Can Peer-to-Peer Learning Support Energy Transition in Cities and Regions?

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1 Introduction

Learning in and between cities has been discussed in the academic literature, and as Campbell (2009) defined it, learning is "the acquisition of knowledge, which is then tested, converted, stored for future use, and employed to make change". By exploring how cities learn, Campbell (2009, 2013) outlined a history of city-to-city contact and identified four broad types of learning: city clusters; cities engaging in one-on-one exchanges; proactive cities; and cities participating in network associations. As McFarlane (2011) observed, all this literature—and more—has one central claim: "that learning is a process of potential transformation". As Campbell (2009) argued, however, researchers pay less attention to the mechanisms and processes of learning. In aiming for more

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conceptual clarity, Devers-Kanoglu (2009) started by exploring individual learning, including underlying intentions, in municipal partnerships. Devers-Kanoglu (2009) observed that "learning benefits" have become "standard procedure" while "real learning" still "remains unnoticed". There is also less literature dealing with the outcomes of learning, needing what Devers-Kanoglu (2009) suggests as "empirical verification" for "built up expectations" regarding "possible learning benefits".

Among the different types of learning in and between cities, we will focus on peer-to-peer learning methods and explore their connection with energy transition. Learning is a key aspect in transitions research, and this can be operationalised—not just in terms of novel or accrued knowledge—but also in different ways (Kathleen 2014). Transitions research suggests that successful scaling up of energy technologies (or solutions in general), for example, requires prolonged periods of experimentation and learning—from a small-to-larger scale (Grubler 2012). In scaling up, interactive learning and institutional coordination can also facilitate the creation of the necessary conditions for successful diffusion. Via learning processes, energy actors can build on previous experiences and diffuse these at other locations. Learning can also be goal-oriented (or learning that helps to realise expectations) or contribute to goal-creation (learning that creates new expectations) (Byrne 2011 in Raven 2012). According to Raven (2012), the link between learning and (changes) in expectations is also underdeveloped.

Peer-to-peer learning has been defined in different ways and is used synonymously with other related concepts, such as, but not limited to, peer mentoring, peer tutoring, peer assessment, peer review, peer appraisal, and peer counselling (Topping 2005). Topping (2005) defined it as "the acquisition of knowledge and skill through helping and supporting among status equals and matched companions. It involves people from similar groupings who are not professional teachers helping each other to learn and learning themselves by doing". Andrews and Manning (2015), who reviewed peer-to-peer learning in public sector reform initiatives, defined peer-to-peer learning as learning that involves well-matched individuals, who exchange knowledge and experience with each other based on the values of trust and commitment, and circulate what they learned to their organisations to create an impact at scale.

While individuals are the direct learners in a peer-to-peer learning engagement, the question is how the lessons learned can be scaled up to other actors in organisations who may not have been directly involved

in the process. In other words, how can the "individual learning trap" be avoided? Andrews and Manning (2015) categorised these challenges in two ways: getting peers to share forward, ensuring that lessons learned go beyond individuals to the organisation, and ensuring that home organisations are open to learning from returning peers. In order to address these challenges, Andrews and Manning (2016) outlined mechanisms that should be in place to make sure that individual learning is scaled up to the organisational level. Individual peers, on the one hand, should reflect on their learning gains, be willing to share, and be able to share their learning back to their organisations. Organisations, on the other, should provide time and space for such learning to take place, be open to learning, and be willing to invest in learning from returning peers.

Bontenbal (2009) viewed peer-to-peer (also called colleague-to-colleague or practitioner-to-practitioner) approach as a means of transferring knowledge and skills that is distinctive in city-to-city partnerships. Peer-to-peer learning provides opportunities for mutual learning between "likeminded people of similar professional backgrounds" (Johnson and Wilson 2009). Bontenbal (2009) further explains that this approach "stresses the values of equity and mutuality in municipal cooperation and the fact that professional colleagues from both cities speak the same technical language". Moreover, qualities of peer-to-peer approach such as professional equivalence, parity of status, trust, and knowledge sharing can overcome inequality, as observed in traditional donor–recipient relationships in international city-to-city cooperation (Johnson and Wilson 2006). Andrews and Manning (2016), furthermore, recognised the potential of peer-to-peer learning approaches in facilitating the transfer of tacit knowledge "about the softer dimensions of change (like managing politics, inspiring teams, or building coalitions) between individuals – and beyond".

In urban areas, significant opportunities are available for facilitating energy transition, and many local governments are implementing initiatives in sectors such as buildings, lighting, and transport. Although there are political and economic incentives for undertaking such actions, many cities and regions face financial and technical barriers, such as insufficient financial resources and lack of skills and experience. Public authorities, however, can also tap into new financing mechanisms and funding sources to complement their own financial resources or public funding from national or regional budgets. Cities and regions can also learn the

most from other cities—their peers, which have successfully implemented similar projects and are recognised for their "best practices".

So how can peer-to-peer learning support energy transition? Our chapter is situated within the framework of PROSPECT: Peer Powered Cities and Regions, a European Commission—Horizon 2020 funded project. We will focus on peer-to-peer learning, which we define as the sharing of knowledge, skills, competencies, and experience among matched peers from local and regional authorities, learning with and from each other about financing and implementing sustainable energy and climate action projects through innovative schemes.

