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# Stakeholder Collaboration in Energy Transition: Experiences from Urban Testbeds in the Baltic Sea Region

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**Abstract:** Energy-efficiency improvement measures for existing building stock are vital for reaching EU climate mitigation and energy targets, especially in urban areas, which are responsible for a large share of total energy consumption and CO<sub>2</sub> emissions. The complex and multi-faceted nature of the energy sector is characterized currently by fragmented planning practices and a lack of cross-sector action to improve resource efficiency. The authors examine a comprehensive multi-stakeholder collaboration model at the district-level as a method to systematically address challenges of energy planning in urban areas while exploiting synergies with local conditions. A detailed description and evaluation of formats for successful collaboration is provided, considering lessons learned by the Interreg BSR project AREA 21 including seven cities from the Baltic Sea Region (BSR). The authors propose five main features for stakeholder collaboration in energy planning: inclusivity, intermediate scale, interactivity, mutual benefit, and institutionalization. The analysis provides evidence of successful multi-stakeholder collaboration that resulted in the development of strategies and action plans for energy improvements for the selected urban areas.

**Keywords:** stakeholder collaboration; climate mitigation; energy planning; energy efficiency; energy improvements; energy transition; building stock; urban district; district level; energy improvement district

## 1. Introduction

With the adoption of the Paris Agreement in 2015, the international community committed itself to fight climate change by setting ambitious binding targets to limit global warming to well below 2 °C compared to pre-industrial levels [1]. In line with this, the European Commission adopted several strategies to significantly reduce greenhouse gas (GHG) emissions [2,3]. All major producers of GHG emissions have to significantly contribute in achieving this target, including the energy sector as the main source of emissions in Europe [4]. In the European context, the building sector represents the largest single energy consumer accounting for circa 40% of the total energy consumption and 36% of the GHG emissions [5]. Currently, around 75% of the building stock in Europe is assessed as energy inefficient [6]. This area holds great potential for improvement through reduced energy consumption in the form of heating and electricity as well as with urban energy production [7]. Improvements in the present will have lasting impacts: more than 75% of today's building stock is estimated to still be in use in 2050 [6,8]. In this context, the central question is: how stakeholders should address this sector and unlock its energy efficiency potential?

The AREA 21 project, carried out from 2017 until 2020, focused on seven urban districts from the Baltic Sea Region. It was a transnational cooperation project co-funded through the Interreg Baltic

Sea Region Programme 2014–2020. It sought to develop and test innovative formats of cooperation for strategic planning and implementation of energy solutions through the deployment of a novel concept, the Energy Improvement District (EID). The EID, a transformative instrument for low emission urban districts, aimed to promote a paradigm shift from a strong top-down approach towards a cooperative energy planning model with increased involvement of relevant local stakeholders (e.g., public authorities, energy utilities, property owners, citizens). In this context, the EID contributed to the pooling of competences, ideas and resources between public, private and civic sector stakeholders for energy efficiency planning and implementation.

Building on experiences and results from the AREA 21 project, this article aims to expand the knowledge on collaborative energy planning for improved energy efficiency in the existing building stock. We analyze results from the exploitation of the EID concept, developed and implemented in the frame of the AREA 21 project in seven cities, to highlight crucial features contributing to successful stakeholder collaboration in energy planning.

Section 2 presents the methodology. The theoretical background of stakeholder collaboration employed in the development of the EID concept is analyzed in Section 3. Building on the literature concepts of collaborative governance and cross-sector collaboration, the authors elaborate on the results of multi-stakeholder collaboration processes of the AREA 21 project in Section 4. Here empirical evidence from the project is presented, defining and describing key features for collaborative energy planning. Finally, in Section 5, the results are discussed, considering to which extent these key features, approaches and methods for stakeholder collaboration deployed in the AREA 21 project can be used to address the problem of energy efficiency in the existing building stock in the European context.

Our principal conclusion is that collaborative energy planning at the district level as modelled by the projects' EID Concept and carried out in the seven pilots has the potential to increase cooperation and, with this, unlock synergies and push energy efficiency actions for the existing building stock. We offer a new approach for cooperation of diverse stakeholders that goes beyond business as usual. The approach provides tailor-made solutions in energy planning featuring five main features: inclusivity, intermediate scale, interactivity, mutual benefit, and institutionalization.

