



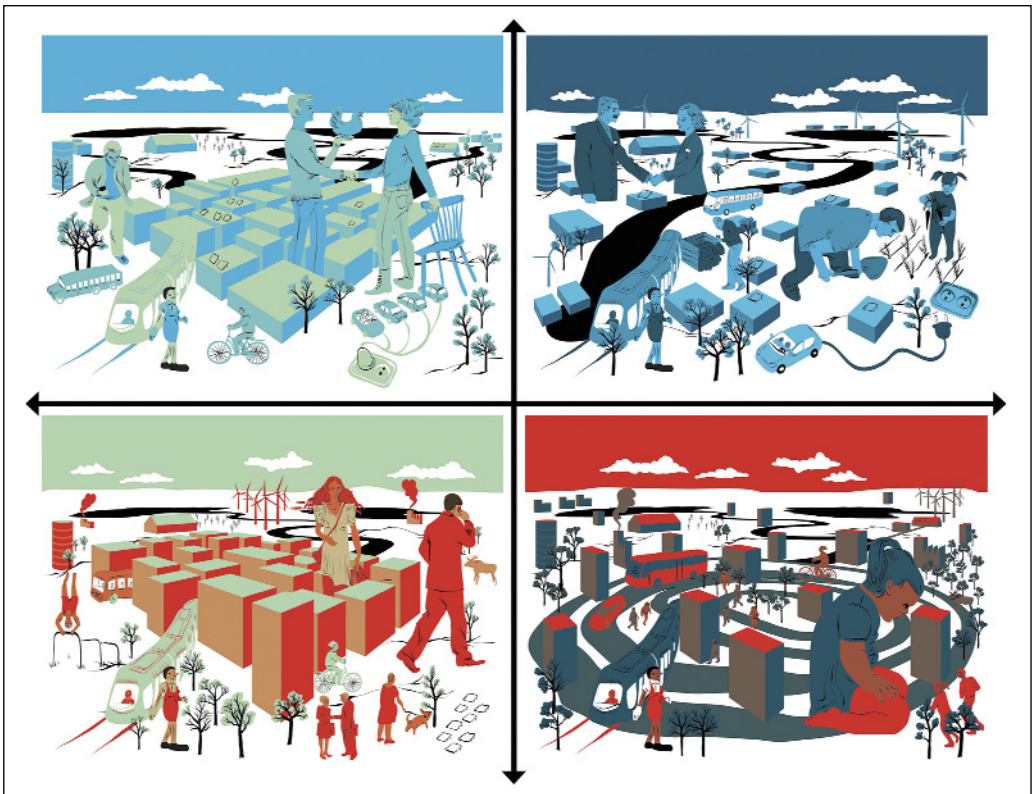
SPECIAL Expert Paper 4

SPATIAL PLANNING and ENERGY for
COMMUNITIES IN ALL LANDSCAPES



Co-funded by the Intelligent Energy Europe
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The sustainable municipality planning approach



Methods and tools for integrating sustainability and energy
perspectives into spatial planning

By Ulf Ranhagen and Mats Johan Lundström





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About SPECIAL

Spatial planning has a key part to play in creating urban environments that support less energy-intensive lifestyles and communities, and spatial and urban planners have a pivotal role in developing energy strategies and action plans. The SPECIAL (Spatial Planning and Energy for Communities In All Landscapes) project has been set up to help bridge the gap between climate change/energy action planning and spatial and urban planning.

SPECIAL is funded by Intelligent Energy Europe and is an exciting partnership between eight Town Planning Associations (TPAs) and planning authorities from across Europe. It is a three-year programme with a focus on spatial planning for the deployment of local energy efficiency and renewable energy solutions. The Town and Country Planning Association (TCPA) is the lead partner, with partner TPAs and planning authorities in Austria, Germany, Greece, Hungary, Ireland, Italy, and Sweden.

The project has been set up to help the TPAs and planning authorities of the partner countries meet the EU's challenging energy and climate change targets for 2020. It has several objectives relating to exchanging best practice and experience; promoting integrated renewable energy strategies; and building the capacity of the partner planning associations and authorities in the planning and delivery of renewable energy solutions. Most importantly, the partners must then share that learning through their professional networks and maximise the dissemination of their training to others, in a multiplier effect.

The SPECIAL partnership:



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The SPECIAL project runs from March 2013 to March 2016, with a final conference held in London to disseminate the project outcomes, including a pan-European Guide on Spatial Planning and Sustainable Energy.

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Cover illustration: Visualisations of four 'future images' from the Borås scenario matrix

1 Introduction

The Sustainable Municipality Planning Approach (SMPA) is a process-oriented planning concept involving ideas and methodology drawn from various schools of thought, and combining collaborative, communicative, rational and strategic planning ideas and approaches. The SMPA's main purpose is to promote inclusive cross-sectoral planning processes that integrate the energy perspective into spatial planning – or the spatial perspective into energy strategies – and to support sustainable spatial development in general.

The SMPA is the product of various research and development projects, and experience gained from planning practice, led by one of the authors of this Expert Paper (Ulf Ranhagen). Working with practitioners and other researchers, it has been continuously developed for over a decade. The first stage in its evolution was the Swedish Sustainable City concept, launched at the World Summit on Sustainable Development in Johannesburg in 2002¹ and later re-named SymbioCity. The approach was further developed in collaboration with municipal practitioners as part of the Swedish Energy Agency's Sustainable Municipality research and development programme (running from 2003 to 2012), combining the general sustainability planning approach with targeted tools and methods for integrating energy considerations into urban planning. The SMPA approach has continued to be developed, especially within the SPECIAL project.

The emphasis is on capitalising on informal opportunities in addition to – or within the framework of – addressing the necessary formalities required in planning. It aims to go beyond procedural formalities and analyses, focusing on the creative development of proposals on sustainability issues and, in particular, on planning for energy for commercial and domestic heat, power and transport.

1 U. Ranhagen: *The Sustainable City – a Swedish Partnership Initiative*. Exportrådet/Export Sweden, 2002

2 Four big leaps and 20 small steps

The experience gained from almost ten years of research and development work on the SMPA is recorded in the publication *4 Big Leaps and 20 Small Steps: Conceptual Guidelines on Sustainable Spatial Planning*.² This sets out the four main steps – or leaps – in SMPA:

- **Leap 1:** Organise and formulate the planning work.
- **Leap 2:** Integrate sustainability issues into comprehensive (strategic) planning.
- **Leap 3:** Integrate issues relating to energy for power and transport into comprehensive (strategic) planning.
- **Leap 4:** Formulate an implementation and monitoring strategy.

