REVISED 26 JUNE 2019

A methodological framework to assess the gaps from national energy efficiency policies to local actions within a multilevel governance system

Valeria Zambianchi & Ksenia Petrichenko
UNEP DTU
Copenhagen Centre on Energy Efficiency
Denmark
valza@dtu.dk
ksepe@dtu.dk

Keywords

energy efficiency policy, local and regional energy planning, cities, policy implementation, national energy efficiency plans

Abstract

The role of cities has recently gained attention in the global energy arena, for instance when a delegation of 25 cities pledged to become carbon neutral by 2050 during COP23. Scientific evidence shows that cities are essential partners to work with to achieve a sustainable energy transition, while organisations such as Covenant of Mayors, ICLEI and C40 are supporting the movement towards a larger inclusion of local institutions. Historically, local governments were considered policy-takers, as they tended to implement actions following the national energy agenda. Yet, despite the progress in the energy governance system, the local energy efficiency potential is far from being fully captured.

This paper aims at presenting a methodological framework to identify the gaps preventing municipalities from reaching their energy efficiency goals. Building upon theories of multilevel governance for energy policy, the paper presents an innovative methodology, assessing if and how energy efficiency policies and projects are translated from the national to the local level. The methodology includes the typology of gaps, defining commitment, action, coordination and replication gaps. Using the data collected during interviews with national and local policy makers and experts, the methodology is applied to a case study of five municipalities in Argentina.

The case study demonstrates that municipalities with the presence of a coordination gap tend to be embedded within the vertical typology of multilevel governance, while those with an action gap fall under the hierarchical type. Therefore, despite the progressive role of cities and local authorities, the dynamics between national and local levels tend to be top-down. With the presence of diverse gaps within the same nation-state, diverse typologies of energy efficiency governance are present. Conclusively, regardless of the typology of the detected gaps, the dynamics between local and national level are determinant for the success of energy efficient city actions, demonstrating that the increased role of cities and the change of the system of governance has not yet fully occurred.

Introduction

Over the years, when presenting the energy transition, the political attention has mainly addressed national governments and the international organisation in their support. The scientific evidence of the contribution of cities to emission of greenhouse gasses (GHG) and consumption of energy, allowed for an evolution of the dynamics between international organisations, national institutions and cities. In 2017, the cities worldwide accounted for two thirds of the global energy demand, while contributing for the 75 % of the carbon emissions (Carbon Disclosure Project, 2018). In light of the alarming pollution, climate hazards and disaster risk, pioneering cities have started to take action in their jurisdiction to mitigate climate change, also by improving their energy efficiency rates (C40, 2018). Moreover, their actions started to be networked and coordinated worldwide, especially among cities in the Global North. In fact, the major global cities have pledged to become front-runners in the energy transition, especially in terms of energy efficiency during the Conference of the Parties of 2017 (C40, 2017). Furthermore, the Paris Agreement stressed that local governments need to be included in the

fight to climate change and since 2015 cities have committed to the goals of the Agreement, demonstrating how active was their engagement (Fuhr, Hickmann, & Kern, 2018). Thus, the potential to reduce energy use in cities and related GHG emissions through energy efficiency improvements is significant, however, there is a number of factors or gaps, which might be preventing cities from realising it.

The objective of this paper is to investigate potential 'gaps' municipalities might face in implementing energy efficiency actions[1], in light of their national energy efficiency policy development and coordination at the local level. Implementation of actions at the municipal level is complex policy-making process, which usually involves different levels of governance and coordination among numerous decision-makers and actors. Therefore, this paper first introduces the theoretical background of multilevel governance for energy efficiency. Secondly, it presents the methodology to analyse gaps related to the implementation of energy efficiency actions in a municipality. This methodology is applied to a practical case of five municipalities in Argentina, namely Caseros, Chacabuco, Chañar Ladeado, Godoy Cruz and Paraná[2]. To conclude, the final discussion covers how the gaps are related to specific typologies of energy governance in a multileveled system.