## 2. Empirical Basis

Throughout its duration, the AREA 21 project focused extensively on cross-sector collaborations and stakeholder engagement activities, aiming at developing and testing an overarching concept-framework for energy planning (the EID) leading to the definition of tailored measures for the project's seven pilot areas. The collaboration framework proposed by AREA 21 built upon three key aspects: (1) an integrated system perspective, (2) a coordinated approach to strategic energy planning and implementation, and (3) cooperative planning, decision-making and implementation at the city district level. It is the project's hypothesis that the combination of these three aspects underpin the development of effective energy efficiency measures.

This article discusses a model-instrument for multi-stakeholder collaboration in energy planning through the lenses of its key features, approaches and methods. This goal is addressed through two core methods. The first is a literature review analyzing stakeholder collaboration and especially those core concepts that also informed the elaboration of the governance model applied in the AREA 21 project, i.e., collaborative governance and cross-sector collaboration. The authors analyzed key literature employed in the development of the EID concept, supporting the identification of core elements of the proposed framework, i.e., coordinated cross-sector collaboration at the district scale. Further, the second methodological approach builds extensively on the experiences from the AREA 21 project with the demonstration of collaborative energy planning in seven pilot cases from the Baltic Sea Region. For this purpose, a qualitative analysis of the documentation produced throughout the project was carried out (document analysis). A qualitative analysis is used for reviewing or evaluating documents and needs to be interpreted following the authors research interest [9] (p. 27). It is a well applicable research method for qualitative case studies as it provides "rich descriptions of a

single phenomenon, event, organization, or program” [9] (p. 28). The authors’ objective was to condense the fundamental aspects of the implementation of multi-stakeholder engagement in the energy-planning sector.

Using these methods, the article reflects on the application of the collaboration and stakeholder engagement activity in the AREA 21 project to highlight key features towards successful collaboration for energy efficiency planning in the context of existing building stock. Results from the AREA 21 project are limited to the collaboration phase including the finalization of strategies and action plans, whereas the implementation of the measures is out of the scope of this article.

### 3. Stakeholder Collaboration from a Theory Perspective

Cooperation requires various types of actors to decide on, develop, and implement energy initiatives. The concepts of collaborative governance or cross-sector collaboration informed the approach adopted in the AREA 21 project, in which various actors (public authorities, energy utilities, property owners, housing cooperatives and local citizens) engaged in collaboration to foster measures for increased energy efficiency. Furthermore, the search for synergies between local issues and energy measures and the scale of the planned initiatives are also relevant to the dynamics of multi-stakeholder collaboration as proposed for the AREA 21 project.

Gustafsson et al. explain that the development of energy strategies is a challenge for European municipalities and the effectiveness of the strategies is often questioned due to the various influencing factors lying outside of the scope of local authorities [10] (pp. 206–207); also see [11–15]. Pellerin-Carlin et al. further elaborate on the challenge, remarking on the necessity of overcoming silo-mentality through a holistic approach to energy transition, coherent both horizontally—across sectors—and vertically—across European, national, and local levels [16] (pp. 28–29). The incorporation of multiple relevant perspectives through collaborative governance or cross-sector collaboration offers a path to improved solutions and better decision making.

Ansell and Gash identified collaborative governance as a strategy of governing that has developed over time since the 80s, aiming to replace adversarial and managerial modes of governance, oftentimes in response to previous governance failures [17] (pp. 543–544). According to Emerson, Nabatchi and Balogh, other authors also traced the idea of collaborative governance, rooting it in American federalism itself [18] (p. 3). They defined collaborative governance as processes and structures for the constructive engagement of various actors across sectors (public, private, and civic) aiming to accomplish public purposes that demand multi-stakeholder cooperation [18] (p. 2). The definition from Bryson, Crosby and Stone for cross-sector collaboration further clarifies its nature, citing the connection between sharing of knowledge, resources, activities, and competencies by organizations across different sectors [19] (p. 44). These processes foster legitimacy, especially through improving transparency and inclusivity [20,21].