The full 'ladder' of four 'leaps' and 20 'small steps' that constitute SMPA is shown in Fig. 1. However, the SMPA is an approach, not a set recipe or one-size-fits-all formula. For example, leaps 2 and 3 can successfully be carried out simultaneously. However, starting with broad sustainability issues is a good way to introduce planners and other urban professionals to this way of thinking and working, before starting on work on the more 'hard core' energy issues.

The SMPA approach and its four leaps and 20 small steps are discussed briefly in the following sections.

2 U. Ranhagen: *4 Big Leaps and 20 Small Steps: Conceptual Guidelines on Sustainable Spatial Planning*. Energimyndigheten/Swedish Energy Agency, 2011.
http://cal.abe.kth.se/uploads/Reports/ET2012_14wenglish.pdf

Leap 1: Organise and formulate the planning work

- Step 1:** Apply a systematic and flexible approach
- Step 2:** Form a cross-sectoral project organisation
- Step 3:** Formulate an iterative schedule and work plan
- Step 4:** Work in a workshop format – establish a forum for dialogue

Leap 2: Integrate sustainability issues into comprehensive (strategic) planning

- Step 5:** Develop a local interpretation of sustainability
- Step 6:** Prepare external and internal conditions analyses
- Step 7:** Formulate goals and key issues concerning sustainable development
- Step 8:** Develop 'future images' (spatial scenarios) for the planning area
- Step 9:** Evaluate 'future images' from a sustainability perspective
- Step 10:** Develop, present and visualise a selected 'future image'

Leap 3: Integrate issues relating to energy for heat, power and transport into comprehensive (strategic) planning

- Step 11:** Conduct a detailed survey of energy and traffic systems
- Step 12:** Document the microclimate and local environmental effects
- Step 13:** Consider the potential for energy efficiency and renewable supply
- Step 14:** Develop scenarios for energy and transport
- Step 15:** Develop spatial 'future images' (heat, power and transport)
- Step 16:** Evaluate and assess the consequences of the spatial 'future images'

Leap 4: Formulate an implementation and monitoring strategy

- Step 17:** Document 'hard' and 'soft' control measures for implementation
- Step 18:** Develop forms of co-operation between the various players in all phases
- Step 19:** Develop physical and digital forums
- Step 20:** Develop a model for implementing and monitoring the project

Fig. 1 The 'four big leaps and 20 small steps' that make up the SMPA

2.1 Leap 1: Organise and formulate the planning work

There is a tendency to rush through setting up the organisational arrangements at the early phase of any planning work, so eager are we to get on with the task of developing good outcomes. But organisation and process design are nevertheless crucial to a successful planning process – and to implementation that delivers against desired goals and visions. It is vital to devote full consideration and wholehearted effort to issues of organisation and process design if we are to develop our society in a sustainable direction. Although this may initially require more time and resources than expected (or budgeted for), it is most often an investment that will pay off later on in a development project.

Step 1: Apply a systematic and flexible approach

The SMPA includes a basic procedural structure, supplemented by a toolbox of planning instruments and methods that can be used and combined in various ways (see Fig. 2). Although our approach is presented in the form of four main steps (leaps) and the associated sub-steps, it is important to note that it should be applied flexibly and with sensitivity to the needs of the particular planning context. As noted above, it is not a one-size-fits-all formula.

Step 2: Form a cross-sectoral project organisation

Cross-sectoral partnerships are a key success factor in spatial planning, and achieving better planning outcomes requires co-ordinated and integrated work on sustainability and energy issues. Research clearly shows the benefits of inclusive and interactive planning processes in which planners co-operate with other planning-related professionals, as well with politicians, communities and private sector interests.

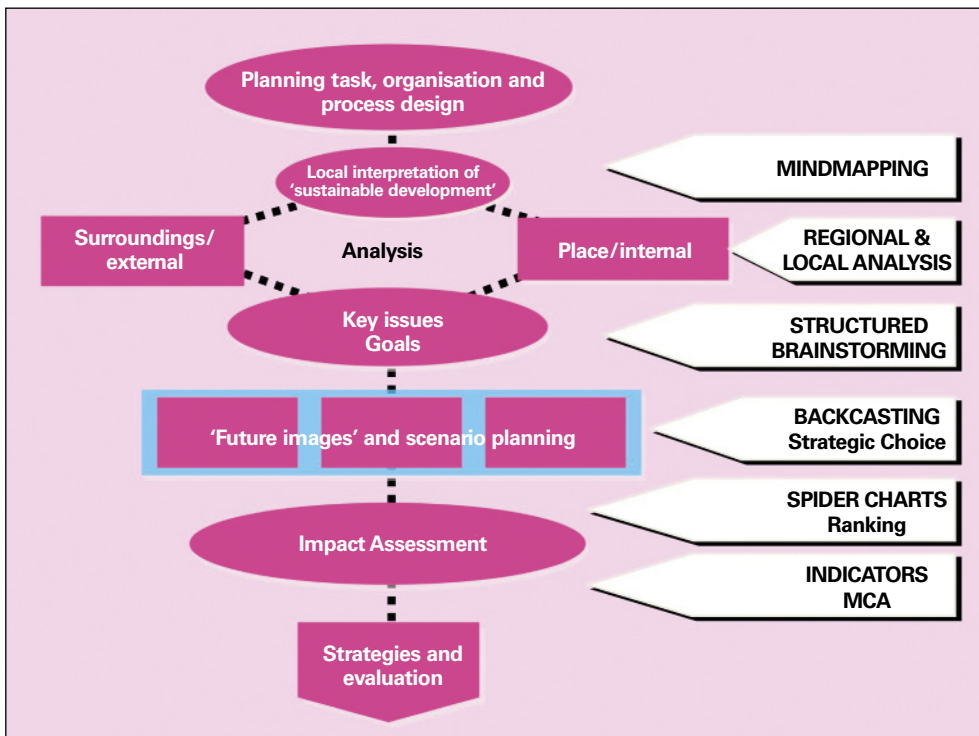


Fig. 2 Process design and toolbox (to the right) within the SMPA

Among other things, such an approach fosters mutual trust and understanding, builds social and institutional capital, boosts mutual learning and encourages a willingness to keep an open mind,³ as demonstrated by findings from our research.⁴

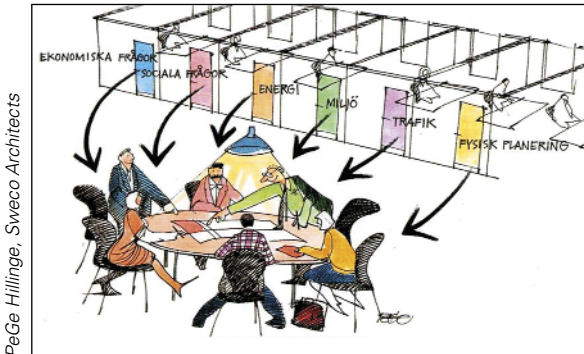


Fig. 3 Close cross-sectoral co-operation between municipality departments is key

Furthermore, research on planning processes shows the importance of a continuous interaction between the processes of reification and involvement/participation. For a plan to be effective, it needs to be accepted among those who are to implement it.⁵ Embracing cross-sectoral and inclusive working methods at an early stage gives a plan or strategy a stronger legitimacy and leads to greater commitment among those involved in its formulation – and so sets the ground for efficient implementation. Despite extensive co-operation between various parties in local government, planning can have no positive impact unless it is combined with active communication and co-operation between politicians, citizens and commerce. The SMPA comprises methods and tools that, initially, have been tested primarily in cross-sectoral city administration groups. Subsequent implementation at a local municipal level has included several examples of dialogue with politicians and citizens, as well as co-operation with local commerce.