Theoretical framework

The current energy governance regime is built upon multiple institutional levels, with an increased relevance of sub-national actors in the global energy arena. Multilevel governance theories explain that the competences for the design of policies is shared by different institutional levels (i.e. international, national, regional, and local), and that these levels are interconnected and dynamic (Setzer, 2015). In fact, the debates see multilevel governance as a new typology of public governance, based on networks and dynamics between the various levels (Lund, 2019). Hence, cities gain more attention in the decision-making process and the hierarchical system of governance is challenged (Setzer, 2015). This setting also affects the development of policies for energy efficiency, as cities started to overcome their former role of policy-takers and became more active in undertaking initiatives (Kelly & Pollitt, 2011; Kern & Mol, 2013). This, climate governance is escaping the nation-state container and cities and other sub-national actors raise their sovereignty (Beck, 2005). As measure to mitigate climate change and sustain the economy, energy efficiency is one of the areas which possibly best benefits from a multilevel governance system by increasing the relevance of cities in the system (Rezessy, Dimitrov, Urge-Vorsatz, & Baruch, 2006; Kelly & Pollitt, 2011). In fact, the localised problem pressure (from e.g. pollution), the local economic interests and political preferences are some of the many factors which enhance the position of cities amongst other institutional actors to implement energy efficiency actions (Fuhr, Hickmann, & Kern, 2018; Bertoldi, Kona, Rivas, & Dallemand, 2018; Kostka & Hobbs, 2012). Scholars and policy-makers argue that cities allow for a higher engagement with citizens and their needs and that regional authorities benefit from a better connection with their territories than national institutions (Setzer, 2015). Thus, to successfully improve the rate of energy efficiency, local and regional governments shall be granted with the ability to adopt policies targeting specific circumstances and interests (Setzer, 2015). To foster the ability of cities to actively engage with climate change mitigation measures, the international institutional framework has begun to adapt to the multiple levels of governance, for example, by granting cities a space at international climate change negotiations (Popovski, Breakey, & Maguire, 2015).

Scholars have demonstrated academic interest in developing theories on scale of environmental and energy governance and on the gained role of cities in the global policy arena (Kern & Mol, 2013; Evans, Yu, Staniszewski, Jin, & Denysenko, 2018; Kuzemko, Lockwood, Mitchell, & Hoggett, 2016; Schock, 2013; Jörgensen, Mishra, & Sarangi, 2015). Yet, there is a notable research gap in the area of assessing actual city-level actions and their place in the governance structure. (Setzer, 2017)

Improvement of energy efficiency at a large scale (e.g. a city or country) requires involvement of and cooperation among diverse institutions at various levels of governance. As argued by Setzer (2017), the lenses of the multilevel governance allow for a holistic analysis of how institutions are intertwined. Such analysis permits to understand how institutions are embedded within their system of governance and their dynamics (Andonova & Mitchell, 2010). To do so, this paper refers to the hierarchical, vertical, and horizontal typologies for energy efficiency governance in a multilevel system, to understand how different levels are linked (Fuhr, Hickmann, & Kern, 2018; Kern & Mol, 2013; Kern, 2014). The choice of this scheme stems from the focus on how the role of cities may differ in the system and how cities with the other levels of energy governance. Moreover, this framework includes in the picture city networks and transnational associations, which in practice are embedded as well within the various levels of governance but tend to be limitedly acknowledged by the literature. This framework, however, disregards the position and the role of the private sector, the market and the civil society in a multilevel governance system and instead focuses on the national-local relations.

Table 1[3] introduces the typologies of governance – hierarchical, vertical, and horizontal – and how differently the role of cities changes between the typologies, as well as their relations with the national level. This theoretical framework allows for a comprehensive analysis of how energy efficiency improvements can navigate among the different levels of governance.

These typologies of multilevel governance for energy efficiency shed a light on how cities relate to the national level and also on how city networks are introduced in the multileveled system of governance, which creates a new space for the coordination and collaboration between cities with their national institutions. This framework serves as a guide to understand how the gaps are related to a certain governance system and how these are more likely to emerge in a certain typology (ibid.). In fact, whether and how cities implement energy efficiency

1. With the term "action" the authors refer to policies, programmes, projects, plans, roadmaps and other soft law instruments implemented by the local authorities.

2. The collected data were also re-analysed by the authors in a study targeting Argentinean energy efficiency modes of governing at local level and the detected 'gaps' (Zambianchi & Petrichenko, 2019).

3. Para-diplomacy is defined as the representation of the own interests of cities independently from the national government in activities with actors outside their nation-state (Kern & Mol, 2013).

Table 1. Types of energy efficiency governance in a multilevel system (Kern & Mol, 2013).