By innovative financing schemes, we refer to non-traditional ways of raising funds and facilitating sustainable energy and climate investments that have been applied by European cities. They may do so by mixing different sources (their own fund, public and private funds) or engaging different partners (citizens, private sector), aside from established financial institutions (banks). The main target participants for the learning programme are individuals from local and regional public authorities—and public entities who represent them on their behalf—in the European Union (EU). These local and regional public authorities may have developed or are developing their Sustainable Energy Action Plans (SEAPs), Sustainable Energy and Climate Action Plans (SECAPs), Sustainable Urban Mobility Plans (SUMPs), or any other long-term energy strategy or climate action plan. They should be either willing to share or wanting to learn from the topic of financing and/or implementing these projects. At the end of the project, we expect 150 participating local and regional public authorities, evidence of diffusion of learning within and outside the participating organisations, and new applications of innovative financing schemes in sustainable energy and climate actions.

With this chapter, we aim to answer the following research questions: (1) How can a peer-to-peer learning programme be developed? (2) What can we learn from a pilot implementation of the peer-to-peer learning programme? (3) What are the learning outcomes for the pilot implementation participants? And (4) What are the factors that may influence learning? In this chapter, we present the development of a peer-to-peer learning methodology, highlight the lessons learned from its pilot implementation for the eventual roll-out and implementation, describe the pilot

participants' learning outcomes, and examine the factors that may influence learning. In the next sections, we will present the theoretical background, the research methodology, the results and discussions, and, lastly, our conclusions.

2   THEORETICAL BACKGROUND

2.1   *Development and Implementation of Peer-to-Peer Learning*

Various authors have developed frameworks for planning and implementing peer-to-peer learning. Topping (2005) identified thirteen organisational dimensions, from context and objectives to participants; materials and training to process monitoring, assessment, evaluation, and feedback. Ross and Cameron (2009) prepared a set of questions that include background and aims; mentors, mentees, and their interaction; and aspects of evaluation, institution, and realisation. With the advent of information technology, peer-to-peer learning that combines face-to-face and virtual environments has also been discussed by authors, such as for creating groups, structuring learning activities, and facilitating group interactions; for assessing transferable skills; for managing peer-to-peer learning by a coordinator or facilitator; and for receiving regular feedback among participants (various authors in Topping 2005).

Recently, Andrews and Manning (2015) identified three requirements: context analysis as a prerequisite, careful design of peer learning programmes, and need for changes to be documented at the organisational level. Andrews and Manning (2016) also suggested principles for peer-to-peer learning. First, objectives should be clear and peer engagements should be structured to maximise the objectives. Second, peers must be matched appropriately and authorised to engage effectively. Third, peers should engage with each other over a medium- to long-term period and in multiple ways, from shared work to site visits. Fourth, learning gains of individual peers should be communicated back to their organisations to ensure support for the learning process. Fifth, facilitators must simplify the process of peer engagement to reduce administrative demands and costs. Each sharing experience or programme, lastly, should involve assessment for more successful future replication. Andrews and Manning (2015) also outlined the steps in the development of a peer-to-peer learning programme (Table 1).

Table 1 Process map for peer-to-peer learning (Andrews and Manning 2016/)

Step	Description
1	A pre-foundational engagement where consideration is given to basic questions about peer engagement
2	A foundational engagement
3	A period in which peer engagement is sustained over time (to build trust and sharing)
4	Structured engagements to actually foster relevant learning outcomes in individuals
5	A period in which learning is diffused from individuals to organisations to foster impact at scale

Topping (2005) considered peer-to-peer learning the most cost-effective of learning strategies, and there have been studies that observed high effect size at low delivery cost. However, there are also reports showing that peer-to-peer learning programmes did not yield significant effects (Topping 2005). Topping and Ehly (2001) recognised that, for peer-to-peer learning to be effective, five influential groups of processes are required: organisation and engagement, cognitive conflict, scaffolding and error management, communication, and affect. According to Topping (2005), simple peer tutoring utilises only a few of these subprocesses while more elaborate forms utilise all possible channels. Other forms of peer learning have also emerged, and the implementation quality of some of these peer learning methods is valuable. Some of these methods, however, have been widely adopted without being properly evaluated (Topping 2005).

2.2   Evaluation of Peer-to-Peer Learning Outcomes

Peer-to-peer learning via "energy walks" or Open Homes has been used as an intervention to spur residential energy solutions in Finland (Heiskanen et al. 2017). Open Homes allowed homeowners to learn about efficient and renewable energy systems. "The experiences suggest that real-life, situated examples and the stories of the local people who carried out those projects offer opportunities for identification, modelling, and the normalisation of new solutions". While monitoring and evaluation of learning outcomes can be complicated (Berry et al. 2015 in Heiskanen et al. 2017), the researchers attempted to answer these questions: (1)

"What kind of learning outcomes occur at the level of individuals, networks, and institutions?" and (2) "What potential for self-sustaining does the intervention have?"

Heiskanen et al. (2017) adopted three learning outcome levels (individual, network, and institutions) from Rodela (2011) on social learning and natural resource management. Individual learning in the peer-to-peer learning intervention by Heiskanen et al. (2017) was evident in concrete experience of renewable energy solutions as a real-life option; identification of oneself in relation to the people owning the systems; and in gaining practical information for investments. In terms of network-centric learning, these were stimulating discussion in the community; empowering people to participate in discussions; and expanding everyday conversations to include renewable energy. If we analyse the results of the intervention on learning at the institutional level, there has been one successful embedding of Open Homes in one locality, while two were not self-sustained but did spread in other places.