Step 3: Formulate an iterative schedule and work plan

Another key element in our planning philosophy is avoiding a rigidly linear approach. It is not necessary for each part of a step to be completed prior to commencing the next step. Naturally, a logical, step-by-step process is advantageous to a certain degree; however, there are advantages in working through several stages concurrently to gain a compiled, if somewhat rough, basis for discussion of the main features of the planning project.

- 3 M.A. Hajer and H. Wagenaar: *Deliberative Policy Analysis – Understanding Governance in the Network Society*. Cambridge University Press, 2003; P. Healey: 'Collaborative planning in perspective'. *Planning Theory*, 2003, Vol. 2 (2), 101-23; P. Healey: *Collaborative Planning: Shaping Places in Fragmented Societies*. Palgrave Macmillan, 1997; C.M. Hendriks, J.S. Dryzek and C. Hunold: 'Turning up the heat: partisanship in deliberative innovation'. *Political Studies*, 2007, Vol. 55 (2), 362-83; J.E. Innes and D.E. Booher: 'Collaborative policymaking: governance through dialogue'. In M.A. Hajer and H. Wagenaar: *Deliberative Policy Analysis – Understanding Governance in the Network Society*. Cambridge University Press, 2003, pp.233-59; and J.E. Innes and D.E. Booher: *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. Routledge, 2001
- 4 M.J. Lundström: *Planering och hållbar bebyggelseutveckling i ett energi- och klimatperspektiv*. KTH/Royal Institute of Technology, 2010. <http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A292906&dsid=9082>; and U. Ranhagen: *Att integrera hållbarhets- och energifrågor i fysisk planering – metoder och verktyg*. KTH/Royal Institute of Technology, 2012. <http://cal.abe.kth.se/uploads/Reports/Attintegrerahallbarhetsochenergifrakorifysiskplanering.pdf>
- 5 P. Tornberg: *Making Sense of Integrated Planning Challenges to Urban and Transport Planning Processes in Sweden*. KTH/Royal Institute of Technology, 2011. <https://www.diva-portal.org/smash/get/diva2:459001/FULLTEXT03.pdf>

Aiming for a cyclic/iterative planning process in which the various elements are dealt with in several, usually three rounds (first roughly, then more in depth, and finally in detail – see Fig. 4), has several advantages. One is that problems and key issues become apparent at a general level without being obscured by detail. It is crucial that the overall vision is finalised before work starts on the details. Early development of overall, alternative future visions provides a clearer perception of the preconditions and key issues that need further investigation – and that are most relevant to the continued development and evaluation of the alternatives.

Step 4: Work in a workshop format – establish a forum for dialogue

The workshop is a format that works well in facilitating cross-sector working, providing a vehicle for the exchange of knowledge and practical experience in implementation and experimentation. The aim is to find informal, creative and development-oriented – and enjoyable – methods of working. Switching between highlighting issues in a specific municipal department and among cross-sectoral groups, respectively, can also be beneficial here. It has proved advantageous to engage an external workshop facilitator who is not directly involved in – nor has a direct interest in – the municipality’s internal work, to avoid deadlocks and ensure that the process flows smoothly. It is also crucial both to document the process and to plan how the work will be followed up in daily operations and in further workshops.

2.2 Leap 2: Integrate sustainability issues into comprehensive (strategic) planning

Step 5: Develop a local interpretation of sustainability

Over the years a number of formulations of sustainable development have emerged, each put forward as more or less definitive. To avoid unnecessary conflicts and misunderstandings later on in a project, it is important that an agreed definition of sustainable urban development is adopted early in the planning process – using an interpretation of sustainability relevant to the planning assignment in question.

There is a tendency among specialised professions to attempt to define sustainability in their respective areas in great detail, but this risks losing the crucial overall perspective, since reality always comprises an intricate interrelationship between the various elements and fields. Inspiration can be gained from research-based definitions, but it is important to balance the ecological, socio-cultural and economic aspects of sustainable development and adopt a spatial perspective with a focus on people.

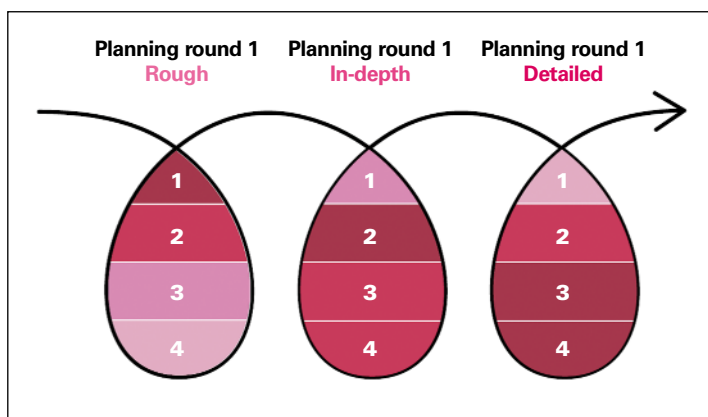


Fig. 4 An iterative planning process design with three rounds, all including four 'leaps', but each with different emphasis
The darker the red, the stronger the emphasis

It is not possible to unambiguously define sustainability at a general level without reference to local interpretations of the term to give it real meaning (and subsequent local impact) for the people affected. Accordingly, it is important to attempt to develop local interpretations of sustainability that are relevant for the particular planning project in hand. Participation from a wide range of sectors and municipal departments is thus necessary, and working towards developing a locally relevant formulation of sustainable development also provides a way of initiating planning in the context of prevailing conditions.

Step 6: Prepare external and internal conditions analyses

An understanding of the current state of the planning project area and its surroundings is fundamental. Spatial planning for an entire region, a municipality or a city district depends on the interaction between factors in the world at large and in the project area (external and internal factors).

