# Implementation of energy strategies in communities

Helmut Strasser, Ken Church, Jens Freudenberg, Andreas Koch, Marie Sevenet, Oskar Mair am Tinkhof, Jan Schiefelbein & Carissa Slotterback Salzburg Institute for Regional Planning and Housing Schillerstraße 25 5020 Salzburg Austria

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## Abstract

More than 70 % of global greenhouse gas emissions are attributed to human activities in cities. Thus, cities can play a major part within the  $CO_2$  emission reduction goals set by the Paris Agreement. The domains of urban and energy planning have been identified as important processes by which to reach these  $CO_2$ -reduction goals. However, many previous approaches have focused on a single building or technology and have often led to suboptimal solutions or failure of the implementation process. To successfully support the implementation of energy strategies within urban areas, wider scale solutions have to be found so as to more efficiently integrate the powers of urban and energy planning.

Within the IEA Energy in Buildings and Communities Program (EBC), the Annex 63 – Implementation of Energy Strategies in Communities – aims to provide recommendations for an optimized urban and energy planning process that supports decision makers as well as energy and urban planners. Therefore, existing processes, legal frameworks and case studies within urban and energy planning in communities were analysed. Within this paper, results of the Annex 63 are shown and discussed to serve as orientation for decision makers and other interested persons in the field of urban energy planning.

# Introduction

Cities are major contributors of  $CO_2$ , producing more than 70 % of global emissions (IEA, 2016). The COP21-Agreement recognised that a drastic reduction of both energy and emissions is essential and emphasised a higher international commitment. IEA Energy Technology Perspectives 2016 "Towards Sustainable Urban Energy Systems" ascertains that cities should be the main focus of the decarbonisation effort - around two-thirds of required  $CO_2$ -reduction is seen to be urban. Additionally, it is identified that mobilizing the urban sustainable energy potential requires strong support; from national governments through to local policy makers.

Urban design, energy systems and mobility are important issues at the urban scale. In particular, working at the community-scale offers concrete opportunities for action and supports identification of energy efficient measures which would probably not be viable on single building scale. Following on previous projects (e.g. IEA-EBC Annex 51 Energy Efficient Communities) that were mainly focused on technical barriers and optimization, it is now clear that issues like process organization, coordination and supportive frameworks are key elements for successful integration of energy efficient strategies in communities.

Increasing the emphasis placed on the system-wide reduction of energy demand,  $CO_2$ -emissions and a higher share of renewable energy is essential and requires optimized solutions for entire communities. This systems approach identifies the need for close linkages between all aspects of urban and energy planning. But, integrated planning must occur within a highly complex environment containing multiple issues and stakeholders, conflicting interests and a lack of instruments for implementation. Within the IEA-EBC Program, 19 organisations from 11 countries worldwide are involved in Annex 63 "Implementation of Energy Strategies in Communities" (2014-2017; www.annex63. org). Additionally, project partners are in regular contact with 21 cities to get ongoing feedback and ensure the integration of cities' needs within the Annex 63.

## Objective and methodology of Annex 63

For background, a previous project, Annex 51 (Energy Efficient Communities), found that successful urban energy planning is only possible if energy planning is integrated in the entire urban planning process. However, in many countries energy considerations are missing in urban planning processes (Jank et at., 2013). Therefore, the overall objective of Annex 63 is to give recommendations on procedures for implementation of optimized energy strategies at the scale of communities in the urban development. "Community" is understood as a functioning part of a city. It can be a municipality or may be a smaller sub-area such as a neighbourhood or district. Annex 63 shall primarily serve the needs of urban decision makers and urban and energy planning departments.

For the development of recommendations, information about existing national urban and energy planning practices, instruments and framework conditions in the fields of urban and energy planning was collected from the 11 participating countries. After that, the information was compared and analysed for similarities and contradictions by the project team. Based on the outcomes of this analysis, 88 measures for implementation of energy strategies in communities were identified, described (e.g. role, entry point in urban and energy planning, benefits) and structured. A "measure" is an action or program that influence the implementation process (e.g. 2000-Watt-Society in Switzerland; more details will be available in the project report).

In addition, 22 case studies describing integrated energy and urban planning in participating countries were documented. Contextualisation of the case studies (answering the questions: what works, why and how) produced deeper knowledge on planning procedures and the role of instruments and framework conditions, and ultimately informed optimised strategies. Three international expert-workshops and more than 20 national workshops were held that discussed, summarized and clustered the key-findings into nine effective action fields that justified further investigation. Finally, these research fields were translated into useful and practicable formats enabling target groups to address each.

