PUTTING ENERGY IN URBAN PLANNING

This article describes the main results of Annex 63 and the activities of the ongoing Working Group on Cities and Communities, which are part of the IEA- Energy in Buildings and Communities (EBC) program. This article presents the nine strategic measures being key for successful implementation of energy strategies in communities, which have been identified based on experts-analyses of different instruments, cases and pilot projects. Furthermore, the reader will learn about supporting materials which are provided to be successful in their implementation. Finally, the article provides recommendations and an outlook on ongoing IEA-activities supporting the decarbonisation of urban energy systems.

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BACKGROUND AND INTENTION

Cities face extensive challenges when it comes to transformation processes of their energy and mobility systems. In particular, the generation of suitable decarbonisation strategies and the selection of the best-fit solutions for cities' specific and individual framework conditions requires comprehensive skills, knowledge, and resources, which are often missing in smaller communities. In addition, these decision-making and planning processes take place in an often highly dynamic environment with a large number of further requirements with potentially higher priorities. Thus, the coordination of urban and energy planning processes on a local level is a central element for achieving CO_2-reduction goals. However, case studies from several countries show that there is still a missing link between urban and energy planning processes that would enable the implementation of innovative technologies in large-scale projects.

The project "Implementation of Energy Strategies in Communities" (Annex 63 in Energy in Buildings and Communities Programme of the International Energy Agency, 2013-2018) has intended to close this gap. It has collected and analysed available experiences on national scale (amongst them, eight European including the Netherlands) and developed them further to strategic measures supporting the successful implementation of energy strategies in communities including information on how these strategic measures can be applied at local scale. Finally several stakeholder support materials enabling the start of the necessary change management process were developed.

Additionally the complexity which was described above often leads to uncoordinated decision-making within cities but also within different stakeholder groups. While solutions are mostly provided at a strategic level, decisions at the urban scale can have substantial impacts on individual approaches and technologies. The "Working Group on Cities and Communities" ("WGCC") was founded as a follow-up-activity of Annex 63 and intends to improve this situation by integrating these "urban issues" into the IEA TCP research.

STRATEGIC MEASURES

The collected national measures were developed further to nine strategic measures. They can be used to develop individual implementation strategies on a local level for part or the whole life cycle of a project (from the first vision to monitoring of the implemented solution). The strategic measures are:

– **Set Vision and Targets:** This measure focused on how urban and project planning processes can be enriched with an overarching vision, as well as clear targets. Applying this measure will make planning more productive by orienting planning actions toward a common vision and set of targets. Building early and broad acceptance of visions and targets will increase their success.

– **Develop Renewable Energy Strategies:** This measure focuses on developing strategies, ideally in alignment with vision and targets, to shift the existing energy supply mix to include a higher amount of renewable energy. Strategies informed by stakeholder engagement and that rely on the range of implementation tools are more likely to be successful.

– **Make Full Use of Legal Frameworks:** This measure supports the analysis of existing legal frameworks to identify opportunities to integrate energy and urban planning, such as through memoranda of understanding, joint powers agreements, and shared decision making, governance, and funding structures.

– **Design of Urban Competition Processes:** This measure offers recommendations as to when and how climate and energy-related issues can be entered into competitions (sometimes called requests for proposals – RFPs) to produce projects that have enhanced urban design quality, as well as features that advance climate and energy goals.

– **Make Use of Tools Supporting the Decision Making Process:** This measure is focused on tools that can help to analyse and apply energy and other information in decision-making and planning processes. Tools can be helpful in integrating multiple data sources (e.g. energy, economic, social), conducting analysis across large data sets, and exploring potential scenarios.

– **Implement Monitoring of Energy Consumption and GHG Emissions:** This measure highlights the importance of monitoring energy and GHG data at multiple scales, from the building to the community. Establishing an initial baseline and tracking data over time can be used to identify progress toward and updates to Targets and Renewable Energy Strategies.
– **Stakeholder Engagement & Involvement:** This measure emphasizes that successful stakeholder engagement involves a two-way exchange of information via an early, frequent, and ongoing process. Engagement is acknowledged as helping to build consensus, improve the outcomes of planning efforts, and build support for implementation.
– **Include Socio Economic Criteria:** This measure emphasizes the significance of early analysis and integration of multiple benefits (e.g. cost savings, environmental equity) of energy efficiency practices. Socio-economic criteria can be relevant at both the project and planning scales.
– **Implement Effective and Efficient Organisational Processes:** This measure outlines mechanisms to assist in moving the principles of a sustainable project beyond its project lifetime through the creation of a functional organisation. It compares the organisation of process within the local administration for cross-sectoral initiatives and helps to identify relevant local/regional (key) stakeholders.