An external conditions analysis is needed to document the key economic, social, ecological and spatial driving forces and trends and assess both opportunities and threats. In addition, a description and analysis of the project area (an internal conditions analysis) – whether it be a municipality area as a whole, a city district or a smaller neighbourhood – is a fundamental element in all planning for sustainability. The internal conditions analysis is a way of strengthening our understanding of how spatial conditions interact with and influence ecological, economic and socio-cultural conditions, particularly issues relating to energy for heat, power and transport.

Analyses can be performed in outline or in detail. However, there is a risk that describing existing conditions will become an excessively dominant activity in the planning process, diverting energy away from analysis and creative work directed at developing alternatives and proposals.

It is often necessary to combine different methods and tools of analysis. Mapping and analysing the urban morphology and typologies can be a good way of assessing existing urban structures and growth patterns and also of characterising proposed extensions in the form of new city districts. Issues such as development density, the developed proportion of the land area and the number of floors in building development are key elements in classification, and may be valuable when performing more energy-based analyses and scenario development. The type morphology should be supplemented with an analysis of relationships between the various sections of society.

The well known and simple but wide-ranging SWOT (strengths, weaknesses, opportunities and threats) analysis tool can help in generating a commitment to analyse the strengths and weaknesses of a planning project area and its surroundings. It has been used to initiate broad discussion processes among citizens and community associations – and also among public officials and experts.

Step 7: Formulate goals and key issues concerning sustainable development

SWOT analysis is a good way of identifying some of the most important issues that a project has to deal with. However, planning on a comprehensive/strategic level needs to be truly strategic and focus on a limited number of key issues. A key issue here may be defined as an important problem that must be tackled if the best use is to be made of opportunities, as well as the threats and shortcomings identified in analysis that must be overcome. A focus on key issues will supplement vision, goals and targets and will help in developing alternative proposals and solutions.

Step 8: Develop ‘future images’ (spatial scenarios) for the planning area

The challenges of sustainability and climate change call for a long-term perspective in spatial planning. Our responsibility to future generations means that we must try to look at developments not just from a 30-50-year perspective, but over even longer terms. There are (at least) three more or less streamlined approaches for assessing future requirements that are relevant to urban planning:

- The ‘*prediction approach*’ is a deterministic approach whereby current trends are projected into the future. This methodology has resulted in the ‘*forecast approach*’, which is still the most common method for assessing the future.
- The ‘*possibility approach*’ is a method that seeks to take account of various behavioural alternatives. The approach has resulted in ‘*scenario planning*’, which when applied strictly may be seen as an advanced method.
- The ‘*vision approach*’ entails envisaging how society or a certain function or operational factor could be designed better than is in effect today.

‘*Backcasting*’ is a method that is compatible with the two latter approaches – scenario planning and the vision approach. Instead of making projections of the future based on present trends, a backcasting approach should be taken – with long-term visions of the future (or ‘*future images*’), in which solutions to key environmental and socio-economic issues have been achieved, constituting the starting point. It is important that the time horizon is set sufficiently long term to allow qualitative changes to occur. Innovative, previously unconsidered solutions may emerge if the planning team can

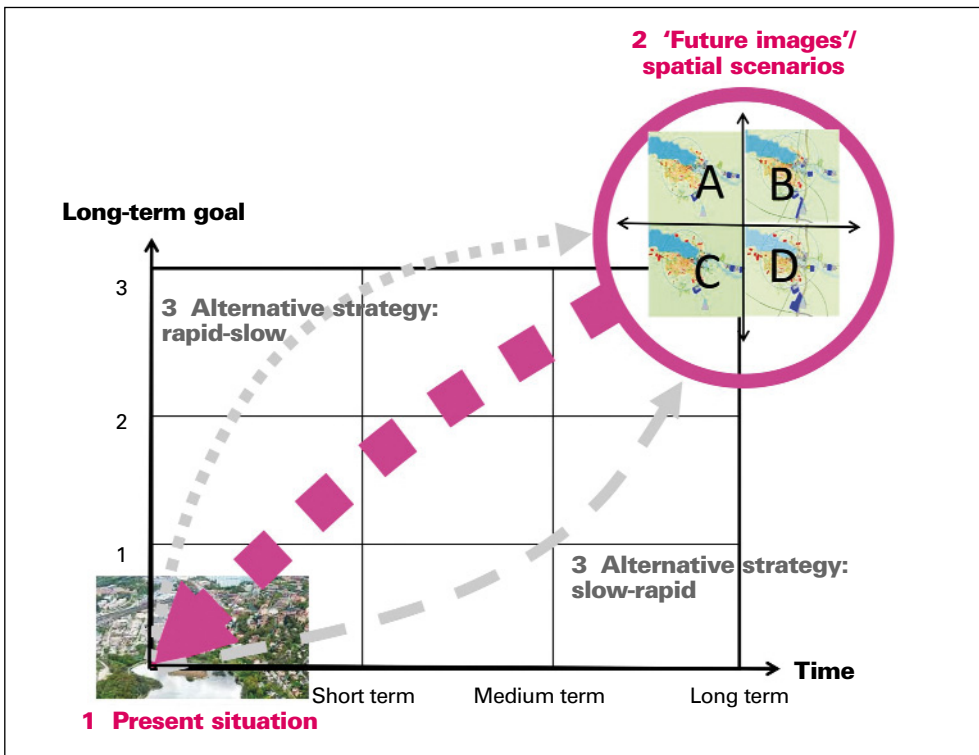


Fig. 5 Backcasting can be used to prepare visionary ‘future images’ (spatial scenarios) – here, in an explorative scenario working with four ‘future images’ using a scenario matrix