Recently, a qualitative review of learning concepts for social-ecological change identified five learning outcomes: cognitive change, relational change, skill development, action orientation, and wider capacities; it also described three manifestations at the higher level: management change, policy and institutional change, and environmental effects (Suškevičs et al. 2017). Among individual learners, learning outcomes relate to cognitive, relational, and skill-related changes, and these, according to Kristjanson et al. (2013) in Suškevičs et al. (2017) "may, or may not, induce concerted action". When establishing causal links between learning processes and their outcomes, however, an attribution problem may arise due to characteristics of the learning process, such as its length, iterative nature, and contextual factors that affect outcomes but are not directly related to learning (Plummer and Armitage 2007 in Suškevičs et al. 2017) (Table 2).

To illustrate this, there may be an iterative loop between cognitive and action-oriented change. Direct interventions, for example, may facilitate policy or institutional change and support the building of wider capacities (Suškevičs et al. 2017). In at least one study reviewed (Boyd et al. 2014) by Suškevičs et al. (2017), however, transformational change did not occur. "It seems that many of these examples are evidence of incremental outcomes (as in Adger and Jordan, 2009) rather than of transformational social and political outcomes (as in Pelling, 2010)" (Boyd et al. 2014 in Suškevičs et al. 2017). Suškevičs et al. (2017) also recommended examining non-outcomes or negative outcomes, that is, instances of expected

Table 2 Learning outcomes and manifestations and their definitions (Suškevičs et al. 2017)

Learning outcomes	Definition
Cognitive change	Acquisition of knowledge by individuals and groups; creation of shared knowledge
Relational change	Changes in individuals' feelings towards each other, and attitudes towards specific topics
Skill development	Changes in relational abilities for conflict resolution and technical abilities such as specific expertise
Action-orientation	Changes in networks such as stakeholder alliances, formed with the intention to influence decision-making
Wider capacities	Changes in wider social capacities beyond specific initiatives: these may also have tangible outcomes in other policy arenas
Learning manifestations	
Management change	Changes in the operational decision aiming to achieve specific goals, i.e. changes in practices, what is done in a given situation
Policy and institutional change	Policy change—achieved agreements, such as management plans and other documents concerning future actions. Institutional change—changes in formal rules (such as legislation) but also in informal institutions, such as social norms
Environmental effects	Changes in environmental conditions, such as habitat, water, or air quality

results not being achieved, which could reveal impediments to learning success. Indirectly, examining these can also reveal trends on—implicit and explicit—expectations about learning outcomes and their wider implications.

3   METHODOLOGY

Utilising an exploratory mixed research methodology, we here discuss the main phases involved in (1) development and pilot implementation and (2) evaluation of the learning outcomes.

3.1   *Development and Pilot Implementation*

After an extensive academic literature search on peer-to-peer learning between and among cities, PROSPECT developed a learning programme in its first phase. As multiple projects involve a variety of peer-to-peer learning approaches and methods, we also examined practitioner reports, manuals, and toolkits. All lessons learned and all recommendations were helpful in mitigating process-related risks and enhancing learning outcomes. The PROSPECT learning programme particularly followed the learning process map by Andrews and Manning (2016). Although there were many methodologies, PROSPECT only focused on two of these: peer mentoring and study visits. Project partners and external experts reviewed the structure and plan for these methodologies.

Peer mentoring is a one-to-one relationship characterised by "positive role modelling, promotion of raised aspirations, positive reinforcement, open ended counselling, and joint problem solving" (Topping 2005). Peer mentoring, as the name implies, involves a matched pair, or a learning process between two public authorities. A study visit, on the other hand, involves a group composed of up to eight peers. The main differences between peer mentoring and study visit are the number of learning participants (two versus eight) and the scope of learning (in-depth versus introductory). Both methodologies have the same number of structured learning engagements.

A facilitator provides guidance and direction to the participants during the entire learning process. A facilitator establishes the purpose of the learning programme in an orientation session and introduces the participants to each other; supports the development of the learning plan and guides online peer learning activities; monitors discussions and activities, including online engagements; collects feedback on the peer learning process and facilitates a transferability analysis. The learning facilitator also ensures that all peers adhere to specified administrative, financial, and practical guidelines (Table 3).

In both of these methodologies, there is an "experienced peer", who is an individual representing a local or regional authority with direct experience or specific expertise in financing sustainable energy and climate action through an innovative scheme and is willing to share insights with another peer. The latter should also be an individual representing a local or regional authority wishing to learn from an experienced peer on financing a sustainable energy project using an innovative scheme and interested

Table 3 Features of the peer learning methodologies

Name of learning methodology

No.	Features	Peer mentoring	Study visit
1	Scope of learning	In-depth	Introductory
2	Number of peer participants	2	3–8
3	Number of experienced peer	1	1
4	Number of learning peer(s)	1	2–7
5	Number of physical meetings	1	1
6	Host organisation of physical meeting	Experienced peer	Experienced peer
7	Number of days for physical meeting	2 days plus one day of travel (back and forth)	2 days plus one day of travel (back and forth)
8	Number of online meetings	3	3
9	Number of hours for each online engagement	1–4 hours	1–4 hours
10	Is the facilitator present in the physical meeting and online engagements?	Yes	Yes
11	Steps for the peer learning programme	Step 1: Getting started; Step 2: Working together; Step 3: Meeting up; Step 4: Moving forward	Step 1: Getting started; Step 2: Working together; Step 3: Meeting up; Step 4: Moving forward
12	Length of learning period	nine months (maximum)	nine months (maximum)

in applying lessons learned in their own context. These "learning peers" learn from the experienced peer how the authority has implemented its sustainable energy or climate action project using an innovative financing scheme, and they receive insights and recommendations directly from the "experienced peer".