	Hierarchical Governance	Vertical Governance	Horizontal Governance
Main role of cities and regions	Implementing international and national legislation	Lobbying and by-passing nation-states	City networking
Levels involved	International, national	International, regional/local	Regional/local
Dynamics between levels	Top-down	Top-down and bottom-up	Horizontal
National-local relations	Local authorities as part of nation-states	Para-diplomacy; State-local relations loosen	Para-diplomacy; State-local relations loosen
Differences local authorities	All local authorities affected; differences persist between national/local levels	Pioneer cities dominate associations and city networks (C40, ICLEI, Energy cities, etc.)	Pioneer cities dominate associations and city networks (C40, ICLEI, Energy cities, etc.)

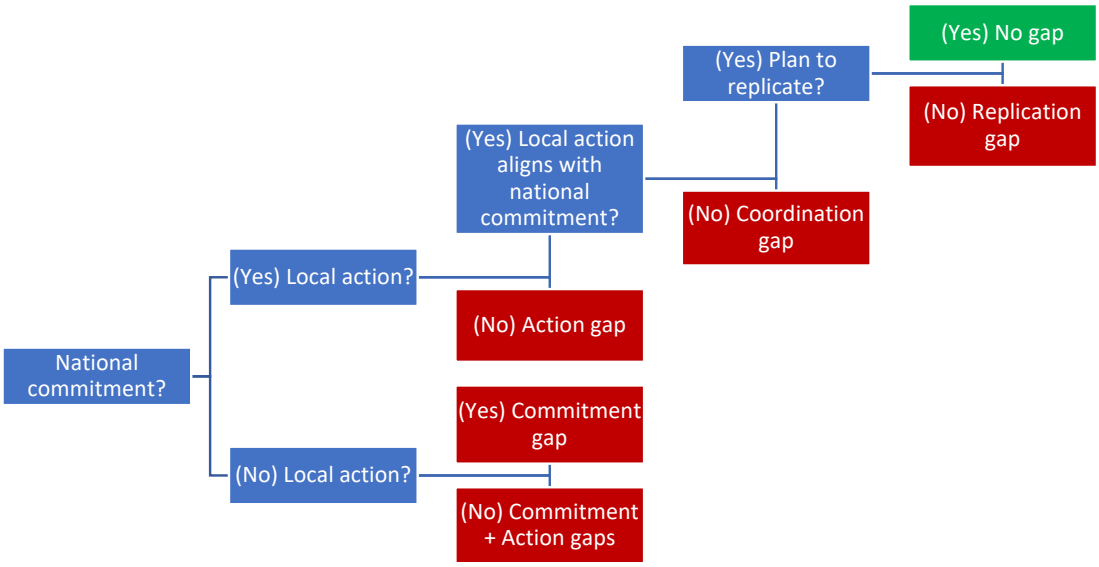

Figure 1. Methodological framework to assess the gaps from national energy efficiency agenda to local actions.

actions, and their potential alignment with the national agenda for energy efficiency, also depend upon the relations between the national/local levels (Marquardt, 2017; Kostka & Hobbs, 2012). Thus, assessing the gaps from national policies to local actions does not only relate to the local capacities to implement energy efficiency improvements, but also on their dynamics of the relations between the national actors (Kostka & Hobbs, 2012; Sharma, Bose, Shekhar, & Pathania, 2017).

Methodology

Parallel to the understanding of the dynamics between national institutions and cities, the authors developed an original methodology to assess the gaps behind the lack of energy efficiency improvements at local level.

In order to evaluate the gaps to implement energy efficiency actions, which might exist in a multilevel governance structure, an analytical framework has been created, which is based on a logic of a decision tree (see Figure 1). Each of the gaps is introduced in more detail in the discussion, which follows.

This figure develops on the form of tree in order to analyse (if and) how a city implements energy efficiency actions. First, it is necessary to determine whether there is a national formal commitment or target related to improving energy efficiency. Secondly, the framework assesses if any related actions are taken by the municipality, i.e. local policies, programmes, projects, roadmaps, etc. Then, it is important to evaluate whether the local actions (in case of their presence) align with the national one. Finally, if both national commitments and local actions are present and they align, the framework evaluates whether there are intentions or plans to replicate these actions elsewhere.