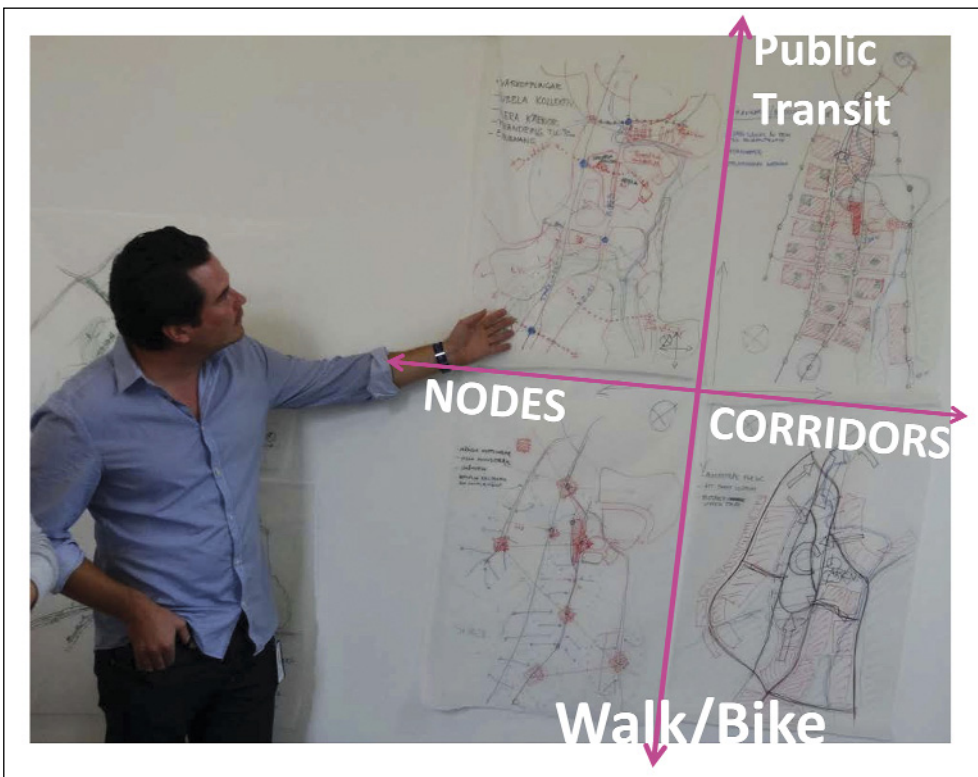
- 1 Document the present
- 2 Develop one or more ‘future images’ based on long-term goals. Reconnect to the present
- 3 Develop strategies for implementation in the short, medium and long term (think about different implementation rates)

avoiding being sidetracked by a narrow focus on the acute problems or development trends of today. Vision, goals and key issues constitute the starting point for developing 'future images'. Once these are decided upon, possible routes from the present to the future may be sketched out.

Initially used in cross-sectoral research groups, the backcasting method and tools were further developed within the SMPA into a qualitative work method in line with Swedish planning traditions, without the sophisticated model simulations that are included in more stringent applications. Participation from all parties has been the lodestar in all the workshops held. In stringent applications, backcasting is linked to visionary 'future images', but in the SMPA it is combined with scenario planning – i.e. a possible future situation that depends on various external changes (see Fig. 5).

In complex planning cases, it may be very difficult to create 'future images' even if the goals and targets are well defined. Taking a 'strategic choice' approach can be a way of handling uncertainty in planning, and also a way of using key issues to generate 'future images'. The scenario matrix tool can be used to adapt the strategic choice approach by using two different interpretations of two different key issues: two key issues, significant to the spatial structure, are selected and combined into compound alternatives in a four-field diagram (see Fig. 6).

Working backwards from the future to the present gives rise to difficulties because it is very difficult to handle the uncertainty connected with long-term approaches. For this reason, it is clearly difficult to take a meaningful very long-term time perspective – as a rule, the period to be considered is no longer than 15-20 years.



Ulf Rånthagen

Fig. 6 Example of a scenario matrix (four-field diagram) from a workshop held in Borås – spatial development (nodes or corridors) based on different transportation modes (public transit and walking/biking)

Step 9: Evaluate 'future images' from a sustainability perspective

Although evaluation is only one element of planning, it is such a central activity that it permeates all parts of the process. It is recommended that impact assessments (here, pertaining not just to the environmental perspective) are conducted in parallel with the decision-making process. Interaction between planning work and impact assessments involves using the alternatives identified earlier as the basis for continued reassessment and refinement. In this way, sustainability issues may be progressively integrated into plans – something that will be more difficult to achieve if undertaken only when the planning and design work is far advanced. The cyclical and iterative planning process described in step 3 facilitates such integrated handling.

Since impact assessments can often become overly extensive written accounts supplemented with various calculations, a need has arisen to graphically illustrate and summarise assessments to compare and rank alternatives. In developing SMPA, three

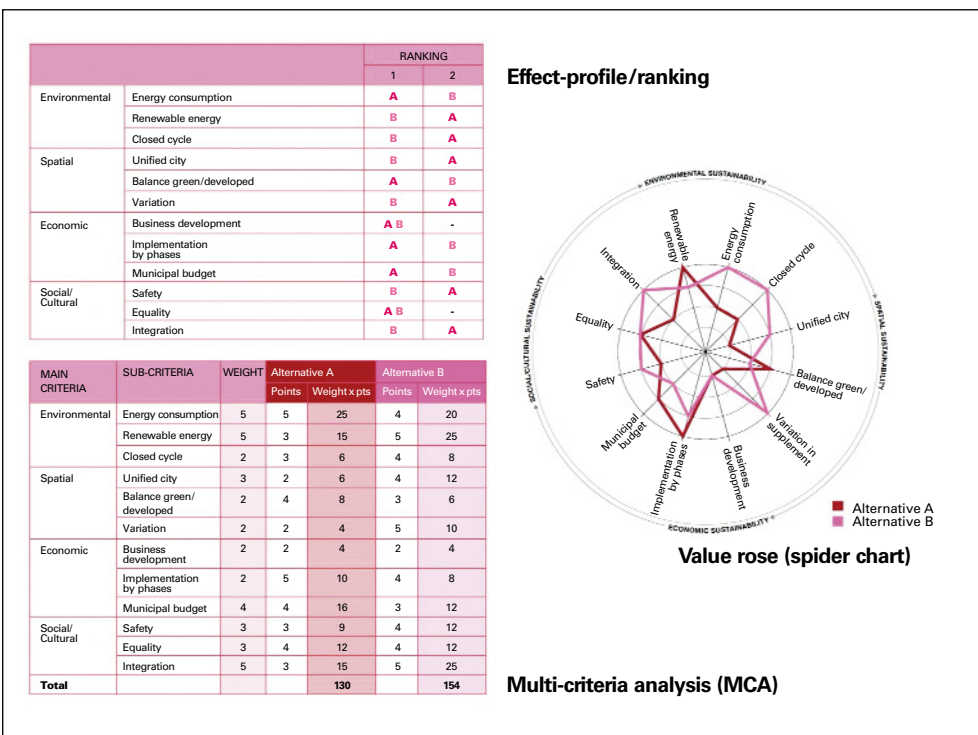


Fig. 7 Three evaluation tools used on the same project

The **effect-profile/ranking** tool is a simpler form of evaluation, whereby two or more alternatives are compared with each other, based on a number of established criteria. For each sub-criterion, the proposals are ranked best, second best and third best, etc. In this example, only two alternatives are evaluated: A or B is best (1) or worst (2). For some criteria, it may be difficult to recognise any differences (business development and equality, in this example). The table does not show how much better or worse one alternative is compared with the other

The **value rose (spider chart)** visualises strong and weak sides in various alternatives. Here, the degree to which one alternative is better or worse than the other is shown against various criteria. The further out on the axis, the higher the value. The scale may be graded or ungraded

