets add up and become resource-relevant over time: There is significant room for improve¬ments, if past spatial development has not been consistently sustainable (as in the case of Vienna: filling up spatial gaps near major lines of transport and moderate densification in underused but well serviced areas can have a major

[1] Likewise, these efforts should be seen in combination with Smart City initiatives, improving the production of renew¬able energy and the intelligent distribution of energy flows.

[2] The continuously built-up area of an agglomeration, as defined by UN-Habitat (200 m max. distance between buildings, based on the CORINE land cover data).

ISBN: 978-3-9503110-2-0 (CD-ROM); ISBN: 978-3-9503110-3-7 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

impact). On the other hand, the case of Athens also shows the limits to a strategy of further densification: here, densities are already high enough to provide attractive urban transport systems; expanding and improving the transport system is a key for more sustainable transport in this agglomeration.

The BASE scenarios show a substantial expansion of the UMZs for the fast growing cities, ranging from a growth by 24 % in Athens UMZ to 30 % in Marseille UMZ, 41 % and 47 % in Munich UMZ and Stockholm UMZ to 54 % in Vienna UMZ. These results are due to population increase, a pro¬por¬tional growth of jobs and a continuing increase of the per capita floor space consumption.[3] It has been assu¬med here – based on the empirical evi¬dence of the past – that the historic trend of floor space increase will con¬tinue in a stable eco¬nomic development, but the per capita growth will slow down compared to past decades.

From this 'baseline' of expected development, the so-called SUME scenarios demonstrate a develop¬ment path which should provide for lower resource consumption (land use, energy, materials) and can be reasonably achieved through concerted urban development policy packages. SUME scenarios focus on inner-city development, high-level public transport axes and more compact development on the fringes of the existing UMZ.

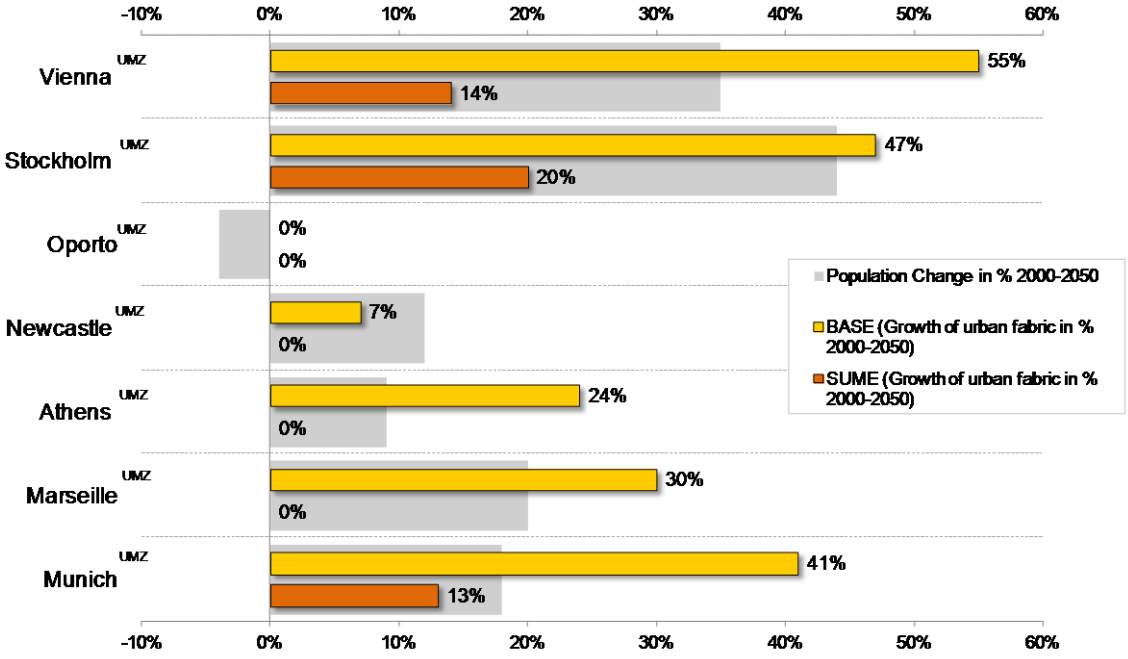

Fig. 1: Spatial development scenarios: Population growth and expansion of the Urban Morphological Zones (UMZs), comparing BASE and SUME scenario. Source: SUME Working Paper 1.2 (2011).