Collaborative governance and cross-sector collaboration processes show several key aspects, which can be understood as state of the art within the implementation of these concepts. These can include the establishment of formal agreements among stakeholders and building of leadership, among others. According to Bryson, Crosby and Stone, formal agreements support the definition of practical aspects of the collaboration (e.g., purpose, decision-making structure, etc.) and foster accountability [19] (p. 47). The presence of leaders in the collaborative process is also seen as an important element, as they may take the role of process facilitators, supporting multi-stakeholder dialogue and consensus building [17] (pp. 554–555).

The inclusion of a broad and diverse range of stakeholders, including citizens, is another key element of collaborative governance, and it is especially significant to the success of these processes. Gustafsson et al. specify that participation and participative processes can foster democracy through the empowerment of citizens and stakeholders, promote transparent decision-making, foster learning, increase acceptance of initiatives and reach better decisions [10] (p. 207); see also [20,21]. The latter is the main goal of multi-stakeholder participation in energy planning within AREA 21.

Moreover, finding synergies between energy improvement and local demands can promote a broader local interest towards increased energy efficiency and acceptance of measures. Becchio et al. refer to this identification of synergies as co-benefit, and they explain that investing in energy efficiency is likely to benefit diverse stakeholders involved in the project (e.g., reduction of fossil fuel consumption, creation of employment, etc.) [22] (p. 805); see also [23].

As collaborative governance and cross-sector collaboration processes are applied to the energy field, the scale of action is a fundamental concern. AREA 21 proposes the establishment of Energy Improvement Districts, in which a district does not have a specified size or shape, but is defined according to local context, issues and objectives. The level of complexity of the energy sector contributes to the difficulty in defining the best scale of action. Even limiting the sector to energy in the building stock, the relevant stakeholders are not limited to the production and distribution of energy, but go beyond the sector's boundaries to include end-users in multiple fields. Therefore, defining the scale of action implies a balance between the impact of initiatives and the amount of relevant stakeholders that can be engaged in collaboration. Cajot et al. argue in favor of the neighborhood scale, as "urban quarters may already provide the critical size for most energy efficiency measures, while involving a fairly well-delimited and manageable group of stakeholders" [24] (pp. 233–234). There are several examples of successful local energy projects that operate on a district scale and that inspired the framework developed within AREA 21. Overall, they relate to community-owned renewable energy or energy efficiency projects and include a varied range of actors in the organizational structure. Most of these examples refer to community energy initiatives led by consumers who actively participate in a local energy system; see also [25,26]. They can be local energy cooperatives, local energy projects, consumer-owned district heating, or MUSH energy producers—in which MUSH stands for municipality, universities, schools, and hospitals.

Although cross-sector collaboration can foster positive results, they are not infallible. Bryson, Crosby and Stone highlight the possible misconception of collaboration as "the Holy Grail of solutions and always best" [19] (p. 45). Ansell and Gash add that manipulation of the collaboration process, lack of commitment and distrust are also risks in engaging in a collaborative process [17] (p. 561). Therefore, it is fundamental to evaluate whether collaboration fits the situation, to carefully plan and implement collaborative schemes, especially when dealing with very complex issues, and to ascertain the participation of all relevant stakeholders. These complex and multifaceted issues can benefit from the pooling of diverse perspectives to produce more adequate solutions.

As part of the AREA 21 project, the EID concept was developed rooted in these theories of collaborative governance. The following section outlines the aspects of the instrument and its implementation.

#### **4. Stakeholder Collaboration in Energy Planning: Experiences from the AREA 21 Project Cases**

The goal of the collaboration in the AREA 21 project pilots was the joint development of strategies and action plans tailored to the needs and challenges of specific urban districts. The main cornerstone of the project contributing to reach this objective was the Energy Improvement District (EID) concept. It constitutes a framework for the implementation of cross-sectoral cooperation surrounding district energy planning. The concept development was extensively informed by the experiences of the project pilots in seven different countries in the Baltic Sea Region and provides guidance for the planning, initiating and implementing of collaborative development of energy efficiency measures at the district scale and in diverse cities. Hence, its application aims to unlock energy efficiency potential in the existing building stock by addressing common challenges in the energy planning processes, such as the lack of resources (e.g., knowledge, personnel, financial) and awareness of energy usage, as well as to address the resistance to change and the lack of cooperation of key stakeholders.