Multi-criteria analysis (MCA) facilitates advanced evaluation and comparison of various alternatives. The principal sub-criteria receive higher weights than other criteria. The weight is multiplied by the points for each alternative, to give weighted points. The total of the weighted points shows the total points for each alternative – in this case 130 points for alternative A and 154 points for alternative B. In this instance, the MCA results indicate that alternative B is preferable to alternative A. The results can also be visualised graphically in a value rose

different evaluation tools were tested and evaluated: effect profiles (ranking), value roses (spider charts), and multi-criteria analysis (see Fig. 7). Each tool has its pros and cons, depending on the needs and frameworks of a particular planning project:⁶

- The *effect profile (ranking)* tool is a simpler form of evaluation, whereby two or more alternatives are compared with each other based on a number of established criteria. For each sub-criterion, the proposals are ranked best, second best and third best, etc. This works better than the value rose when a large number of aspects are to be addressed, although the latter is advantageous if the total number is limited.
- The *value rose (radar/spider/start chart)* may be referred to as a simplified form of multi-criteria analysis. It may be used to graphically illustrate the actual fulfilment of targets (in a quantitative assessment) in various alternatives, but it can also be based on a qualitative scale. It is a more informative tool than the effect profile, but does not consider the fact that criteria may be of different importance.
- The difference between *multi-criteria analysis (MCA)* and other evaluation methods is that various indicators are weighted (with regard to their importance) in order to produce a more nuanced result than would have been possible using the simpler tools. It is the most thorough and informative evaluation tool of the three.

In all cases, it is necessary to place major emphasis on the sustainability aspects, indicators or criteria selected. Regardless of the tool used, the choice of sustainability aspects should be preceded by dialogue between relevant players from different departments in the municipality. Care must be taken when using standardised models in planning, since the context and key factors can vary greatly from location to location – and between various planning situations. Furthermore, it is of great importance that the evaluation is made by a broad group involving representatives from various departments and sectors of the municipality (or external experts).

Step 10: Develop, present and visualise a selected ‘future image’

After a thorough evaluation process, comparing the pros and cons of the different ‘future scenarios’, the preferred ‘future image’ is selected – or a combination of the various ‘future images’ is developed – and visualised in a suitable manner.

2.3 Leap 3: Integrate issues relating to energy for heat, power and transport into comprehensive (strategic) planning

An initial round of planning undertaken within leap 2 serves as an excellent basis for a further round of planning addressing energy issues in greater detail. These may then be connected more clearly to other sustainability issues, which will allow any conflicts to be addressed and provide opportunities to strengthen synergies with other aspects.

Step 11: Conduct a detailed survey of energy and traffic systems

The broad mapping, surveying and analysis made according to leap 2 needs to be supplemented with various ways of mapping and analysing the sustainable energy perspective of spatial development. This includes transportation-related issues as well as the energy system for heating, cooling and electricity.

The transportation-based mapping and analysis may include issues such as the city’s character, travel and transport requirements; accessibility (traffic flow); security; traffic

6 M.J. Lundström: *Planering och hållbar bebyggelseutveckling i ett energi- och klimatperspektiv*. KTH/Royal Institute of Technology, 2010. <http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A292906&dsid=9082>

safety; and environmental impact. It may also look at the interplay between different types of traffic, such as pedestrians, bicycles, mopeds, public transport (including consideration of railway stations and major connection hubs), vehicles, goods traffic in urban areas, and emergency services traffic.

An overview of the energy system could include information on heat density in a heat density map, which is one way of providing a clear image of the structure in the geographic distribution of heating requirements in a particular area. Analysis by the type-morphological method provides an excellent starting point, since

$$\text{heat density} = \text{floor area ratio} \times \text{buildings energy performance}$$

A survey could set out in an energy supply document the energy supply system in the form of production and distribution systems for heating and cooling. The scope of district heating and district cooling connected to various urban morphological types could be presented in such a document, as could local heating islands (i.e. places where district heating, combined heat and power and local heating facilities are located). Other systems that could be presented spatially are wind farms, facilities for geothermic energy and geothermal heat solar-power facilities, and wave power plants.

Step 12: Document the microclimate and local environmental effects

The microclimate of a location is another important issue to consider, as it is a significant factor in assessing the conditions for energy-efficient housing development. The potential to utilise renewable energy from sun and wind must be reviewed – as too must the potential impact of air pollution and noise generated by energy production, traffic flows and industries. The microclimate is also a vital factor in a sense of comfort.

Step 13: Consider the potential for energy efficiency and renewable supply

When there is an adequate picture of current planning conditions, it will be time to commence work on future changes and improvements. The SMPA uses the following approach:

- minimise the energy needs for heating/cooling/electricity in buildings and the energy need from transport;
- maximise the proportion of renewable energy for the remaining needs from both buildings and transport; and
- consider how lifestyle factors, such as habits and attitudes, affect energy requirements.

A tool that may be used to make a rough analysis of the current energy situation in an area is the 'potential analysis', using a value rose (spider chart) with a five-grade scale to indicate the current status and the desired and probable development. This has been used as a 'soft', qualitative tool, as the basis for discussion in cross-sectoral groups. It is also possible to grade the current situation and the potential based on energy consumption figures.

Step 14: Develop scenarios for energy and transport

In this step, work advances using the 'future images' prepared in the first round of planning. It is fundamental to the SMPA way of working that rigid solutions to energy issues in urban planning founded on purely technical and economic viewpoints are not proposed in advance. Instead, alternative scenarios must be drawn up and tested in a spatial environment, with connections made to social, ecological and economic aspects.

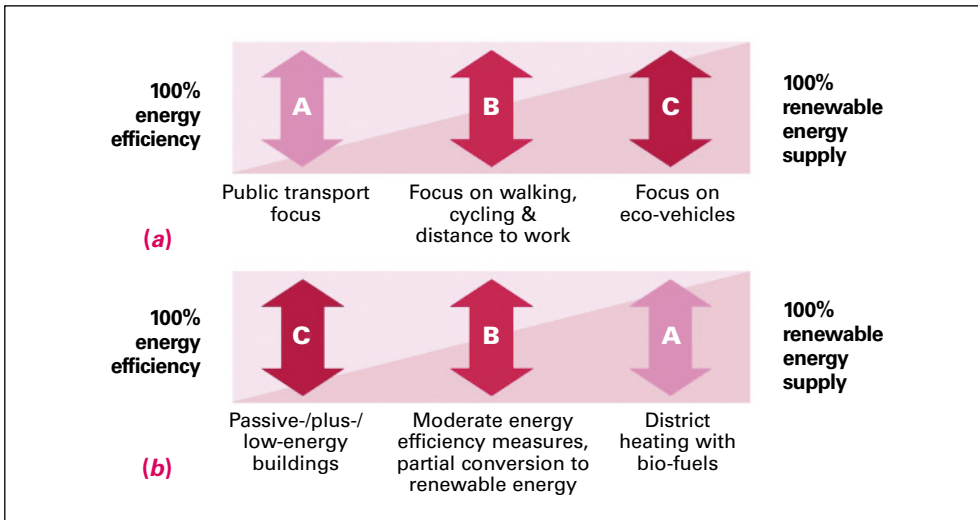


Fig. 8 Three alternative scenarios for (a) transport and (b) heating and power for buildings that are integrated in spatial 'future images' (sketched plan proposals) and evaluated