APPLICATION OF STRATEGIC MEASURES

To understand how implementation champions apply the strategic measures, national case studies were collected. Implementation champions are hereby understood as stakeholders in the city who take the initiative to lead and facilitate implementation processes. In general, the following aspects are relevant:
– Where: Positioning of energy targets as part of integrated planning approaches is an effective driving force for implementation.
– Who: Implementation champions can be almost anybody, as illustrated by the case studies.
– What: Implementation champions actively apply and combine strategic measures.
– How: Implementation champions work in an iterative way with great care about knowing and learning during the process.

STAKEHOLDER SUPPORT MATERIALS

Stakeholder support materials were developed within the framework of Annex 63 to contribute to overcome existing gaps. An Excel-based self-assessment tool supports the analysis of the status quo regarding the implementation of the nine strategic measures in a municipality. A simple to understand traffic light system helps to assess the awareness, available skills, regular application, quality and efficiency of application and gives a first overview about existing potentials for improvements. Recommendations for the optimisation of organisation with respect to capacity buildings and skills is a second support material. As moderation and technical skills are central skills for implementation champions, workshop formats, a set of Powerpoint-slides as basis for powerful presentations for different purposes and target groups and an overview of existing education materials for academic lectures are further support materials that were elaborated in the framework of Annex 63.

RECOMMENDATIONS

Analysis of urban and energy planning processes has shown that a change of existing processes is very complex because it must take into account the different stakeholders´ needs (e.g. politician, administration staff, investors, planers, users) and the impact of different topics (e.g. visions, goals, process flow, organisation). Therefore, social skills and practical recommendations are necessary to initialize the change process.

A key-finding for policy and decision makers indicates that an upscaling of building solutions to the level of settlements is not possible. To optimise the energy supply for urban development projects, solutions on a building scale are necessary, but a broader framework is needed at an early planning stage (urban planning). Therefore, it is important to include all relevant stakeholders early in the planning process and understand their potential contributions. This can be done by restructuring urban planning processes and by including internal or external expertise. The adaption of urban planning processes has a more significant impact on the energy use and the CO_2-emissions within countries compared to the optimisation of the building stock. So if the energy strategy recommendations are deployed at a large scale, high impacts could be achieved with low   ▶

Name of the municipality	xxx
Date of the assessment	xxx
Participants	xxx

STATUS-QUO	Set Vision and Targets	Develop Renewable Energy Strategies	Make Full use of Legal Frameworks	Design of Urban Competition Processes	Make Use of Tools Supporting the Decision Making Process	Implement Monitoring of Energy Consumption and GHG Emissions	Stakeholder Engagement & Involvement	Include Socio Economic Criteria	Implement Effective and efficient Organizational Processes
Awareness	green	green	yellow	red	yellow	green	green	green	green
Available skills/knowledge/resources	green	green	red	red	yellow	green	yellow	green	yellow
Regular application	yellow	green	red	yellow	yellow	yellow	yellow	green	green
Quality of application	red	green	yellow	red	yellow	yellow	red	green	green
Efficiency of application	red	yellow	yellow	red	yellow	yellow	green	green	yellow

1

Example for the visualisation of the results of a self-assessment

costs and create the basis for the start of an internal change management processes.

WORKING GROUP ON CITIES AND COMMUNITIES

In IEA Energy Technology Perspectives 2016 "Towards Sustainable Urban Energy Systems" (IEA, 2016) highlighted the relevance of CO_2 -reduction potential at urban scale. Experience in Annex 63 showed that cities face quite extensive challenges when it comes to transformation processes of their energy and mobility systems. Thus, the outcomes of the Annex 63 are intended to support cities´ efforts. Additionally there was a requirement for further information exchange between researches on different technologies with relevance for urban scale as well as between technological and non-technological issues such as urban planning processes identified.