In the pilot implementation, the project carried out a matchmaking analysis, assignment of roles, and an identification of objectives by assessing the application forms and project consultations. A pilot group was then set up from PROSPECT's three city and regional project partners. These were the OÖ Energiesparverband (ESV) from Linz, Austria; the

Regional Energy Agency for Barreiro, Moita, Montijo, and Alcochete in Portugal (S. Energia); and Mesto Trnava (City of Trnava), Slovakia. Each of these partners had two representatives. One representative from Energy Cities, the European association of local authorities in energy transition, served as the facilitator. PROSPECT recognised the ESV, the central institution in the field of sustainable energy in the region of Upper Austria (Oberösterreich), as the "experienced peer". The ESV is an expert in implementing energy performance contracting (EPC) for public buildings and public lighting along with other innovative schemes, such as third party financing, and soft loans for homeowners of residential buildings.

The "learning peers", then, were the city of Trnava in Slovakia and S. Energia from Portugal. The city of Trnava aimed to reduce the energy consumption in its public buildings, mainly schools and kindergartens, as well as to decrease the annual costs of streetlighting by fifty per cent. Trnava was working on two projects in the sectors of public buildings and public lighting and was interested to learn about EPC. S. Energia, on the other hand, is the regional agency representing the municipalities of Barreiro, Moita, Montijo, and Alcochete in Portugal. S. Energia aimed to implement energy efficiency in public lighting and was interested to learn about EPC as a financing scheme. The pilot learning focus, then, centred on EPC as an innovative financing scheme for the public lighting and public buildings sectors.

As the number of individual peers and participating public authorities exceeded two, a study visit was chosen as the learning methodology. The learning objective was to increase internal know-how on EPC for public lighting, especially street lighting, and public buildings. EPC is a contractual arrangement between a client (e.g. a municipality) and a provider of an energy efficiency improvement measure, a so-called "Energy Service Company" (ESCO). What makes EPC innovative is that the ESCO finances and implements energy efficiency investments, the ESCO guarantees the energy savings and the annual energy savings are used to cover the investment and capital costs. After the end of the contract the client benefits from the energy and cost savings. An overview of the study visit methodology, including its steps and features, was provided to all peer participants. The study visit had four steps: (1) Getting Started, (2) Working Together, (3) Meeting Up, and (4) Moving Forward (Table 4).

Table 4 Overview of the study visit methodology, steps, and features

No.	Features	Preparatory steps	Step 1: Getting started	Step 2: Working together	Step 3: Meeting up	Step 4: Moving forward
1	Approach	Online	Online	Online	Physical	Online
2	Activities	Communication with the participants	Orientation Session	Learning plan development, online peer learning	Study visit activities	Evaluation and feedback
	Inputs	Benchmarking survey	Learning experiences, learning needs			Transferability assessment
	Outputs			Learning plan		Learning programme report
3	Lead participant	Facilitator	Facilitator	Experienced and learning peers	Experienced peer	Facilitator
4	Host Organisation	–	–	–	Experienced peer	–
5	Is facilitator present?	Yes	Yes	Yes	Yes	Yes
6	Tool(s)	Online communication tools (Email, Webinars)	Online communication tools (Email, Webinars)	Online communication tools (Email, Webinars)	Presentations, workshops, excursions, etc.	Online communication tools (Email, Webinars)
7	Number of hours/days	Flexible	1–4 hours	1–4 hours	2 days plus 1 day of travel (back and forth)	1–4 hours
8	Indicative timeline	1–4 weeks before	Month 1	Month 2–3	Month 4–6	Month 7–9

3.2 *Evaluation of the Learning Outcomes*

Data were collected using the materials for the learning programme, such as application forms, documents detailing learning experiences, learning needs, and learning plans, and the evaluation survey results. Participant observation was also used as the researchers participated in the online meetings of the pilot programme. As the researchers were not present at the two-day physical meeting, they used feedback from the participants via email and online correspondence. After the pilot learning programme had terminated, the participants reported their feedback to the researchers. To assess the learning outcomes, online interviews were also carried out after one year. The results were analysed using content analysis, which particularly applied to the pilot participants' assessment of the learning outcomes (Table 5).

4 Results and Discussions

4.1 *Developing and Implementing a Peer-to-Peer Learning Programme*

Between February and April 2018, all peers participated in all four steps of the learning programme, as follows:

4.1.1 *Step 1: Getting Started (Online)*
Led by the facilitator, this step served as a formal orientation to the learning programme, to introduce the peers to each other, to clarify roles and responsibilities, and to provide further instructions to the participants. During this step, the participants also completed a benchmarking survey, aiming to explore their capacity to finance and implement sustainable energy and climate action projects. At the end of Step 1, the ESV, the "experienced peer", completed a document on "Learning Experiences" and provided additional documentation and other materials to show their experience with the topic, for the benefit of the other participants. S. Energia and Trnava, the "learning peers", also completed a document on "Learning Needs" and provided documentation and other materials showing what they were working on and what advice they were specifically looking for.