After formulation, there is the possibility of combining portions of the various scenarios into a processed proposal from which to continue work

Alternative A focuses on major investments in public transport and on the supply of renewable energy for buildings; B entails investments in improving conditions for pedestrians and cyclists and distance to work, as well as moderate investments in both energy efficiency enhancements and the supply of renewable energy; C entails major investments in eco-vehicles and energy efficiency enhancements in building developments

As the starting point of this work, three energy scenarios for heat, power and transport that are different in principle are formulated (see Fig. 8). In this early stage, the scenarios may advantageously be formulated as extreme scenarios (going 'all in' on district heating or solar energy, for example), to clarify the reach of possible alternatives and the differences there may be between them (compare with step 8). The scenarios for heating/cooling/electricity and transport may be combined as in Fig. 8, but it is also possible to combine the scenarios in other ways.

Step 15: Develop spatial 'future images' (heat, power and transport)

The conceptual energy scenarios developed in step 14 are then developed and visualised in alternative, spatial 'future images' (sketched plan proposals). The starting point may lie in the prepared 'future image'. It is very important that the work is carried out as a co-operative venture between planners and transport, energy and environmental experts – and also in broad co-operation with community associations and citizens. Expert support is also of importance in finding the best focus for the 'future images'.

If urban planning is to become a more forceful instrument for increasing energy efficiency and renewable energy supply, it is important to specify the action package connected to the various scenarios in the urban structure. Subsequently, following evaluation of the scenarios, it may be possible to combine parts of the various scenarios into a refined proposal from which to continue work.

Step 16: Evaluate and assess the consequences of the spatial 'future images'

Similar to the general development of 'future images' (leap 2), it is important to evaluate and compare them based on a number of agreed primary and secondary criteria (indicators), using the tools presented in leap 2. Separate work can be conducted to evaluate 'future images' for heating, cooling, electricity and transport,

but it is important to make an overall appraisal in order to draw out any synergies between these individual perspectives.

To evaluate the energy ‘future images’, the SMPA team (together with energy and transport experts) have developed supplementary quantitative evaluation software tools based on Microsoft Excel: EnScen, and TranScen. These can be used to model, calculate and compare energy consumption and carbon dioxide emissions for the alternative ‘future images’ (see Fig. 9, for example).

2.4 Leap 4: Formulate an implementation and monitoring strategy

When a planning proposal is being developed, it is important not only to concentrate on making the proposal itself sustainable and energy smart, but also to consider the potential to implement the proposal or parts thereof.

Step 17: Document ‘hard’ and ‘soft’ control measures for implementation

Various types of control measures are required for implementation of the sustainability objectives – political, social, economic, institutional (organisational) and legal. Certain control measures are formal and tightly defined instruments, such as legislation and limit values for energy consumption. Others are softer and informal and more difficult to quantify, such as education, information and forms of co-operation. There are thus various ‘hard’ and ‘soft’ control measures to be used in sustainable spatial development processes.

Plans are control measures, and may also involve political decisions, guidelines, programmes, agreements and financial incentives connected to the planning issues. Here, good forms of co-operation between various players – such as between government and municipality, or between municipality, property owners and developers – are seen as soft control measures. In the SMPA, municipalities are encouraged to work in broad, cross-sector workshops (using structured brainstorming)

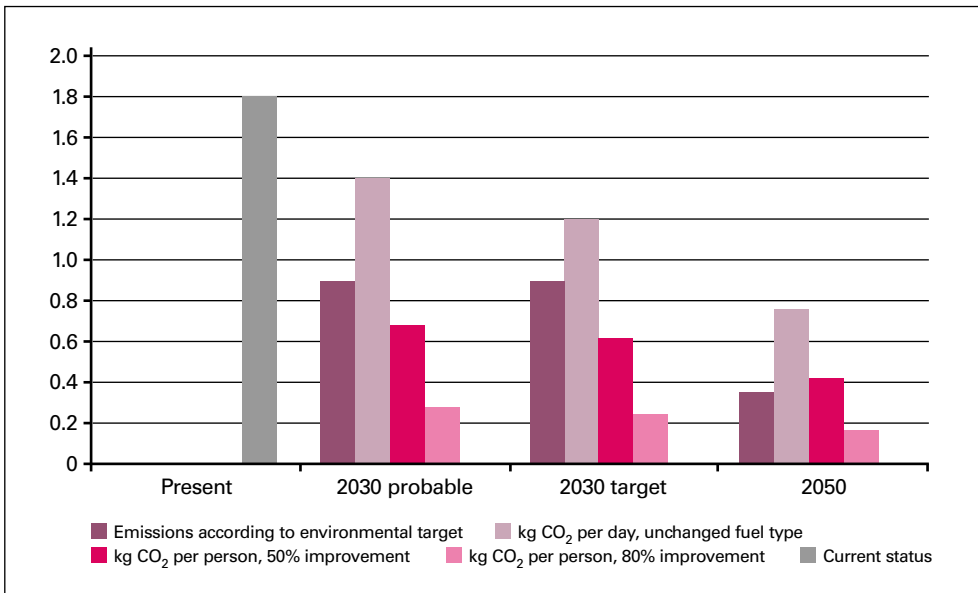


Fig. 9 With TranScen, it is possible to model how various scenarios affect the transport sector’s carbon dioxide emissions and compare them with various targets

to document and develop ideas on various control measures (both soft and hard) that apply to sustainable spatial development processes – relating to politics, policies, programmes, plans (both advisory and binding), agreements, and financial incentives.

Step 18: Develop forms of co-operation between the various players in all phases

As noted in step 17, it is often difficult to make a sharp distinction between hard and soft, or formal and informal, control measures – as a rule, various combinations are involved. A highly significant prerequisite for achieving success in planning is well functioning co-operation between various players, as well as opportunities to compile and co-ordinate various inputs.