The potential effects – the results of the search for an 'action space' – are substantial: the expan¬sion of the agglomerations analysed can be avoided altogether in Oporto UMZ and Newcastle UMZ, mainly due to their small demographic development, but also in dynamic cities such as Athens UMZ and Marseille UMZ. The fastest growing agglomerations in the group are Munich UMZ, Stockholm UMZ and Vienna UMZ, where the expansion to 2050 can be greatly reduced to 13 %, 20 % and 14 % respectively. This differentiated spatial development pattern has a great impact on transport, with a direct ef¬fect on the potential to provide and use attractive public transport. This effect has been ana¬lysed through a combined transport and diversity-pattern indicator, which shows a considerable de¬terioration in all BASE scenarios and the need for concerted policy measures – as in the SUME scenarios – in order to maintain or slightly improve the existing level of public transport provision.

4.2 Overview results from metabolic modelling for the four main case study cities

The individual case study city results for the two spatial development scenarios, with their spatial distribu¬tion of jobs and residents, localisation of services and central functions and fast lines of public transport, were used as input for the spatially disaggregated modelling of energy flows in the four cities (Vienna, Stockholm, Oporto, Newcastle).

[3] Defined as average per capita residential floor space in m².

The table below, an overview of the main results for the agglomeration aggregates is given for both, the building and the transport model results. It shows the final state of development in 2050, comparing the per capita energy demand figures for heating and transport in the BASE and SUME scenarios. The main results show that today's energy demand can be reduced by 60 % to 80 %, varying between cities and scenarios. In general, a SUME-scenario-type agglomeration development will reduce energy consumption between 10 % and 40 % by the year 2050 compared to the BASE scenario.

	Vienna UMZ	Stockholm UMZ	Oporto UMZ	Newcastle UMZ
Per capita energy demand for space heating in 2050 (GJ p. a.)				
2001	**42,8**	**57,0**	**22,8**	**50,6**
BASE scenario	**16,1**	**18,0**	**9,9**	**18,3**
SUME scenario	**9,2**	**11,1**	**8,8**	**9,8**
SUME vs. BASE (abs.)	**-6,9**	**-6,9**	**-1,1**	**-8,6**
SUME vs. BASE (%)	-42,7 %	-38,1 %	-11,1 %	-46,8 %
Per capita energy demand for transport in 2050 (GJ p. a.)				
2001	**11,2**	**15,3**	**17,8**	**13,3**
BASE scenario	**5,6**	**7,3**	**5,1**	**4,0**
SUME scenario	**3,9**	**5,7**	**4,9**	**3,5**
SUME vs. BASE (abs.)	**-1,7**	**-1,6**	**-0,2**	**-0,4**
SUME vs. BASE (%)	-30,0 %	-21,8 %	-4,9 %	-10,7 %

Fig. 2: Metabolic modelling results: Per capita energy demand for heating and transport 2050 in four cities (UMZs). Source: SUME Working Paper 2.3 (2011).

The following figures show the modelled development of energy demand in the periode 2001-2050 and the space for action between BASE and SUME scenarios for the examples of Vienna and Oporto – the two UMZs with the highest respectively the lowest action space in terms of energy demand.

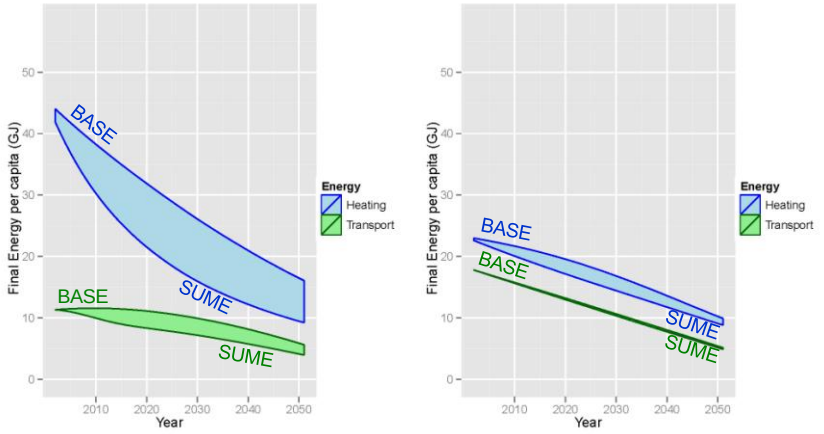

Fig. 3: Metabolic modelling results: Per capita energy demand for heating and transport 2001-2050 in Vienna (left) and Oporto (right) UMZs. Source: SUME Working Paper 2.3 (2011).