Thus, the recently started "Working Group on Cities and Communities" ("WGCC") intends to build a forum for exchange on these "urban issues" within the IEA TCP research and others. The Working groups aims to:
– assess and identify cities' and their actors' (and associated stakeholders') needs,
– generate appropriate non-technical "on demand" input and service ideas for cities,
– identify and discuss bottlenecks and barriers for the transformation of cities' energy and transport systems,
– discuss and provide results and (policy) recommendations on energy and mobility systems,
– close the gap between cities and research,
– connect TCP technical researchers with non-technical experts and city representatives and is primarily targeting urban decision makers (administration, planning staff, etc.), intermediaries (local/national), IEA officials and IEA research community.

The WGCC primarily uses formats such as workshops and other exchange, capacity building, and training activities, publications, short-term projects, and research. Additional formats emerge directly through to specific needs of a project, specific research questions or requirements of cities. Through these formats, the WGCC intends to identify crucial cities' needs, which are translated into research questions for short-term (research) projects within the working group.

Within the WGCC, three subgroups emerged which focus on specific issues relevant for decarbonisation of energy and mobility systems:
– technologies
– strategies
– data

Technologies

Cities offer the best opportunities for decarbonization as local sectors such as buildings, transport, water, and waste show the most significant potential for high impact investments. Yet, cities often lack the capacity to plan and implement decarbonized energy systems and need support in terms of individualized and targeted technology portfolios. Decarbonziation technologies are best developed by experts and subsequently discussed and

transferred into the discussions at the local level. The working group offers a platform for such discussions and the development of these technologies and their system integration.

Subgroup 1 intends to:
– collect and discuss best-practice approaches and research results,
– develop a portfolio of technologies able to contribute to decarbonization strategies including aspects of system integration and information regarding framework conditions (local potential, national regulations, …),
– conduct smaller studies on national framework conditions and strategies (e.g., electricity in the heat market, Dutch strategies for gas-boilers replacement, etc.), including questions such as "what are goals and visions (and success monitoring strategies) of cities with respect to the neighbourhood scale and national goals?" or "which technology-portfolios exist in cities and how do they contribute to national and international goals?"

Strategies

The implementation of decarbonization technologies requires – in addition to the strategic prioritization of decarbonization - integrated and transformational planning at the city or community scale. These planning processes need to be recognized as "journey" wherein a city or community "matures" in moving initially from ad hoc or one-off efforts to opportunistic, then repeatable and managed efforts, and finally to an optimized and iterative system. Ultimately, in integrated or transformational planning, energy (and other strategic components) is accounted for at multiple scales - city, sector, site - within the broader urban planning and development process. New incentives for change are identified, knowledge is available and transferred as to how planning affects energy demand, and energy is linked across infrastructure, housing, land use, and all types of mobility.

Subgroup 2 intends to advance integrated and transformational planning primarily by:
– gathering examples of integrated planning frameworks, methods, and processes (e.g., UK, Germany),
– collecting case studies of cities and communities that have implemented the frameworks, methods, and processes noted above, with an intent to understand what they are doing now and what they are planning to do,
– connecting to IEA TCPs and Annexes throughout the WCGG process,
– disseminating results in cities through intermediary organizations (e.g., professional associations).

Data

The subgroup covers issues of data as well as tools and methods for supporting the development of decarbonization technologies and strategies to help the decision-making processes in cities. The subgroup supports the work of subgroup 1 on decarbonisation technologies directly through methods for (e.g.) building greenhouse gas inventories and indirectly via subgroup 2 by supporting the development of strategies.

Subgroup 3 aims to:
– discuss the state-of-the-art,
– collect best-practice-examples, and
– identify barriers for the use of data (tools and meth-
  ods).

The first joint workshops of all three subgroups were
held in April 2019. The activities will continue in autumn
2019. Further participants are welcome.

SUMMARY

The coordination of urban and energy planning process-
es at a local level is a central element for achieving
goals for reducing greenhouse gases (GHG) emissions
and in particular those relating to energy-related carbon
dioxide (CO_2) emissions. But, case studies from several
countries have shown there is still a missing link
between these processes that would enable the imple-
mentation of innovative technologies in large-scale pro-
jects. Previous project Energy Efficient Communities
has shown that the optimization of energy systems at
community scale alone is not sufficient. Rather, a close
linkage between energy planning and established urban
planning processes is required. To address this, this
EBC international research project has closed this gap.
It has collected and analysed experiences in the partici-
pating countries on a national scale. These analyses
have shown that making changes to existing processes
is very complex because these must take into account
the needs of different stakeholders (e.g. politicians,
administrators, investors and planners) and the impacts
of different topics (e.g. visions, goals, process flow and
organisation). Therefore, social skills and practical rec-
ommendations are necessary to initialize the change
process. A result is that an upscaling of building solu-
tions to the level of settlements is not sufficient.