COMMITMENT GAP

The *commitment gap* to energy efficiency is present when, in spite of not having national commitments or targets on energy efficiency improvements, a city under analysis still undertakes local actions in this field. The establishment of formal national commitments, such as executive directives, National Determined Contributions (NDCs) and policies, arises from a translation of ideas to commitments. This, however, happens only in presence of coherence between policies and policy-makers interests (Harris, Drimie, Roopnaraine, & Covic, 2017). This gap is possibly also explained by the conflicts of values between

various national institutions responsible for deliberating policies for energy efficiency (Gifford, Kormos, & McIntyre, 2011). As values inspire actions in accordance to the desired goal, if a city, in spite of not having a national commitment behind, sees energy efficiency as valuable, it will take respective actions in that area (Schwartz, 1996). Thus, the predominant values at the national level do not necessarily affect the micro-action at the city level (Wüstenhagen, Wolsink, & Bürer, 2007). Conclusively, conflicting policy objectives and/or interests at the national level lead to an ultimate lack of commitment, which yet does not prevent cities from taking actions.

ACTION GAP

An *action gap* is present when, with national energy efficiency commitments in place, a city does not implement notable actions to achieve the national goal, or when the outcome of the local action is sub-optimal and does not fairly contribute to the national commitments. Such gap potentially originates from a diverse range of reasons. For instance, local contradictory policy priorities and lack of local government limit the presence and quality of actions for energy efficiency improvements (Bell, Gray, & Haggett, 2005; Flynn, Bellaby, & Ricci, 2010; Kostka & Hobbs, 2012). Moreover, as argued by Blake (1999), different actors misunderstand their responsibility and that of others, which often undermines effectiveness of policy implementation. Building off Blake (1999), when a stakeholder underestimates their responsibility or expects intervention from others, the scale and/or success of the action is limited.

Availability of local resources and capacity is another potential factor influencing the presence of this type of gap. In fact, the presence of resources does not only affect the initial phase of an action or project, but also its development and execution. With unavailable or inadequate resources, such as financial, institutional, human and social, a project which may have started could be left unfinished or be completed with sub-optimal results. Indeed, little structural capacity in the design and implementation of energy efficiency actions leads to ineffective improvements (Wolsink, 2000).

COORDINATION GAP

While national commitments and local actions are in place, these might not completely align and create a *coordination gap*. In theory, this gap is due to the disconnection between the interests of national policy-makers and local policy-implementers (Sharma, Bose, Shekhar, & Pathania, 2017; Evans, Yu, Staniszewski, Jin, & Denysenko, 2018; Kostka & Hobbs, 2012). As above-mentioned, cities are shifting their role from being policy-takers to be active actors for energy efficiency. This change, however, has not completely occurred and cities still need a direction from the national level (Kostka & Hobbs, 2012). Therefore, coordination between the two levels is crucial to meet the national goals through local actions. Moreover, higher coordination between cities and national institutions tend to lead towards a better inclusion of cities' priorities in the national agenda (Blake, 1999; Evans, Yu, Staniszewski, Jin, & Denysenko, 2018). When the two levels are lacking coordination, the local institutions are less likely to implement an effective action and this, among other reasons, is linked to a local misunderstanding of the national commitments (Sharma, Bose, Shekhar, & Pathania, 2017; Blake, 1999; Totin, et al., 2015). This means that if cities interpret the national energy efficiency direction in a different way or they have limited understanding of it, the eventual results of the local actions will not align with the initial commitment (Sharma, Bose, Shekhar, & Pathania, 2017). Therefore, the local human capital determines if a coordination gap will emerge. Moreover, if the coordination gap is present in several municipalities across the country, there is a risk that the local and national institutions will disconnect their priorities and actions. This also means that the measures implemented at local level are unlikely to be acknowledged by the national institutions and incorporated in their commitments. It is important to note that the coordination gap is not related merely to the impact of an action. It eventually emerges also if a local action produces relatively successful results, but it does not align sufficiently to the national agenda.

REPLICATION GAP

In case that national commitment is in place, local actions are successfully implemented, and there is an alignment between the two, it is essential that these actions are replicated in other localities to achieve impact and scale. A *replication gap* is present if this replication of action is not happening or very limited. There are to angles of the replication gap: (1) the replication is missing within the same municipality, e.g. from one district to another; (2) the replication is missing from one municipality to another.