## Results

Urban and energy planning processes all over the world follow more or less the similar steps: target setting, analysis of situation, potential analysis, project development, realisation and monitoring (Jank et al., 2013).

Each step is influenced by several (political) instruments: signature instruments of urban planning, (new) instruments of energy planning (energy mapping etc.) as well as process-related instruments of planning. Each instrument works under defined framework conditions, often differing between countries.

As described above, the planning processes, instruments and framework conditions in participating annex countries led to nine "action fields" supporting the development of integrated planning/energy strategies for communities. As visualised in Figure 1, each action field is necessary to optimise one or more planning steps.

To communicate the results, several products such as a set of guidelines, a set of power point slides, a set of education materials, a description of required capacities and skills in cities and an expert group summary on recommended practices were produced.

The following section elaborates on two selected topics, "Stakeholder Engagement" and "Organisation and Planning Processes" and offers insights into planning practices, revealing how energy planning issues can be integrated in urban planning to implement energy strategies in communities.

## Stakeholder engagement

Any transition to low-carbon urban development from current practice will require a change in approach. Integrating energy planning and urban planning is predicted to impact urban



Figure 1. Nine action fields for implementation of energy strategies in communities (SIR, 2016).

	NGREASING IMPACT ON THE DECISION						
	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER		
PUBLIC PARTICIPATION COAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.		
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.		

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Figure 2. Public Participation Spectrum (used with permission of International Association for Public Participation Federation).

form and policy making to create the opportunity for energy saving and thus reductions in carbon emissions. As with planning processes generally, the engagement of stakeholders and the public is essential to achieving high quality plans and plan implementation (e.g. Burby, 2003; Sheppard et al., 2011). At the municipal level, government is charged with providing quality services to its residents: the public. In this role it communicates regularly and often, providing information to the public. It may be expected that the municipality recognizes and understands residents' needs. However, when municipal government seeks meaningful input from the public on issues of policy change or other broader planning issues it might struggle with the challenge of designing a participation process that will engage them.

It is inevitable that a transition to a low-carbon environment will demand significant buy-in from the public and that stakeholders will face varying impacts and having varied perspectives. As summarized in (Bryson et al., 2012), engaging stakeholders early and throughout a change process has been shown to build understanding of problems and solutions, build support for future decisions, and produce higher quality plans and policies. Developing a workable strategy that integrates stakeholders with an urban project's development is therefore a fundamental part of the overall process of change.

#### Degrees of Engagement

Differences exist between engaging stakeholders and informing them. While informing stakeholders involves a one-way flow of information, engaging stakeholders for planning purposes is designed to broaden input and alternatives to an otherwise, singular planning perspective. The degree of stakeholder engagement is often presented as a continuum, reflecting the different levels of engagement, from higher and lower, that are associated with the desired level of impact on a decision. The International Association for Public Participation's (IAP2) Public Participation Spectrum (Figure 2) is among the best-known typologies of this participation and engagement, identifying the range of levels and expectations involved in decision-making. For the public they range from inform and consult to the higher levels of engagement that include involve, collaborate, and empower.

When engagement is part of the project development or approval process it is important to distinguish between participation and inclusion, for example: involve, collaborate and empower as shown in figure 2 and specifically when in relation to responsibility and liability. Participation in a process is seen as increasing "public input oriented primarily to the content of programs and policies," while inclusion goes further in "continuously creating a community involved in coproducing process, policies, and programs for defining and addressing public issues" (Quick and Feldman, 2011). Planners' capacity, stakeholder expectations and resource availability are often factors that define the degree to which the public/stakeholders are involved in a process and can influence whether the process moves beyond participation toward inclusion and empowerment (Laurian and Shaw, 2009; Quick and Feldman, 2011; Slotterback, 2011).

#### The stakeholder

The term "stakeholder" commonly reflects a party who can have an impact or is impacted by a decision, policy, plan, etc. (Bryson, 2004; Freeman, 1984). Applied to the planning context, their opinion is such that it could influence the form and shape of any design or other decision and should therefore be taken into account by those involved in the specific change, plan or project. In the relatively novel context of integrating energy considerations into urban planning, many stakeholders (e.g. utilities, neighbors, developers) may not be aware of the purpose and/or impacts of each change and thus additional awareness building and outreach may be required to ensure that the stakeholders better understand the implications and approaches available and are best positioned for meaningful engagement in the change process. Failure to effectively identify and reach out to stakeholders can result in only a group of "the usual suspects" becoming involved. Annex 63 results suggest that for greater effectiveness, this approach could be replaced by a more targeted process that defines the impact that the change in energy delivery or technology is hoped to bring and hence how the stakeholder group that can affect or will be affected by that change. Recognising these groups will allow refinement, determining who specifically in the group would be

most impacted by the change and/or has expertise or insight to offer a planning or project decision-making process. The process requires insight into the role of the stakeholder groups, industries and associations and can help to identify linkages between groups that create additional impacts and benefits.