The core features deployed in the implementation of the EID concept are: inclusivity, intermediate scale, interactivity, mutual benefit, and institutionalization. Here, concrete approaches and methods from the project pilots are presented, providing evidence for the importance of each feature in the

context of stakeholder engagement and collaboration processes for improved energy efficiency in the existing building stock.

#### 4.1. Inclusivity

One of the main objectives persistent in the seven EID pilots was the identification and inclusion of key stakeholders in the process of development of tailored strategies and action plans, i.e., the tangible results of the collaboration process in the AREA 21 project. Inclusivity in this regard is understood as direct and targeted involvement of diverse stakeholders in the energy sector, including public authorities, advocacy organizations, businesses and citizens. In the AREA 21 project, key stakeholders were actively approached by the EID initiators (i.e., project partners) through different engagement methods and with the final aim to collaboratively develop strategies and action plans. In this context, the stakeholder involvement process fostered (mutual) learning and increased awareness and acceptance of initiatives, contributing thus to better decisions. Moreover, as no threshold for participation was applied in the AREA 21 cooperation formats, the overall process ensured increased accessibility and transparency for the local stakeholders. Taking part in the co-development of strategies and actions is a democratic instrument that contributed to a strong commitment to the EID.

For instance, the overall goals in the Hamburg EID are aligned with the climate protection and action plan of the District of Hamburg-Wandsbek. To communicate this and to establish a good cooperation with the key stakeholders of the selected area, the core team organized a kick-off meeting introducing the project, the overall energy improvement goals and the expectations for the coming years. The Hamburg EID targets an area with mostly housing cooperatives as main stakeholders. Accordingly, among others, these were engaged by the initiators and actively involved in the co-development of the strategy and action plan in further multilateral meetings and multi-stakeholder workshops.

In the case of the EID St. Petersburg, the area entails the Polytechnic University (SPbPU). Main stakeholders are students and staff of the university. The goal of the EID is to raise awareness regarding energy savings among the mentioned stakeholders and exchange energy inefficient infrastructure. While the planning of the exchange of technical infrastructure did not need much collaboration, raising awareness does. Here, 37 students from different institutes were involved in a competition (“EcoGen Cup”) for ideas on energy savings. The best ideas were implemented in the EID and thus there was a high interest in participation. In the competition, the three best rated ideas were: (1) The introduction of a rating system of incentives, (2) a competition for the most energy-efficient dormitory, and (3) social privileges for energy saving achievements. In addition, posters and information videos were produced together with students and distributed on the campus. As students at the Polytechnic are the coming generation of technicians and engineers, the importance of their awareness of energy efficiency concerns needs to be stressed here. In addition, the SPbPU is working to establish a long-term format for cooperation with students.

During the implementation of the AREA 21 project, inclusivity was mainly addressed through a series of targeted workshops with the local stakeholders from the public, private and civic sectors. The overall objectives of the workshops were to seek support and resources for the collaborative energy planning and to establish a long-lasting cooperation. In addition, pre-meetings were arranged with to identify key stakeholders and to introduce them to the broader framework and its objectives. Key stakeholders are actors that play a major role in the intended implementation of actions. They can vary in respect to the planned actions. In the AREA 21 project, four local workshops were carried out for each EID pilot during a period of two years with varying numbers of participants (regarding workshop and EID). The first workshop focused on identifying needs, interests and concerns of the stakeholders in order to set mutual improvement goals following the project tool “Guidelines for the Organization, Documentation and Evaluation of Local Workshops in EIDs” [27]. Subsequently, a second workshop targeted the collaborative development of tailored strategies for the EID pilots. In all the pilots, the strategy steered the development of a cooperative energy planning process within the urban districts, in addition to elaborating a clear vision and goals for the area. For instance, the strategy of the

EID in Tartu (Estonia) builds upon the vision statement: “conscious citizens will be living in buildings refurbished to meet 21st century requirements and needs” [28] (p. 12). The formulated goals in Tartu are: (1) Decrease energy consumption by at least 20% by 2025, (2) increase the usage of renewable energy by 10% by 2025, (3) improve indoor climate in dwellings, (4) activate citizens and increase their awareness in urban energy, (5) accomplish entire district renovated by 2025 [28] (p. 13).