The first possibility of having a replication gap is potentially linked to the availability of resources and local political commitment to proceed towards that direction. Moreover, if local stakeholders, such as the private sector, do not perceive the replication of actions as important, the local institutions are likely to be influenced by the stakeholders (Rydin, Natarajan, Lee, & Lock, 2018; Holtz, et al., 2017). Thus, the replication of one action within the same municipality is not necessarily linked to the availability of resources, but also to the local willingness to utilise them. The second possibility occurs when the other municipality where the replication could potentially take place is not only affected by the local capacities and capitals, but also by its relations with the national institutions. In fact, as stated in Table 1, cities differ as some may develop as pioneering cities, thus advance their energy efficiency improvements faster than other cities.

Lastly, upscaling and replicating local actions for energy efficiency further contributes to enhance the role of cities within the multilevel governance system, by demonstrating the success of one municipality in designing, implementing and exporting its action elsewhere.

DATA COLLECTION

The main source of data for the evaluation of the gaps presented above is a series of semi-structured expert interviews, which the authors conducted with local energy officers, policy-makers and climate change experts from five municipalities of central Argentina. The collected data were triangulated and analysed according to the illustrated methodological framework, in order to detect the gaps. Building off this, the authors adapted the results to the multilevel governance theory to assess if and how the gaps are linked to the governance system they fall into. To conclude the paper, the final discussion sheds a light on how the detected gaps are defined by a top-down system of energy

efficiency governance, to provide a theoretical understanding of why the gaps persist.

The data collection covered five municipalities of Central Argentina, namely Caseros, Chacabuco, Chañar Ladeado, Godoy Cruz and Paraná. The choice for selecting these stemmed from the intention to gather data from a diverse sample of cities, to cover urban and rural areas, smaller and larger cities, etc. Moreover, every city is a member of an Argentinean city network, whose objective is to implement measures against climate change (Argentine Network of Municipalities against Climate Change, 2018). Therefore, the selected municipalities allow for a comprehensive application of the theoretical framework for multilevel energy governance. The guidelines for the interviews were semi-structured and the interviews were conducted in Spanish. The collected data were also re-analysed by the authors in a study targeting Argentinean energy efficiency modes of governing at local level and the detected 'gaps' (Zambianchi & Petrichenko, 2019).

REPLICABILITY OF THE METHODOLOGY

This methodology is designed to be applied in a diverse range of countries and/or cities, including countries where local governments have more jurisdiction than the state, such as the U.S. system. The case under analysis presents the characteristics of a system where the national-local connection is bound, as the next section "Results and data analysis" explains. Nevertheless, if this methodology is applied to a different case study, the results would illustrate that the detected gaps stem from diverse contextual institutional and policy framework, both at local and national level. The application of the methodology is fixed, allowing for a straightforward detection of the gap(s); however, the analysis of the gaps is highly contextual and thus does not favour any frameworks. For instance, a case study where the local jurisdiction on energy efficiency is more prominent than the national one, would demonstrate if and how city's actions are able to compensate limited national commitments. On the one hand, the local level may implement successful actions and direct the national stakeholders towards the design of national policies. On the other hand, some legal frameworks may provide a high level of autonomy to cities to develop their actions but it may also occlude potential collaboration between cities, thus restricting the replication of these. Consequently, further applications of this methodology are encouraged, especially in diverse institutional frameworks, to expand the knowledge on how different systems are affected and cope with their own limitations.

Results and gaps assessment

The results from the data collection determine the presence of diverse typologies of multilevel governance systems within the same country, principally depending on the dynamics between the local and the national institutions. The country where the municipalities are located is Argentina, which has developed its institutional and policy framework for energy efficiency in the latest years. Energy efficiency is managed at national level by the energy secretariat under the Ministry of Treasury and by the environmental sub-secretariat under the Ministry of the Interior, Public Works and Housing (Decree 801/2018). The national policy portfolio started with the Decree 140/2007, which established the National Programme for Rational and Efficient Use of Energy, where energy efficiency was defined as national priority. This programme is multi-sectorial and touches transport, building and industry efficiency. Since then, however, the Programme has not been updated and the Nationally Determined Contributions of Argentina, submitted after the Paris Agreement, do not address energy efficiency. Thus, further updates at national level are recommended. Nevertheless, the national legislation in support of energy efficient lighting has grown, thanks to laws banning the commercialisation of incandescent light bulbs for residential buildings (Law 26473). Moreover, in 2017, Argentina established the National Plan for Public Lighting to support selected municipalities[4] in the LED retrofits of street lights. This legislation has been accompanied by the creation of a series of national energy standards, which include energy efficiency for buildings and appliances. The authority establishing these standards is Instituto Argentino de Normalización y Certificación (IRAM), which is internationally linked with the International Organization for Standardization (ISO).