#### Stakeholder involvement

Within the general structure of project development phases (Figure 3), stakeholder involvement can vary significantly. Stakeholders can provide technical expertise and local knowledge along with a broad range of related skills and experience. Engagement requires a 2-way exchange of information with the aim of advancing knowledge via continuous dialogue. At the same time, a balance is needed between the need for their time and the limitations of stakeholders' schedules.

The creation of committees (e.g., advisory, technical, steering) is of great advantage when developing complex integrated urban and energy plans at a community scale. Figure 3 illustrates the stages of engagement. While they do require the engagement of more stakeholders, the committees can serve as critical sounding-boards for options and enable participation as and when required. The creation of these committees also provides an opportunity for linkages to form between symbiotic organisations.

## Organisation and planning processes

Throughout the reviewed case studies, a multitude of different actors were involved in the local urban energy planning process taking on different roles and contributing local, technical or administrative knowledge to the local planning process. Even though planning regulation varies between different countries, the cases suggest that the challenges of local urban energy planning requires adapted governance instruments to provide the necessary organisational framework and thus supports engagement in the planning process for all stakeholders.

Evidence for a revised structure rests within the technical assessment of case studies for local urban and energy planning.

Based on the assessment of a number of successful case studies, (Jank et al., 2013) state that "technical problems posed less of a challenge for energy planning than originally thought. The real problem was found to be a management problem, in particular social and organizational challenges." On the other hand (Cajot et al., 2015) investigated urban planning processes and identified conflicting objectives as well as uncertainty in the process design as main obstacles. Both aspects point out the strong need for adapted organisational formats and processes to allow an exchange between different participating parties and provide a clear and transparent communication. In contrast to the need of new organisation structures, community scale energy planning - in case of communities which are defined as smaller sub-area of a municipality - currently tends to focus on technical measures. This deficit could be explained by a sub-optimal definition of the community-area, based on technical or administrative parameters such as the built form or administrative boundaries. This concept is often expressed via zoning or master plans as the sole basis for a local energy concept. At the local level, however, the notion of community or neighbourhood bears a connotation of space as well as social belonging. (Heyder et al., 2012) proposed to capitalise the benefits of both viewpoints by fostering grassroots movements for greater sustainability in urban planning processes and on the other hand integrating those into top-down planning instruments such as certification schemes. With regard to urban energy planning, the work in Annex 63 identified both top-down as well as bottom-up processes described in Table 1.

From the research it was seen that coordination and networking are core requirements to enable cooperation between both concept- and project-oriented approaches to local energy planning. The process management has to be provided by an administrative body with sufficient capacity that is aware of the different needs and objectives of the stakeholders and of potential conflicts that may arise throughout the process. This body can be an appointed team in the administration or a public institution (i.e. local energy agency). In any case, it is of great importance to agree on an institution that will deal



Figure 3. Stages of Stakeholder Engagement (Ken Church, Natural Resources Canada, 2015).

Table 1. Steps in top-	down and bottom-up	local urban energy pl	lanning processes
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Concept oriented top-down approach from community concept to pilot project	Project oriented bottom-up approach from pilot project to community concept
1. Set up of a local project team	1. Set up of a local project team
2. Clarify local institutional framework	2. Define energy objectives of local pilot project
3. Physical analysis and potentials	<ol> <li>Technical and financial feasibility study for the pilot project</li> </ol>
4. Involvement of local key actors	4. Detailed definition of the pilot project
5. Develop of a common vision for long-term energy goals	5. Public tender/competition
6. Derivation of specific objectives and sub goals	6. Involvement of local key actors (stakeholder analysis)
7. Define of indicators to measure success	7. Implement local pilot project
8. Define action plan: ranking and time frame for measures	8. Documentation, valuation and dissemination of results
9. Discussion of energy concept by the local government	9. Conceptual design for development of a district concept

with all of the administrative procedures and will act as trustworthy and competent partner in the target area for private and public actors. This managing entity can also guarantee the integration of all actors, which goes beyond standard participation processes. The involvement in the elaboration of local schemes also leads to a stronger identification with the objectives and actions for the area and stronger support for their implementation. To a certain extent, this can help to engage further private resources, knowledge and finances for the implementation of the actions.