Further, a third workshop was carried out to determine the action plans. The action plan was allocated responsibilities, resources and set a timeframe for the implementation of the actions. Therefore, this tool represents a roadmap with concrete activities needed to achieve the pre-defined goals and specific objectives of the EID. In its implementation in AREA 21, this workshop was in some cases of little interest for several stakeholders as topics were rather technical. Nevertheless, the active participation of multiple stakeholders is especially relevant here: the more stakeholders who take part and can effectively participate in the development of the action plan, the higher the long-term commitment and support for the actions. Finally, a fourth workshop addressed the issue of local policy-making. Here the target group was different from the previous workshops: decision-makers and politicians. They were invited to learn about the EID concept and experiences from the collaboration, as well as the strategy and action plan and their development process. Beyond learning purposes, the inclusion of this stakeholder group aimed at actively discussing the current regulatory barriers and how to address them in order to improve the energy-planning framework at local, regional and national levels.

#### 4.2. Intermediate Scale

From a governance perspective, the complexity of management and coordination increases with the size of an area. Thus, defining the ‘best size’ for collaborative energy planning is certainly not an easy task. While energy improvement measures for a single building may be restricted by financial or technical feasibility, the large scale of a city or region makes the governance and coordination of the collaboration process complex and more difficult. Collaboration at the district level appears to be an appropriate scale to reduce complexity but be able to use synergies that only appear in a bigger context (e.g., technical: energy infrastructure, de-centralized combined power production; financial: pooling of measures and procurement). The AREA 21 project addressed the district as an intermediate territorial scale, ranging from neighborhoods to urban quarters and not necessarily equal with administrative districts, which can have a much bigger size. Hence, the EID concept focuses on a relatively manageable urban area.

However, the AREA 21 pilot areas were diverse in terms of size and functions. For instance, the EID Tampere consists of a mixed-use with residential areas, schools and other public functions, and industrial use. It is around three km<sup>2</sup> and has about 8000 residents. The EID collaboration included diverse stakeholders like building owners, local SMEs, local authorities, and the local energy utilities. The EID in Kohtla-Järve has a size of around 1.66 km<sup>2</sup> and has 2525 inhabitants. It is a mixed function area including a cultural center and several schools. The building ownership is municipal and private. Mentioned above are also the university area of the Polytechnic St. Petersburg and the mostly residential area of the EID in Hamburg. The other project districts were the EID in Helsingborg—a hospital area, the EID in Lublin—a mixed-use area, and finally a mixed-use area in the EID in Tartu. These EID areas with different functions show clearly that the EID concept can be applied to various district-level-sized cases. Benefits of this size are the relatively easy identification of key stakeholders, a collaboration that focuses on a manageable amount of stakeholders and thus interests—including a communication with a limited number of actors. This facilitates the identification of synergies and collaboration among them as elaborated in Section 3 (e.g., [10] (p. 207), [16] (pp. 28–29), [17] (pp. 554–555), [19] (pp. 44, 47)). However, even at the level of intermediate scale challenges may arise. These are related, for instance, to a lack of political or economic importance, as the district may be too small or already too big to fund it.

### 4.3. Interactivity

Interactivity refers to the reciprocal awareness of and the ability to communicate between stakeholders. Interaction allows the communication of needs and visions and is a relevant factor for collaboration of different stakeholders. In AREA 21, collaboration was ensured through two main approaches: (1) the coordination group and/or initiating organizations, and (2) the workshop series. The initiating organization(s) set up the overall frame of the EID with its objectives and coordinated actions and the collaboration process. The coordinators were responsible for the inclusion of further key stakeholders and acted as facilitator. The workshop series had the objective to inform and include diverse stakeholders in order to raise awareness, engage in collaboration and co-develop strategies and action plans.