Table 5 Indicators for the learning outcomes (as adapted from various authors in Suškevičs et al. 2017)

Learning outcomes	Indicators
Cognitive change	Acquisition and/or co-creation of knowledge, enhanced problem comprehension
Relational change	Attitudinal change towards stakeholders/actors, such as gaining a better understanding of their interests and viewpoints and acquiring a more critical understanding of one's own role; actual changes in relationships, such as trust-building, facilitated conflict resolution, and changes in power relations
Skill development	Relational or social skills, such as communicative or leading participatory processes, or task-oriented skills, such as problem-solving or technical expertise
Action-orientation	Changes in actor networks, such as new connections among stakeholder networks, informal shadow network developed, direct focus on action
Wider capacities	Enhanced capacities beyond the scope of the intervention; capacities spanning across different time scales as well as governance or social organisation
Learning manifestations	
Management change	Changes in management practices, such as operational decisions, Direct physical interventions, innovative sustainability practices
Policy and institutional change	Changes in the general policy discourse, such as revising or implementing new policies or reaching new agreements, changes in existing institutions, creating new institutions or organisations
Environmental effects	Improvements in the environment, such as increased energy savings, reductions in greenhouse gas emissions

4.1.2   Step 2: Working Together (Online)

Before Step 2, all participants established a better understanding of each other's context. With the facilitator leading the process, the peers then defined a learning plan with clear goals, topics, and activities allowing them to support each other. In this step, the ESV highlighted the importance of being explicit about learning needs, particularly about the problems S. Energia and Trnava were facing in their local contexts. The learning plan then outlined the next steps on how the participants could jointly

work together. This plan consisted of action steps, available support, time frame, resources needed, and evidence of success. It also included setting the date for the next step: the only physical meeting.

4.1.3 Step 3: Meeting Up (Physical)

In this step, the ESV was in charge of developing the agenda, while the other peers provided feedback. The facilitator ensured that all participants made the necessary preparations and that the planned activities supported achieving the learning objectives. The physical visit took two days, in which representatives from S. Energia and Trnava visited the ESV. The ESV served as the host organisation and prepared relevant activities, such as presentations, discussions, and excursions, including the participation of relevant stakeholders. As this was a study visit, its objective was to introduce the topic in a more practical way by bringing the peers to actual project locations and having them engage with other stakeholders, experts, clients, etc. The costs for conducting the physical meeting were covered by the project.

In this step, the ESV showed their key programmes and initiatives on sustainable energy in Upper Austria. It formally introduced EPC by providing an overview of energy requirements and standards for public buildings, the key results of lighting projects and refurbishment of public buildings, lessons learnt on EPC in the regional government, and a step-by-step process for developing EPC projects. Time was also allotted to discussions. The second day was dedicated to excursions to different EPC projects in public lighting and public buildings. A budget of 600 euros per person was allocated for travel and accommodation by the peers travelling to Linz, Austria, where the ESV is based. The ESV had received budget for local transport, materials, and food for hosting the participants. For a two-day activity, the costs, depending on local prices, range from 500 to 1000 euros.

4.1.4 Step 4: Moving Forward (Online)

In this step, the participants evaluated the implementation of the learning plan with the facilitator leading the process. For more successful future replication, as suggested by Andrews and Manning (2015, 2016), each programme should end with assessment. Therefore, a session was also held to enable S. Energia and Trnava to assess nine conditions or factors that would allow them to implement, in their own local contexts, what they had learned. These conditions for success are the following:

staff time, implementation time, governance-related issues, technical conditions, financial framework, legislative or regulatory framework, communication factors, level of pre-financing, and other factors specific to the project. Both S. Energia and Trnava were asked to identify what overall conditions needed to be improved to implement a similar project, the key steps that would be necessary, and a feasible timeline for these steps to be implemented in order to increase the project's transferability potential. The participants were asked to write all these down to document required changes at the organisational level. The learning programme report also showed how the participants disseminated the results of their learning programme to their own organisations.

4.2   *Evaluating the Pilot Participants' Learning Outcomes*

"Learning is about asking – it is key for the learning peers to ask questions and actively participate in order to get the information they need", an experienced peer from the ESV said. Based on the learning outcomes from Suškevičs et al. (2017), cognitive change, relational change, and skill development were evident in the short term. As the pilot learning programme ended in April 2018, medium- and long-term learning outcomes were also assessed after a year. These included action orientation, such as changes in actor networks, a developed informal shadow network, and direct focus on action, and wider capacities, such as enhanced capacities beyond the scope of the learning intervention. They also touched on management, leading to changes in management practices, direct physical interventions, and innovative sustainability practices; policy and institutional changes, such as changes in the general policy discourse and changes in existing institutions and new institutions. Finally, they concerned environmental effects, such as improvements in the environment.

4.2.1   *Learning Outcome 1: Cognitive Change*
Based on content analysis, there was evidence of cognitive change, such as the participants' acquisition and co-creation of knowledge and enhanced comprehension of a problem domain (Suškevičs et al. 2017). S. Energia, for example, realised that EPC is a contractual arrangement between local governments/company (client) and a service provider (the ESCO company), and that it was also possible to use mixed financing, such as subsidies and direct investments. With this model, S. Energia realised they

could finance different kinds of projects on energy efficiency and renewable systems. The practical examples shown in the study visit, moreover, had demonstrated to S. Energia that the projects using EPC models had had positive results in terms of energy savings and contract management.

As for M. Trnava, the participants said: "[We are] more careful when considering EPC projects financed by an ESCO, as other types of financing could be more relevant, especially for smaller projects. It could be useful, but it has to be set up wisely". M. Trnava added that they now had a better idea of how to set up an EPC contract, what criteria and conditions for street lighting projects needed to be considered, and how different projects with different levels of financial profitability could be bundled. The participants from M. Trnava were also inspired by the mission and the work of local and regional energy agencies, which are not very common in Slovakia but could bring benefits to cities and citizens alike.

Both S. Energia and M. Trnava also analysed the key strengths and weaknesses of the scheme, developed their own ideas on how they could implement these in their own contexts, and offered opinions on how this scheme could be further improved. To M. Trnava, it seemed better to create a pooling of several buildings in one EPC to be able to achieve savings. S. Energia, on the other hand, recommend new short-term investments after the EPC model ended. M. Trnava thought that they could adjust the basic steps to suit their needs.