The results demonstrate that, even in a future agglomeration development which will use all available tech¬nological improvements, there is a great differential between a BASE- and a SUME-type development: A higher replacement or renovation rate of buildings and a better spatial focus of new developments with respect to public transport accessibility will reduce energy con¬sumption by 30 to 40 %. Only in special situ¬ations like in Oporto, where relatively small changes are anticipated for both components – buildings and transport – will the differential between the BASE and SUME scenarios be less than 10 %.

5 METABOLIC IMPACT ASSESSMENT (MIA) FOR URBAN DEVELOPMENT PROJECTS

In principle, Metabolic Impact Assessment (MIA) can be applied to different types of planning proposals – policies, programmes, plans and projects. However, within the scope of the SUME project, it was applied to detailed plans of large urban development projects. It has been recognised that at strategic levels, MIA's application will be complex and demanding. At a local level, data is more easily identified and the analysis becomes more objective.

Within the general objective of SUME, to analyse the impacts of urban form on resource use, the application of MIA has focused on specific components of urban metabolism, namely energy, land use, water and materials. Moreover, in each case study some limitations of data have caused further restrictions.

ISBN: 978-3-9503110-2-0 (CD-ROM); ISBN: 978-3-9503110-3-7 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

The four case studies in the European cities of Vienna, Stockholm, Oporto and Newcastle have demonstrated the application of this new method. The case studies show the impact of projects, compare them with the performance of alternative projects and of the relevant districts within the agglomeration. Applying MIA can lay the ground¬work for improving planning proposals in key aspects of urban metabolism and also contri¬bute to a necessary assessment of alternative locations for such projects within the urban fa¬bric. MIA shows that it is essential to include the impacts of urban development projects regar¬ding infrastructure needs and transport in the agglomeration context, because a) unexpected effects in other sections of the complex transport network can be detected; and b) underuse of existing infrastructure in certain districts can be determined. Both of these potentially lead to substantial project modifications.

6 METABOLISM-ORIENTED, SUSTAINABLE URBAN DEVELOPMENT STRATEGIES

To improve the metabolic performance of a city or agglomeration, urban spatial development strategies should focus on the application of the four SUME principles for developing new settlements and for rebuilding existing quarters. This would be an ongoing process with a clear strategic orienta¬tion:

- Containment at the level of agglomerations: reduce urbanisation expansion to a min¬imum, keep travel distances low, provide for good spatial access to public transport routes and attractive service there. Currently most growth happens in the spaces be¬tween transport axes in areas out of reach of attractive public transport.
- Spatially focused densification in low-density urban outskirts: key strategy in growing cities to avoid expansion and improve transport service quality.
- Locate services and offices at transport nodes and allow for a mix of functions at neighbour¬hood level: the busiest nodes of agglomerations' public transport systems are attractive for office and service space, and most advantageous for the location of jobs with excellent access to public transport. At a neighbourhood scale, it is also important to have a functional mix within each of the urban regions' neighbourhoods to provide for services and access to daily supplies at short distances.
- Improve agglomerations' public transport systems: some urban regions have comparatively high densities, but do not provide well developed public transport systems – there exists a great potential for improvements, particularly at agglomeration level (reaching out from the core city into the surrounding urbanized area).

Urban development policy packages (see below) need to be oriented towards the following:

- All urban growth and the life-cycle turnover of built structures should be used as potential to improve the existing urban form, both in terms of spatial structures and object qualities – urban growth in this sense is not an enemy to sustainable development but can be a partner in getting there.
- Large urban development projects can be located and serviced with infrastructure in such a way that they improve the overall performance of a whole area of a city/agglomeration (see MIA).
- At the level of users/developers, all ongoing relocation and renovation activities have the potential to improve urban form qualities, if continuously directed regarding location, building standards and functional distribution (residential, services, jobs).