The interaction among stakeholders established an exchange platform and allowed for the empowerment of local stakeholders (e.g., tenants) in the AREA 21 pilots. In this context, concerned stakeholders are given a voice and the chance to contribute in the co-creation of a strategy and actions. Thus, they can actively engage and take ownership of the process and its results. This can result in better solutions, additional impulses for the process, reduced resistance towards the measures and increased awareness of energy issues. Especially the case in the EID St. Petersburg with its focus on awareness raising shows that stakeholders (teaching and technical staff, and students) not only learn but can also actively participate, for instance through energy saving campaigns and other incentives. They are given the chance to bring in their ideas and interact with other students and the university staff. In the EID in Lublin, the stakeholders were mainly from several public authorities, a kindergarten, a primary school, a military hospital, Lublin statistical office, the municipal real estate administration, housing co-operatives, cultural institutions, and a citizen foundation. This broad group with different ideas, needs and expertise discussed goals and how to achieve them. They managed to voice their concerns and expectations and develop a common understanding and strategy. Especially the citizen organizations and the smaller stakeholder groups could profit from the workshops as they contributed substantially to the development of the goals. Both examples show that diverse stakeholders were brought together in order to exchange and interact to the ends of a common goal. The pilot partners tried to include all stakeholders and activate them through direct invitation. Still, not every stakeholder was interested or available to join the process, a known limitation of collaboration processes and needs to be considered.

### 4.4. Mutual Benefit

Stakeholders can identify synergies combining e.g., renovations with installing energy supply measures of several units or even the complete EID. Furthermore, combining actions of different stakeholders can lead to cost reductions, increasing efficiency and unlocking cross-sector synergies if, for instance, the pooling of measures from several actors reduces costs per unit for procurement. Collaboration with further stakeholders opens the door for public funding schemes that require cooperation. Energy efficiency can be increased by building improvements (e.g., in EID pilots Tartu, Helsingborg, Hamburg, Kothla-Järve) or the exchange of inefficient appliances (e.g., EIDs Helsingborg, Tampere, St. Petersburg). In the case of the EID in Helsingborg, the public hospital cooperated with the local energy utility. The goal was to reduce the hospital's energy demand (heat and electric) by e.g., deep renovations, installation of energy efficient appliances and rooftop PV panels, as well as awareness raising. The production of energy and installation of energy efficient appliances reduce the overall demand of energy and help to flatten demand during peak hours. Surplus energy can be sold to the local energy utility, increasing economic gains for the hospital. Cost savings can be reinvested into health care, improving the overall situation for staff and patients. The energy utility benefits as well from more stable energy demand and long-term energy contracts. In addition, they are contributing to national goals on greenhouse gas (GHG) emissions reduction.

However, benefits go beyond economic aspects. In the case of the City of Tampere, these include technical (exchange of technical equipment and use of future oriented and energy efficient technology

and appliances) and societal (increasing living standards and stopping climate change) benefits. The city's goal is to be carbon neutral by 2030 [29]. To this end, energy efficient renovations, exchange of inefficient appliances and (oil-based) heating, the use of geothermal heat and the application of information and communication technology (ICT) tools were planned as measures in the EID to support the overall city's goal. The energy agency played a major role as an information and consultation actor. Together with the stakeholders of the EID in Tampere, synergies can be explored and unlock co-benefits of various actors. For instance, house owners receive guidance for energy efficiency measures and can significantly reduce energy costs and improve living conditions. They can use the ICT monitoring tools to further reduce their energy use.

#### 4.5. Institutionalization

The actions in the EID pilots are expected to have a long-term impact with regard to the energy efficiency improvements and the local collaboration processes in the energy and building sector. Hence, institutionalization in this regard is understood as the longevity of the environmental improvements resulting from the implementation of the measures in the buildings, as well as the establishment of a collaboration culture inspired by the implementation of the EID approach. The achievement of these desired long-term impacts should be steered by several actions, which take advantage of the political sustainability agenda to raise awareness, incentivize and motivate relevant local stakeholders in the building sector to engage in energy transition processes. First and foremost, the integration of the EID concept or equivalent approaches into the cities' and/or regions' (re)development plan or other instruments targeting resource efficiency and sustainability in broader terms can be of crucial importance for the local stakeholders. An integration of the approach into the policy of housing cooperatives or other business actors is such a case (e.g., the EID Helsingborg, where a private business partner drove the process). Beyond a regulatory and/or financial framework, it can motivate stakeholders to rely on collaboration and look for cross-sector synergies. As mentioned above, the last local workshop supported this ambition by raising awareness amongst policy makers. Even though the EID concept was successfully implemented in all pilots, it became clear that some policy makers are not familiar with the topic of energy efficiency and energy planning or it is not their top priority.