4.2.2   Learning Outcome 2: Relational Change

Evidence of attitudinal change towards stakeholders/actors was manifested by both the S. Energia and M. Trnava participants. S. Energia participants were inspired by the ESV, which is recognised by local governments and the private sector in Austria as a regional "EPC facilitator", increasing their trust in EPC. They would consider how social organisations and citizens' initiatives could be supported in their buildings retrofits via EPC contracts. The most surprising for them was the fact that small EPC projects were feasible and that several funding sources could be blended with ESCO financing. M. Trnava likewise recognised the importance of trust in the EPC model and in ESCO companies.

4.2.3   Learning Outcome 3: Skill Development

Skill development can refer to enhanced relational (social) or task-oriented skills. Through the pilot programme, S. Energia analysed the

technical and economic feasibility of EPC investments for street lighting refurbishment. Two Portuguese municipalities, namely Barreiro and Moita, requested S. Energia to analyse the technical and economic feasibility of such investments. After the pilot programme, S. Energia used technical information from the learning programme to initiate discussions with a Portuguese ESCO company.

4.2.4   *Learning Outcome 4: Action Orientation*
According to Reed et al. (2014) in Suškevičs et al. (2017), learning leads to concerted action if knowledge is co-created, if trust is built, and if changes in practices and their underlying norms take place. Here, we will illustrate the actions to be undertaken by the participants, when these were carried out, and how these were evaluated as outlined in the participants' action plans. Both S. Energia and M. Trnava wanted to focus on the following four conditions for improvement: staff time, implementation time, legislative/regulatory framework, and communication factors. According to Suškevičs et al. (2017), based on their systematic review, the links between learning and action are unclear and under-reported. As researchers, therefore, we were interested to know whether the actions had materialised or not.

The preparatory activities for kick-starting a similar project took longer than anticipated for M. Trnava. According to the participants, the existing energy audits provided insufficient data for making a package of saving measures on a defined group of buildings, and, therefore, M. Trnava had to await updated energy audits. There were political issues as well. The plan to refurbish and modernise street lighting, for example, was blocked by the city council last year, and no decision had been taken this year yet, although the necessary document had been completed by M. Trnava in March. As such, there were currently no relevant projects that could be used to test the EPC scheme. Furthermore, the legislative process also took longer than expected. Participants from M. Trnava expected some projects to happen in the second half of the year at best—or in the next year.

Action 1: Staff Time
For staff time, S. Energia specified that they wanted to have a local government technician dedicated to EPC and share knowledge in the EPC model and get the support from other S.ENERGIA staff in the process of EPC facilitation for a period of six months from March 2018. Indicators

for evaluating were (1) the allocation of one person or more from the local government for the development of the project and (2) engagement with S. Energia staff. The city of Trnava planned to request an increase in staff resources from the city budget. As such a request needs to be approved by the city council, the participants would make sure that their department director spoke to the council about the importance of allocating one more staff member to developing the project.

A year after the learning programme, the participants from S. Energia had taken on the role of dedicated staff on the topic of EPC. After the learning programme, both participants had meetings with the four local governments under their energy agency, and they explained the advantages and disadvantages of the EPC model. As a result, two of the four local governments (Barreiro and Moita) adopted EPC as a financing scheme for their public lighting projects. As such, EPC has been replicated in other contexts.

Action 2: Implementation Time

As for implementation time, S. Energia wanted to follow the key EPC steps of eighteen to twenty-four months from March 2018. This was to be evaluated if they accomplished each key step for the EPC implementation. After cooperating with the local governments, S. Energia facilitated the launch of EPC in two municipalities. The Barreiro government launched the tender for the EPC contract for municipal street lighting refurbishment in August 2018. The local government selected the ESCO company that was to carry out the implementation, and the public lighting will be replaced by LED in July 2019. The Moita government prepared the process for the EPC contract for municipal street lighting refurbishment, launched the tender in April 2019, and are currently waiting for proposals from ESCO companies. They will then select the company that will implement the project.

Action 3: Legislative/Regulatory Framework

Six months after March 2018, S. Energia aimed to provide the local governments with more support in procurement, technical, contractual, and financing issues for the EPC model. A key point to be monitored was a detailed analysis of the legislative/regulatory framework related to the EPC model in Portugal. After the learning programme, S. Energia worked closely with local government technicians (with the support of deputy mayors and departmental heads) in preparing the EPC tender

specifications in relation to the legislative/regulatory framework of Portugal.

Action 4: Communication Factors

Under communication factors, finally, a practical step to be taken was the improvement of trust in the EPC model and ESCO companies through a facilitation process, which the participants wanted to undertake six months from March 2018. According to S. Energia, it was necessary for the existing cases in Portugal to be better known so they could learn from other cities' experiences under the same conditions.

S. Energia reached out to the local governments under their energy agency, and also disseminated information about EPC to wider audiences, including other local governments, through public events. Similar projects were also developed by other actors, such as social institutes for lighting industrial parks and other non-municipal infrastructures. According to S. Energia, the local governments now had a better understanding of EPC, and the performance of these public lighting schemes would also be communicated to the public at large. This could be verified, for example, through technical equipment measuring levels of illumination and energy consumption.