Regarding the structure of the administrative body, it has become clearer, that there is no such thing as a general structure or approach that allows the integration of energy issues into local planning processes. As energy efficiency and sustainability are cross-cutting issues and the relevant stakeholders varied across different communities and municipalities, the framework and structure of the institution dealing with those issues has to be tailored to each local context. In an internal survey, conducted amongst partners of the Annex 63 it has become evident, that cross-sectoral structures were already applied to the local settings in all analysed municipalities. Within the last five to ten years the analysed municipalities or higher administrative levels have been established permanent bodies or organizations for the tasks of local energy planning with regard to higher sustainability and increased efficiency goals. In all cases, the organisation structure connects the municipality with at least one, but mostly many external partners from the private as well as the public and non-governmental sector. Only in a few cases, the responsible persons in charge were directly subordinate to an already existing structure whereas in most cases new bodies within the administration were established. In all other cases, external bodies have been established under direct participation of the responsible municipality. This implies a strong political support but more importantly also a long-term (financial) commitment of the municipality. Common general obstacles however were the final implementation, which is aimed to be realized though community energy plans or questions of responsibility among different stakeholders.

Regarding a management process with many involved stakeholders, as discussed here, a regular evaluation and review of the planning processes is a necessary part of these new governance instruments. An analysis of case studies in publicly funded energy and urban planning programmes in Germany shows, that a consequent monitoring of the impact of individual measures is often missing (pro:21 GmbH, 2013). Besides proving the impact, monitoring is also of great importance in order to draw conclusions and improve the energy and urban planning process. Monitoring is also one main aspect to ensure a sustainable success, wether it is for a deduktiv top down or an inductive bottom up approach.

In the French case study the development and urban planning agency of Strasbourg - Agence de Développement et d'Urbanisme de Strasbourg (ADEUS) which was developed in 2014 initiated an exchange platform to support the local energy transition by providing a "place" where partners can exchange, mutualise and capitalise information. The first issues that were addressed are to identify useful levers in public policies and to define the energy strategy at the different planning level. During the 3 years of the project, several pilot and technical committees were organised to share expertise knowledge and help all partners to create and develop a common vision. For example, different scenarios for the metropolitan area were discussed. Additional investigations were based on interviews that were made to support the analysis. Positive results from the link of different levels of planning and decision making in the larger metropolitan area are for example the identification of difficulties at local level that could be solved at a higher administrative level. The need of training in energy related issues was identified for urban planning experts. Furthermore, the exchange highlighted a number of existing measures, which were more visible at the local level as many of them targeted building scale. Further actors such as local companies, the harbour, local architects were interviewed to enlarge the vision of the process, among other the results point out a lack of transverse interaction between the administrative services as well as towards the project implementation.

## Conclusions/recommendations

While a comprehensive discussion of annex results is not presented here, the analysis of members' planning practices suggested that urban and energy planning could be enhanced through a better understanding of the interplay between urban and energy planning procedures, instruments and organisational frameworks on both sides. The case studies also supported the notion that policy makers need to set a proportioned mix on instruments that allow for engagement, enabling and enforcing energy related topics in urban planning processes. These new approaches linking urban planning and energy planning invariably highlighted the need for capacity building through case specific examples and training materials.

Undoubtedly a key factor within many of the nine actions fields involved increased communication between players. Relative to the specific topic of stakeholder inclusion, it is important to include all relevant stakeholders as soon as possible and specify their contributions. It is recommended that stakeholder involvement follow the following questions:

- Identify the lead person/organisation for the plan or project initiative – who is responsible and under what authority does that lead person operate? Is there a similar role in the energy delivery sector? Is there a critical technical or political champion that should be engaged?
- 2. What are the driving principles and goals of the plan or project in terms of energy/emission-related benefits for the community?
- 3. What stakeholders share the project territory, have related expertise, have interests, and/or have power that can influence the outcomes of the project or plan?
- 4. What impact could the project bring to each of the stakeholder groups and where are the contact points?
- 5. In what ways can stakeholders contribute expertise, knowledge of the local context, and resources that can help to enhance the plan or project?
- 6. What role will the stakeholders play in your project; what are the possible ways to interact with them and when should that interaction begin?
- 7. How and when should ongoing interactions and results be documented and shared?

The optimisation of processes, instruments and framework conditions will lead to a restructuring of existing urban or energy planning practices, so as to accommodate the internal or external knowledge. The common opinion of the project team and of many (North American) energy utilities is that the bringing together of urban and energy planning processes will have a significant impact on the energy use and the  $CO_2$ -emissions at the community level when compared to that of the individual building stock. Deploying these recommendations at the large scale necessary could lead to substantial effects to be reached at relatively low costs and thereby create the basis for internal change management processes.

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