Renovation and building rehabilitation programmes for urban quarters should reach beyond solely improving thermal qualities, but include raising inner-city attractiveness (green spaces, pedestrian/bicycle mobility, services) and putting metabolism-relevant technology in place (this means connecting this spatial strategy with smart city initiatives, e. g. including energy networks, storage and production of renewable energy).

In order to follow these strategic recommendations, it will be essential to develop a cross-sectoral approach in urban development, integrating urban planning, housing policies, energy policies, infrastructure provision and transport policies. Such integrated, coherent approaches for the development of new and existing urban quarters, however, are hardly being found nowadays, presenting the greatest challenge in bringing about the sustainable, resource-oriented restructuring of European cities (see policy recommendations below).

When following these general recommendations, it is important to note how different the starting conditions and development perspectives in European city regions are: urban form, density and fragmentation and the quality of existing transportation networks demonstrate tremendous differences. Adding to this complexity,

the outlook for future population and economic development ranges from fast growth to stagnation or even decline and out-migration.

As a result, fast growing urban agglomerations have a greater potential to improve their exis¬ting urban form overall – stagnating agglomerations need to focus on strategic use of their turnover potential and improve¬ments to existing urban quarters.

The second challenge for those urban regions, however, comes from the fiscal side, since stagnating cities usually have only very limited financial resources with which to improve public transport systems and support an aggressive renovation strategy. Those city regions will need most attention and support from the national and/or EU levels of government.

A portion of these recommendations have been applied in the SUME case study cities; still, in most cities and their respective urbanised regions, it seems to be a long way from a coherent and complete implemen¬tation of the recommended development strategies.

7 METABOLISM-ORIENTED, INTEGRATED POLICY PACKAGES

Based on the SUME findings, we recommend that at the EU, national and municipal levels, the metabolism-oriented spatial development strategies as described above should be incorporated into urban policies, strate¬gies, and plans. At all levels, these policies may be encouraged through:

- using an urban agglomeration perspective (e. g. UMZ) as the basis for information gathering and comparison, as well as coordinated policy development and implementation;
- introducing metabolic standards for urban areas as a way of raising awareness and policy development;
- using comparative, long-term metabolic scenarios for information, coordination and action;
- encouraging Metabolic Impact Assessment (MIA) as an additional method of evaluating new developments and improving the conditions of existing areas.

A coherent, integrated policy approach for sustainable, long-term urban development should encompass five key elements, addressing both sides of urban development, producers and consumers:

Governance, planning and building regulations; incentives; education and raising awareness; direct pro¬vision; and promoting behavioural change.

Governance, planning and building regulations

Planning processes need to be integrated in governance structures that allow for cross-sectoral strategy and decision-making. Anchored in such a comprehensive governance structure, plan¬ning processes should be designed and equipped in a way that they can proactively elicit the participation and contribution of non-governmental actors (both private and public). It is increasingly important to strategically bundle public and private resources together. Commit¬ment of stakeholders and strategic leadership through the municipalities become the crucial characteristic of future sustainable urban development.

Urban redevelopment of existing quarters, smart city initiatives or agglomeration-wide transport systems are examples where such a cross-sectoral approach – also reaching beyond adminis¬trative boundaries – is nee¬ded. Judging from the four case study agglomerations, implementing the four SUME principles will be chal¬lenging for policymakers, requiring much more effective governance structures.

Incentives

Understanding the market mechanisms and the dynamics of property values and property development is a starting point for the design of effective incentives, by which cities can give targeted stimulus and guidance to actors in urban development processes. Effective sets of incentives need to be wide-ranging (crossing administrative boundaries), precise (in relation to development patterns) and long-term. Intervention is necessary to alter development patterns, foster specific built forms and behaviours, and discourage others.

Tax breaks, subsidies and grants in various combinations have been common incentives; in financially less buoyant times, differentiated tax increases and pricing related to behaviour patterns, etc., may be introduced as effective measures. Again, as the experience from the case cities has proven, both targeting and a compre¬hensive approach will be key to success.

Direct provision

Direct intervention by public authorities can steer development towards more sustainable patterns of urban form as described by the SUME principles. Where municipalities have played a direct role in urban develop¬ment, their effectiveness in delivering SUME principles has been noticeable. In the case studies, Vienna, where over half of the households live in either subsidised or municipally-owned housing, may stand out as an example of a municipality's strong, direct role in urban development. Innovative housing competitions are used for large subsidised housing projects, combined with direct provision of infrastructure projects.