However, in the case of the EID in Tampere, the EID concept idea was picked up and is planned to be implemented in national policy. To support this, the local energy agency Ecofellows Ltd. received funding from the Ministry of Environment to create a national website and to help other municipalities to build a local cooperation network between authorities, SMEs and building owners.

For the Hamburg EID, the municipal partner connected the EID concept with the municipal "Integrated Climate Protection Strategy" [30]. In other EID pilots, the concept found interest but it struggled to find support for upscaling and replication purposes. In addition to the integration into existing policy frameworks, the active stakeholder collaboration modelled by the EID implementation can result in ownership and long-term commitment among participating stakeholders. This is a strong base for long-lasting cooperation and partnerships, which can lead to the replication of the EID model also in other urban areas. However, political support is crucial to make the EID model and its implementation successful in the city in the long-term, as well as to draw attention across city borders as political networks can function as connector, multiplier, and enabler. Institutionalization therefore is needed in order to spread the concept and initiate further EIDs.

## 5. Discussion and Conclusions

Reflecting on the role of stakeholder collaboration for energy transition at the local scale, this article offers insights into close collaboration of stakeholders targeting the co-development of strategies and action plans for energy efficiency and the potentials (mutual benefit) of synergies that can be unlocked through this cooperation. The limitation of the analysis is that planned actions from the pilots were not yet carried out.

Starting with a possible limitation, the results proposed and discussed in this article can be attributed to the scope of the AREA 21 project. As such, it concerns the collaboration framework, its features, approaches and methods, which in the project context refer only to the initiation, planning and implementation phase, and not to the execution of the energy efficiency measures. In other words, the stakeholders engaged in collaboration and developed strategies and action plans for the focus urban districts, but they did not put these in practice within the project timeframe. The measures will be executed shortly after the completion of the project. Hence, it can be discussed to which extent the AREA 21 collaboration results allow an assessment of the effectiveness of the collaboration process. On the other hand, the focus of the project and this article are not the measures, but the process that was followed in the various case studies in the implementation of the specific EID objectives. It focused on how diverse stakeholders could go beyond business as usual to promote tailor-made solutions centered on the need for effective energy planning. The cases examined allow specific conclusions to be drawn as they all applied the same instrument of collaborative energy planning, i.e., the EID.

Another consideration can be made with regard to the cooperation set-up and funding of the collaboration and the execution of measures. While the role of actors to steer and fund processes and measures in pure top-down or bottom-up approaches is clear, in a mixed top-down and bottom-up approach the roles are more complex. In this mixed approach, the initiator (mostly from public authority) steers and allocates funding, thus offering the frame and base of cooperation. However, all involved stakeholders have (if they are informed and interested to participate) access to discussions, ideation and decision-making process, as they are co-developing strategies and actions. The facilitation of the collaboration, even though not significantly costly, does require some financial, in-kind, and/or time resource commitment from participating stakeholders. Nevertheless, different sources can contribute to overcome this challenge e.g., public and/or private funding instruments [24] (pp. 64–66). In addition, it is important that stakeholders are actively engaged and can cooperate without the provision of financial contributions. This is especially important for tenants and stakeholders without a strong lobby.

Also, in regard to effective collaboration processes, it can be considered whether collaboration is a self-driven process. According to experiences from the AREA 21 cases, there are often differing ideas and emerging challenges that have to be solved in order to satisfy all stakeholders involved in the process. Bryson, Crosby and Stone confirm that collaboration is not an easy or infallible process and it needs to be treated accordingly [18]. The development of the EID instrument for collaboration in energy transition is a response to this risk, proposing a methodology for approaching this complex process in a suitable manner. However, districts vary as according to their political system, availability of funding, building stock, geography, governance context, etc.. Taking this into account, they should be carefully analyzed in order to define the best path to pursue the specific needs and opportunities for improvements.