To optimise the energy supply for urban development
projects, solutions at the individual building scale are
necessary, but a broader framework is needed at an early
planning stage. Therefore, it is important to include all
relevant stakeholders early in the planning process and
to understand their potential contributions. This can be
done by restructuring existing urban planning processes
and strengthening them with additional internal or exter-
nal expertise. The well-implemented adaption of urban
planning processes is likely to have a more significant
impact on energy use and CO_2-emissions within a coun-
try compared to the optimisation of only the building
stock.

So, the results of the analyses have been further devel-
oped to create a set of nine strategic measures. These
measures support the successful implementation of ener-
gy strategies in communities and include guidance on
how they can be applied at a local scale. Finally, stake-
holder support materials have been developed enabling
the necessary change management process to be started.

Additionally, a requirement for further information
exchange between researchers has been found for differ-
ent technologies with relevance to the urban scale, as
well as on technological and non-technological issues,
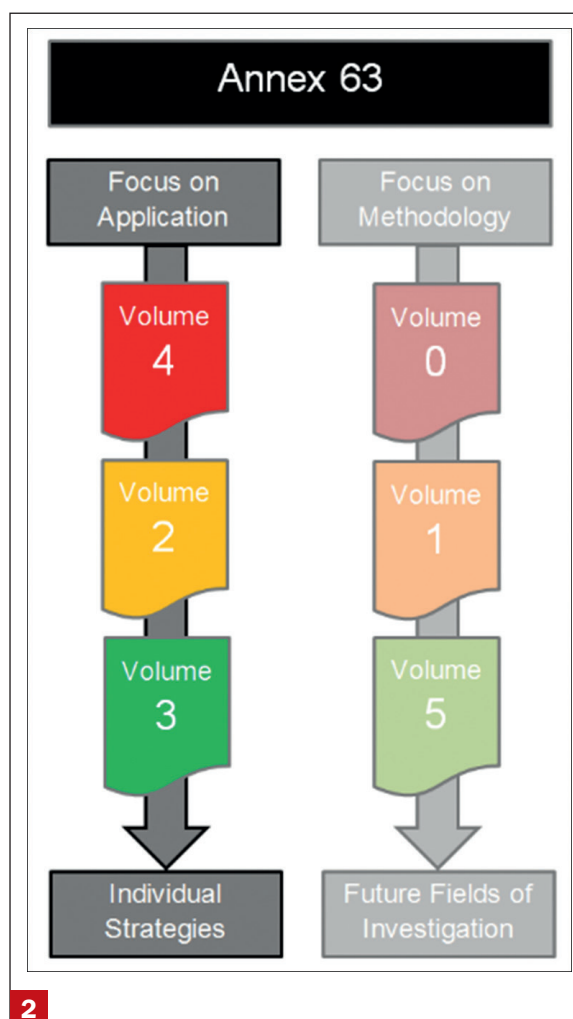
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How to read the reports

such as urban planning processes. Thus the recently
started EBC-led "Working group on Cities and Communi-
ties" is creating a forum for knowledge exchange on such
"urban issues" for the benefit of the IEA Technology Col-
laboration Programmes´ research and other activities.
The success of this project is largely determined by the
close cooperation with more than 20 cities.

These experiences aims to continue to be introduced
through close cooperation. For this reason, attempts are
being made to integrate not only research institutions
and experts, but also relevant city-related facilities. ∎

SOURCES

Following reports of Annex 63 have been published and
are available on the website:
▶ Volume 0: Documentation of workshops and
involvement of cities
▶ Volume 1: Inventory of measures
▶ Volume 2: Development of strategic measures
▶ Volume 3: Application of strategic measures
▶ Volume 4: Stakeholder support materials
▶ Volume 5: Recommendations
▶ www.annex63.org
▶ www.iea-ebc.org