In this approach, the active acquisition of building land at reasonable prices is crucial, as in Sweden, where municipalities have the power to acquire land and set up construction and housing management companies. However, these approaches are more geared to greenfield development – a complementary instrument for the redevelopment and densification of existing urban quarters is still lacking.

Education and raising awareness

It is crucial that both the producers and users of the built environment have a high level of awareness of the issues, whether through promotion of standards, codes of practice or under¬standing of the social, cultural and psychological aspects of sustainable development which are key to changing behaviour. Combining this with (and promoting) financial incentives, to stimulate sustainable urban develop¬ment and to reduce CO2 emis¬sions, will increase the effectiveness of awareness-raising initiatives greatly. According to a Stockholm prac¬titioner, the 'pricing of unsustainable solutions could generate better knowledge on sustainable solutions'.

Promoting behavioural change

'Social practices' in relation to individual behaviour play a key role in implementing sustainable urban development strategies. All the case study cities need to do more in this area: the mismatch between the po¬licies' intentions and their actual – visible – implementation often contributes to the reluctance on the part of consumers to adopt more sustainable lifestyles.

Positive examples – encouraging mixed-use developments, thermal improvement, shopping street redevelop¬ment, pilot projects such as large, innovative passive house development (e. g. over 700 flats in Vienna's Aspanggründe) – have had a number of positive impacts, such as improving the thermal quality of existing and new buildings. Encouraging wider involvement and participation at every stage of policymaking can help build broader community support for policies.

8 GOVERNANCE, INSTITUTIONAL CAPACITY AND STRATEGIC EU SUPPORT

Given the complexity of contemporary urban systems, the capacity to design and implement effective urban development strategies depends on the quality and capacity to coordinate interdependent actors within and beyond the formal governance structure.

Working 'in between' the legal system, development processes, the political system and community concerns to achieve public realm benefits is difficult – requiring organisational structures, platforms and pro¬cesses capable of developing, guiding and implementing sustainable strategies. These (new) organisational forms and activities also need personnel skilled in grasping urban dynamics and understanding legal issues, often in relation to complex technical and/or political issues.

Commitment to adopt the four SUME urban development principles is the first step; to bring the relevant actors together into a workable organisation and an effective governance structure is a major challenge. Only then will coherent strategies and policy packages be drawn up, equipp¬ed with resources for implementation and guided through the implementation process. It is clear that work will be required to ensure that the institutional framework necessary for policy implementation is in place.

The lessons from cities which have been more successful in implementing policies to shape urban form in more sustainable ways include:

- Open planning processes with broad participation, so that citizens are fully aware of the factors being considered. If the reasons for the four SUME principles being adopted are made clear, along¬side the targeting of consumers discussed above, this increases the likelihood of building consensus and should increase the level of acceptance.

- Governance structures to maximise plan effectiveness: fundamentally, if the governing bodies in an agglomeration lack the capacity to act collectively, it will be impossible to adopt the four princi¬ples. Proactive organisational development strategies are essential to improve governance capacities.
- Cross-sectoral policy coherence: this also reflects the conclusion that policy context is vital. Inte¬grating land-use planning with transport, legal structures and incentive patterns, energy planning and other policy areas is essential, needing political support and coherence across tiers of governance.

Institutions and policies at EU level

Urban planning is not a formal competence of the EU. Nevertheless, various EU policies and programmes can have substantial impacts on the nature of development in urban areas (e. g. Structural Funds, the Com¬mon Transport Policy, the Air Quality Directive, Birds and Habitat Directives and procurement regulations). These European policies can also exert various indirect influences on urbanisation patterns, some of which can be supportive to sustainable urban development, but others may be obstructive. Promoting sustainable urban development has been at the heart of the EU's regional policy since its inception in 1989.

At the European level, greater attention needs to be given to issues of resource efficiency and urban development in allocating research money (Horizon) and also in the use of structural fund money. Programming, ex ante evaluations, project selection and assessments need to prove that the EU-co-financed project will have a positive net effect in terms of the resource efficiency and the application of advanced technical standards, not a contribution to an ill-defined "economic competitiveness".