4.2.5   On Other Learning Outcomes

So far we have not analysed learning outcomes such as management change, policy and institutional change, and environmental effects. The researchers focused on evaluating whether short-term and medium-term learning outcomes had been realised or not. As direct interventions may facilitate policy or institutional change, the researchers will further look into this aspect. Environmental outcomes are also regarded as the final goal of learning-based approaches (various authors in Suškevičs et al. 2017). Due to time constraints, we have not attempted to analyse environmental outcomes in relation to learning and are currently looking for experimental evidence. As it is also necessary to report non-outcomes or negative outcomes, finally, we asked the participants in the survey: "Did you meet your learning objectives?" All participants answered that most of their learning objectives had been met.

5   Conclusions

This chapter illustrates the mechanism, process, and outcomes of learning through a peer-to-peer learning method, specifically through a study visit methodology. By presenting the mechanism and the learning process, we undertook to answer the question how cities learn and how the peer-to-peer learning method has contributed. In developing and implementing the learning programme, we highlighted the lessons learned and examined the more specific factors that may have influenced learning and their relevance (Table 6).

5.1   Importance of Intermediate Organisations and Leading Facilitators

In the pilot programme, six representatives from three city and regional authorities participated in the learning programme supported by one facilitator from another organisation. This set-up would not have been possible without an intermediate organisation that can lead the assessment

Table 6 Factors affecting learning and their relevance

Factors affecting learning	Is it relevant or not?
Structure of the network	
Participation of formal and informal organisations and the formality or informality of the network	Yes
Consensus-based decision-making	No
Size/number of actors	Yes
Density	No
Centralisation	No
Intermediate organisations	Yes
Centrality	No
Role of leading person or organisation	Yes
Similarity	Yes
Strong or weak ties	Yes
Characteristics of participants in the network	
Safety	Yes
Willingness to share knowledge	Yes
Transaction costs	Yes
Fairness	Yes
Characteristic of the issue at stake	
Clarity of the issue at stake	Yes

of needs and match peers from different formal organisations with similar backgrounds, such as local and regional public authorities in the EU interested in a specific topic (i.e., innovative financing) in a specific field (i.e., SECAPs). It may not be feasible, furthermore, to carry out the learning programme without a leading person or facilitator, as this role entails providing overall guidance and support after the matchmaking is over and the learning process begins. As the name implies, a facilitator should be able to create and manage effective processes that enable the participants to achieve their objectives and achieve the expected learning outputs and outcomes. As the main point of contact, the facilitator supports the interaction between and among the different participants.

5.2   *Setting Up Pre-foundational Engagements*

Using the process map adopted from Andrews and Manning (2016), the PROSPECT learning programme has met the predetermined requirements. A series of activities—from matchmaking analysis to assignment of roles and identification of objectives—was made possible by pre-foundational engagement, dealing with basic questions of peer engagement. We have learned from the pilot implementation that particular attention is needed in terms of matchmaking participants and in setting learning objectives. Although the learning peers were all interested in EPC as a financing scheme, we have learned to focus on one sector only as the participants covered two sectors, namely public lighting and public buildings, which entail different situations and problems. During the study visit methodology, there also proved to be different needs, expectations, and levels of knowledge. This implies that the participants' needs and the clarity of the issue at stake should be carefully analysed at the very beginning of the learning programme. Context analysis is indeed a prerequisite.

5.3   *Enabling Foundational and Structured Learning Engagements*

The structure of the programme should enable the peers to elaborate on their learning contexts, their motivations, and their end goals. Here we highlight the importance of the design. The programme created foundational engagements, starting with an orientation session, sharing of experienced needs, working together on a learning plan, and, finally, ending with an evaluation and transferability assessment. Online tools and

resources were also used to create the group, facilitate group interactions, schedule learning activities, and allow the facilitator to manage the process. The foundational engagements are important to make sure that the participants are engaged from the start, have willingness to learn, create a safe and fair learning space, and build trust and ties among themselves. Structured learning engagements enable peers to keep commitments, clarify expectations, and create transparency.

5.4   Simplified Process to Reduce Administrative Demands

The participants' inputs were crucial for elaborating the peer-to-peer learning programme. Mainly, their feedback contributed to improving the materials for the participants and instructions for the facilitators. The number of materials for participants was reduced by combining forms and documents relating to different steps of the programme into one single document, named Learning Plan (LP). The LP should be completed by all participants throughout the steps of the learning programme. At the end of the programme, the LP should contain most of the information exchanged by the participants for future consultation, as documentation can illustrate changes from the individual to the organisational level. Overall, the participants recommended a simplified process of engagement to reduce administrative demands, particularly with regard to forms for documentation purposes.

5.5   Paying Attention to Language Differences

Information was added to guide facilitators in critical aspects of the learning programme. For example, the facilitators were instructed to pay attention to language differences and to make sure that all learning materials and presentations shared by the experienced peers with the other peers were translated into English if necessary. As the participants came from different countries and spoke different languages, English was the language of communication and will be the standard in all learning programmes. Language barriers, however, are inevitable in a transnational peer-to-peer learning programme.

5.6   *Addressing Transaction Costs Involved in Learning*

According to Topping (2015), peer-to-peer learning is cost-effective as it offers high effect size at low delivery cost. Having a group of five or more participants can be ideal for study visits. The more people participate, the more open questions will be generated, which all need to be dealt with, and the more coordination is also required to set up meetings and find suitable dates. The total budget available for the two-day physical meeting was less than 5000 euros. Throughout the pilot programme, of course, all participants had personnel costs, which were covered by the budget allocated to them as partners in the consortium. In the project roll-out, peers have to commit to participate during the learning programme and undertake relevant activities. This implies that there are also transaction costs (time, effort) involved in joining.