We argue in this article that collaborative energy planning at the district level as implemented with the EID concept can be an effective method to increase cooperation on energy efficiency topics and support actions towards emission reduction in cities. Even though tested only in BSR countries this could also be applicable to other cities with a culture of multi-stakeholder collaboration. The experiences from the pilots realized within the AREA 21 project support the hypothesis of cross-sector collaborative energy planning and transition as a suitable instrument for increased energy efficiency in the existing building stock. The EID concept responded to context specific challenges and opportunities of each area. As the process targeted their interests and needs, in every EID pilot there were different stakeholders that were motivated to collaborate with each other and improve energy planning in their area. The pilot partners co-developed, together with their stakeholders, strategies and action plans and founded a basis for the execution of the planned measures. In most cases and in particular in Helsingborg and St. Petersburg, the collaboration with the stakeholders was the start for a long-term collaboration. The EID Tampere for instance achieved that the EID concept should be integrated in national urban redevelopment plans. The local non-for-profit energy agency will support building owners and

continue the information and counselling process. Except for the EIDs in Hamburg and Lublin, all the other five pilots will go into a project extension in which selected measures from the action plans will be implemented. In addition, the analyzed literature points out that such an approach has several potential benefits within and beyond the energy field. In summary, the case has underlined that integrated cross-sector collaboration fosters the sharing of knowledge and resources, resulting in transparent and well-informed decision-making [19,20,31].

As argued in Section 4, the central features of collaboration following the EID concept are inclusivity, intermediate scale, interactivity, mutual benefit, and institutionalization. Centered around the EID instrument, these features offer great potential for the participating stakeholders in the energy planning sector and for transition for the existing building stock. Beyond energy improvement measures, the benefits from this approach to energy planning can result in the direct and targeted involvement as well as empowerment of stakeholders (including tenants) in decision making processes (inclusivity and interactivity). Along with creating ownership in the process and its outcomes, mutual learning and knowledge gains can be seen as other benefits for the involved stakeholders. There can be also financial advantages (e.g., lower costs of actions due to pooling and use of synergies), local context problem solving and achievement of common goals, technical or societal advantages (e.g., better quality of housing) (mutual benefit). Even though the examined cases lack quantitative data regarding renovated buildings or numbers of saved energy and costs, they show that collaborative energy planning can lead to the establishment of common goals and agreed actions. This means that EID approach of collaborative energy planning works to the end that concrete strategies and action plans can be developed and agreed upon together with key stakeholders. These cases demonstrate that the collaborative model, applied on a mid-size scale and with attention to local needs, can offer positive results. In terms of size, this corresponds to Cajot et al. arguing that limiting the area of action provides a less complex scenario in terms of relevant stakeholders, while still having more impact than acting on the building scale only [23]. Experiences in the pilot projects not only supported this argument, but also added the flexibility of the term 'district' as beneficial to the methodology. This means the size and shape of the district is entirely dependent on the context, which eases the applicability of the model-instrument in various cases [25] (pp. 57–59).

However, we also learned two lessons regarding collaboration processes in energy transition. First, the employment of an EID coordinator acting as process facilitator is of particular importance for the process itself, as well as its outcomes. The coordinator can manage the complex process and supports the stakeholders, e.g., by organizing workshops, collecting and evaluating data and experiences or acquiring funds to ensure a smooth cooperation. It became clear that especially the initiation phase of the project was challenging and needed this dedicated support. Secondly, the extensive involvement of stakeholders underpins a sound concept development for the EID. This can be seen in all EID cases in their own forms. Examples are the cooperation between the stakeholders in the Helsingborg EID, the collaboration of diverse stakeholder groups in the EID Lublin, and the integration of students in the EID St. Petersburg etc.

Finally, the authors consider that further research should be done on the topic of energy planning and transition of the building stock at the district level to compare more cases beyond the ones presented here from the AREA 21 project. This should include countries with different planning cultures to experience the adaptation of the concept against varying cultural backgrounds (regarding e.g., public-private-cooperation, top down vs. bottom up-policy making, or centralization of municipal steering). This could help to explore additional patterns of cooperation approaches, and could provide a broader basis for assessing and improving the EID concept. Furthermore, the concrete contribution of the EID concept with regard to public innovation and transition theories should be examined in more depth, as the EID concept provides a flexible, process- and innovation-driven approach to the local energy transition.

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