However, European cohesion policy will only be effective in supporting sustainable urban development when supported by legal systems within member states that affect land-use planning and development, such as incentives and taxation – particularly taxation related to property – and zoning. Decisions on these policy areas remain the preserve of national, regional or local authorities.

The common challenges to the quality of life in towns and cities are frequently beyond the control of local agents alone. Since the EU has no direct mandate for urban affairs, its involvement in urban affairs must always be sensitive to the subsidiarity principle. However, the performance and development of cities and towns clearly has a European dimension, which must be addressed with supportive action at the EU level. SET-PLAN and Smart City Initiatives, as well as the Research Framework programmes (Horizon 2020), already do have a major impact and will increasingly do so in the future.

It is important, however, that the governance of complex spatial urban development strategies is understood as an essential key for success. Therefore, research and pilot actions, awareness and knowledge exchange will be extremely important in improving urban governance. EU support here will be most valuable, if urban redevelopment is not to be lost within discussions of purely technological 'solutions'. The design and implementation of effective governance structures for agglomeration development also require innovative encouragement on the part of the EU.

The review of actors and institutions involved in urban development has illustrated that the management of urban issues is complex, and is influenced by a multitude of issues and stakeholder interests. These need to be considered and reflected in any policy response. At the European level, policy requires consistency in its urban approach, based on an audit of the impacts of EU policy in terms of the implications for the urban level, and by developing supportive cross-sectoral policies for the urban area. To achieve this, closer partner¬ship with the local level of governance is key, while respecting the multi-level nature of governance in Europe and the specific local division of roles and responsibilities.

9 REFERENCES

This article is based on the report "Planning resource-efficient cities – SUME Synthesis Report", Vienna 2011, accessible through www.sume.at

provided by:

SUME project team
Project co-ordinator: Christof Schremmer (ÖIR)

Project management: Barbara Saringer-Bory (ÖIR)
Work package leaders: Simin Davoudi (UNEW), Paulo Pinho (FEUP), Christof Schremmer (ÖIR), Helga Weisz (PIK)

Synthesis authors (in alphabetical order within project partner)
ÖIR: Ursula Mollay, Christof Schremmer
FEUP: Paulo Pinho, Sara Santos Cruz
TU Delft: Dominic Stead
Nordregio: Peter Schmitt
UNEW: Simin Davoudi, Claire Megginson
UNI-KLU: Veronika Gaube, Markus Heinz, Julia Steinberger
PIK: Peter Paul Pichler, Helga Weisz

SUME contributors (in alphabetical order within project partner)
ÖIR: Sebastian Beiglböck, Heidi Collon, Raffael Koscher, Wolfgang Neugebauer, Stephanie Novak, Tobias Panwinkler, Barbara Saringer-Bory, Joanne Tordy
FEUP: Magda Barbosa, Vítor Oliveira, Mafalda Silva
FORTH: Eleftherios Mantelas, Poulicos Prastacos
TU Delft: Jan Jacob Trip, Lei Qu, Yuting Tai, Liang Xiong
Nordregio: Alexandre Dubois, Patrick Galera-Lindblom, Mitchell Reardon, Asli Tepecik Dis, Ryan Weber
UNEW: Susannah Gunn, Ali Madanipour, John Sturzaker
UNI-KLU: Alexander Remesch, Anke Schaffartzik

SUME Working Papers published online (www.sume.at, 2011)
1.1: Urban development and urban metabolism: A spatial approach
1.2: Urban development scenarios
1.3: Urban exemplary studies
2.1: Urban metabolic profiles, data availability and requirements and conceptual urban metabolism model
2.2: Prototype of the spatially explicit stocks and flows model
2.3: Second generation model and scenarios of the building, transportation and decision making components
3.1: Manual of evaluation methodologies
3.2: Good Practice Guide on assessing impacts of urban structures on urban metabolism
3.3: Report on approaches and strategies for a metabolically sustainable city
4.1: Development process, urban form and metabolism - Understanding the interface between actors, institutions, structures and mechanisms
4.2: Towards an integrative policy package for resources-efficient cities; A critical analysis of urban planning concepts
4.3: Transforming urban planning policies - Case studies of Oporto, Newcastle, Stockholm and Vienna