5.7   *Diffusing Learning to Foster Impact at Scale*

Through the transferability assessment, the participants had time to rethink the financing scheme and how to apply it in their own localities. It was considered necessary to have a transferability assessment and dissemination, as each programme should end with assessment for more successful future replication. Learning gains of individual peers should also be communicated back to their organisations to ensure support for the learning process (Andrews and Manning 2016). The peers reflected on their learning gains and scaled it up, escaping the individual learning trap. After the pilot programme, S. Energia facilitated the launch of EPC schemes in two municipalities in Portugal, and Trnava is expecting their planned projects to be implemented soon.

With the pilot implementation, finally, we have observed individual, network, and organisational learning outcomes, ranging from cognitive and relational results to skill development and action orientation. We have examined whether there were learning outcomes in terms of action orientation and took a specific look at four areas for direct action: staff time, implementation time, legislative/regulatory framework, and communication factors. The participants specified what actions they undertook when, which served as the basis for our initial evaluation.

In this chapter, we have presented the short-term and medium-term outcomes so far. In the future, we will examine the long-term outcomes of these learning interventions, including wider capacities, management,

policy and institutional change, and environmental effects. We will also report non-outcomes or negative outcomes to reveal trends in implicit and explicit expectations about learning outcomes and their wider implications.

References

Andrews, A., & Manning, N. (2015). *Mapping peer learning initiatives in public sector reforms in development* (Working Papers). The Center for International Development at Harvard University.

Andrews, A., & Manning, N. (2016). *A guide to peer-to-peer learning.* How to make peer-to-peer support and learning effective in the public sector? Effective Institutions Platform.

Andrews, A., & Manning, N. (2017). *Peer to peer learning: An Alternative development approach for South-South cooperation.* Effective Institutions Platform.

Bontenbal, M. C. (2009). Strengthening urban governance in the south through city-to-city cooperation: Towards an analytical framework. *Habitat International, 33*(2), 181–189. https://doi.org/10.1016/j.habitatint.2008.10.016.

Campbell, T. (2009). Learning cities: Knowledge, capacity and competitiveness. *Habitat International, 33*(2), 195–201. https://doi.org/10.1016/j.habitatint.2008.10.012.

Campbell, T. (2013). Beyond smart cities—How cities network, learn and innovate. *International Journal of Sustainability in Higher Education, 14*(1). https://doi.org/10.1108/ijshe.2013.24914aaa.007.

Devers-Kanoglu, U. (2009). Municipal partnerships and learning—Investigating a largely unexplored relationship. *Habitat International, 33*(2), 202–209. https://doi.org/10.1016/j.habitatint.2008.10.019.

Grubler, A. (2012). Energy transitions research: Insights and cautionary tales. *Energy Policy, 50,* 8–16. https://doi.org/10.1016/j.enpol.2012.02.070.

Heiskanen, E., Nissilä, H., & Tainio, P. (2017). Promoting residential renewable energy via peer-to-peer learning. *Applied Environmental Education and Communication, 16*(2), 105–116.

Johnson, H., & Wilson, G. (2006). North-South/South-North partnerships: Closing the 'mutuality Gap'. *Public Administration and Development, 26*(1), 71–80. https://doi.org/10.1002/pad.396.

Johnson, H., & Wilson, G. (2009). Learning and mutuality in municipal partnerships and beyond: A focus on northern partners. *Habitat International, 33*(2), 210–217. https://doi.org/10.1016/j.habitatint.2008.10.013.

Kathleen, A. (2014). The emerging field of energy transitions: Progress, challenges, and opportunities. *Energy Research & Social Science, 1,* 112–121. https://doi.org/10.1016/j.erss.2014.03.002.

Kristjanson, P., Harvey, B., Van Epp, M., & Thornton, P. (2013). Social learning and sustainable development. *Nature Climate Change, 4*(1), 5–7.

McFarlane, C. (2011). *Learning the city: Knowledge and translocal assemblage* (1st ed.). Malden, MA: Wiley-Blackwell (RGS-IBG book series, 56).

Raven, R. P. J. M. (2012). Analyzing emerging sustainable energy niches in Europe: A strategic niche management perspective. In *Governing the energy transition: Reality, illusion or necessity*? (pp. 125–151). London: Routledge.

Rodela, R. (2011). Social learning and natural resource management: The emergence of three research perspectives. *Ecology and Society, 16*(4). https://doi.org/10.5751/ES-04554-160430.

Ross, M. T., & Cameron, H. S. (2009). Peer assisted learning: A planning and implementation framework: Amee Guide No. 30. *Medical Teacher, 29*(6), 527–545. https://doi.org/10.1080/01421590701665886.

Suškevičs, M., Hahn, T., Rodela, R., Macura, B., & Pahl-Wostl, C. (2017). Learning for social-ecological change: A qualitative review of outcomes across empirical literature in natural resource management. *Journal of Environmental Planning and Management*, 1–28. https://doi.org/10.1080/09640568.2017.1339594.

Tjandradewi, B. I., Marcotullio, P. J., & Kidokoro, T. (2006). Evaluating city-to-city cooperation: A case study of the Penang and Yokohama experience. *Habitat International, 30*(3), 357–376. https://doi.org/10.1016/j.habitatint.2004.10.001.

Topping, K. (2005). Trends in peer learning. *Educational Psychology, 25*(6), 631–645. https://doi.org/10.1080/01443410500345172.

Topping, K., & Ehly, S. (2001). Peer assisted learning: A framework for consultation. *Journal of Educational and Psychological Consultation, 12*(2), 113–132.