In Sweden, municipalities cannot use legislation to force property owners to make changes to existing property, but the procedural structures and processes in the Swedish Planning and Building Act (the PBA) can be used to work more proactively on energy issues and other sustainability issues – in what can be called a ‘PBA+ approach’ (PBA+). This is a communicative approach to planning (compared with planning that mainly focuses on formal documents and decisions), in which the municipality actively builds co-operation with, for example, energy companies and property owners to jointly reach a consensus and create innovative solutions and processes. This PBA+ approach includes not just ‘hardware’ aspects (i.e. physical structure and technical solutions), but also ‘software’ aspects, such as expertise, attitudes, and the choices made by, and the behaviour of, people with respect to energy consumption and its impact on climate. Inspiration can be drawn from activities undertaken within mobility management, but the approach may be expanded to include other sustainability issues, including energy.

The PBA stipulates that in traditional urban planning the focus is on the role of the municipality, as the body responsible for implementing the regulations. In the PBA+ approach, dialogue and consultation within the PBA process are used for participation, exerting influence and sharing information (both giving and receiving) among a range of different players. One advantage of this planning philosophy is that all the stakeholders concerned are involved from the beginning and participate in all phases of the process. Participation becomes broad, thus contributing to transparent planning – forms of rational and communicative planning and various planning tools may be combined creatively.

Another advantage is that the implementation and monitoring perspective is included early in the planning, and hardware (physical structures and technical solutions) and software (behaviour and lifestyles) are handled jointly. Using this planning philosophy, a municipality’s urban planners and other experts can gain a more active role as support resources for property owners and the general public – as energy advisors, procurement experts, teachers, property experts, etc.

Municipalities may develop ideas for improved forms of co-operation in planning through local workshops. Demonstrations of good examples by both the municipality concerned and others can provide participants with input for their joint development work.

Step 19: Develop physical and digital forums

The starting point for setting up forums for discussion on sustainable city and district development is the requirement that, working in co-operation with all the players concerned, they must be used to generate and capitalise on innovations. A motto for this way of working could be Albert Einstein’s maxim: ‘We can’t solve problems by using the same kind of thinking we used when we created them.’

In contemporary planning, physical meeting points need to be supplemented with digital and social media arenas if wider target groups are to be reached, although experience shows that physical meetings play a key – and perhaps even crucial – role in generating good-quality discussion and participation. Digital and social media could be used to stimulate dialogue and attract people to physical meetings – but also as complements to those meetings. The advantage of digital media is that participation can occur at any time or place, and can thus help in reaching target groups.

Step 20: Develop a model for implementing and monitoring the project

There is a growing need to develop and apply various systems and tools to monitor planning outcomes, especially those that sometimes may be difficult to measure or quantify. In this case, dialogue-based workshops can be used to develop evaluation models using the ‘mind-mapping’ tool, in which the following issues are addressed:

- What is the reason for the evaluation models?
- What are the relevant indicators in the various phases (planning, design, implementation, administration/evaluation)?
- How may work be organised to develop evaluation models?

Finally, it is important to consider how the work to prepare evaluation models can be organised in co-operation with various stakeholders and players. A set-up for a good organisation could be:

- a well defined project commission;
- project management with a clear mandate; and
- suitable competence and expertise, because evaluation models are genuine cross-sectoral tasks.

The issue of developing and applying evaluation models has many dimensions, and there has been no scope within the SMPA project to delve deeper into this significant issue. At the same time, the process could be started within municipalities based on the fundamental issues presented above.

3 A practice example: Borås municipality

A very good example of cross-sectoral planning using the SMPA is provided by the experience of the municipality of Borås in Western Sweden. Borås has been actively involved in the Sustainable Municipality programme since its very beginnings in 2003. The SMPA has influenced the way Borås works quite substantially – due to the great interest shown by various members of the municipality’s staff and support from politicians and management, and the coincident timing of work on the municipal comprehensive plan in the mid-2000s. The collaborative planning process has been developed and deepened over the years.

When the municipality started to work on a new comprehensive plan in the 2010s, it was more or less obvious that it would be advantageous to combine it with the work on the municipal energy and climate strategy. In an initial joint process, the planners and energy/sustainability officers developed and assessed sustainability indicators and four different development scenarios that later formed the basis for four ‘future images’ (spatial and energy/climate scenarios). After assessment, these ‘future images’ were eventually merged into one 2035 energy ‘future image’ steering the formulation of short-term goals (up to 2020), the spatial comprehensive plan and the energy/climate action strategy. The energy and climate strategy was adopted in 2015 and the comprehensive plan will be adopted in spring in 2016.

The idea of an arena for working on sustainable development is now a reality in Borås. In the summer of 2015, the municipality opened The Orangery – a building in the City Park that is a place for inspiration, recreation and information. It is a meeting spot for Borås’ residents, politicians, municipal administrators, businesses, associations and organisations to reflect upon and discuss sustainable urban development in Borås.

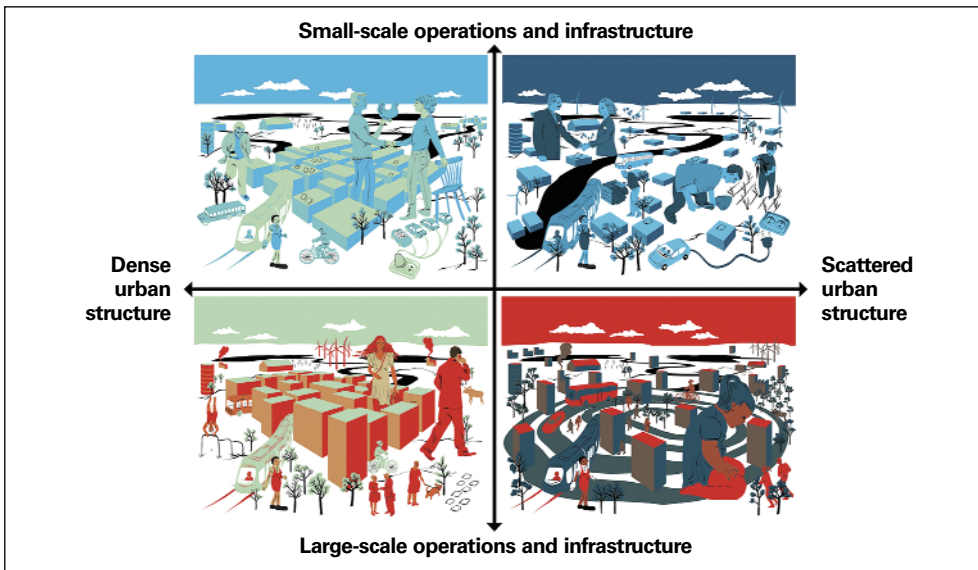


Fig. 10 Borås scenario matrix

The four development scenarios and spatial ‘future images’ were developed using a scenario matrix with two axes, concerning the urban structure (dense or scattered) and the scale of operations and infrastructure (small scale or large scale). The picture above shows the illustrations of the four ‘future images’ made by a local artist

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