In light of the Argentinean policy development, the commitment gap is not identified, due to the fact that the legislative portfolio at national level has increased over the years. Therefore, a national commitment on energy efficiency is established, both at institutional and policy level. Therefore, to apply the methodology, the next steps assess which gaps are observed amongst the municipalities under analysis. Below each of the detected gaps is analysed through the lenses of the multilevel governance system, as per Table 1.

ACTION GAP

This gap emerges when the municipalities lacked local energy efficiency projects or policy, mainly due to the limited financial and technical resources, as well as human capital. The municipalities presenting this gap implemented energy efficiency actions, mainly retrofits of streetlights with LED technology and educational campaigns on energy savings, yet acknowledged that the outcomes are sub-optimal. Local officers in these municipalities claimed that the insufficient financial resources, limited access to external funds for energy efficiency projects, lack of technical skills and knowledge on energy efficiency were the principal causes for such results of projects. Through the interviews, emerged that these municipalities do not have a strategic vision regarding how to improve the rate of energy efficiency, resulting in not having local agendas for energy efficiency. This relates also to the understanding of the multiple benefits of energy efficiency, as there are no linkages between local plans or programmes for energy efficiency improvements and other sectors, such as housing, transport, etc. Consequently, the municipalities presenting this gap perceive that the main actor to promote and lead the energy efficiency enhancement is the national government. One of the interviewees argued that further political support from the national government would largely improve the outcomes of the energy efficiency projects, as it would allow for the development of a long-term strategy, especially if the municipalities are financially assisted and

4. The requirements for the selection are presented in the National Plan, Resolution 0084/2017.

technically trained. As stated beforehand, the insufficiency of resources prevents local governments from correctly designing actions and actually implementing them. Consequently, local governments are dependent on the national institutions and/or external technical assistance to develop their local energy efficiency and do not have the means and the capacity to develop on their own. Therefore, the national-local dynamics are exclusively top-down and there is a high chance that the limited resources of the municipalities are utilised to align with the national priorities but not to the local needs. This scenario limits the potential of increasing the role of cities within the multilevel governance system, due to the limitations stemming from their own resources and their position in the system. Thus, the municipalities with an action gap are embedded within a hierarchical system of governance, where local authorities follow the lead of the national institutions. Conclusively, the presence of this gap demonstrates that the municipality has an insufficiency resource pool and how this prevents from improving the national rate of energy efficiency, as the cities are not acknowledged across the higher levels of the energy efficiency governance system.

COORDINATION GAP

In line with the collected data, when a coordination gap emerges, the cities under analysis implemented successful energy efficiency actions, yet these were not in line with the national agenda. The disconnection between the national and local authorities, according to the interviewees, emerged in terms of both legislative and executive actions. For instance, the little funds destined to municipalities to implement energy efficiency projects was presented by one of the interviewees as the result of the limited connection and coordination between local and national institutions, in matter of energy efficiency. As explained in the previous section, the majority of the municipalities under analysis face financial and technical limitations, due to the local capacity, which in turn lead to the implementation of local symbolic policies, not linked to national ones. These, however, resulted in being not technically viable, which also highlighted how national and local actors differently develop energy efficiency policies, eventually leading to two uncoordinated level of energy efficiency governance. In addition, the municipalities with this gap expressed their limited support and lack of engagement from national authorities. While all the cities examined for this paper implemented or have planned to implement retrofits to street lighting (in line with the national policy portfolio introduced beforehand), the perception of how this action was supported by and aligns with the national commitments differs among municipalities. In fact, smaller municipalities claimed that only their own resources supported their local lighting retrofit and that they need further support from national institutions. On the contrary, the largest city in analysis stated that their perception of national support was positive and that they enjoy a good communication with these institutions. The different perception of how the national level supports the local one exemplifies the vertical typology of multilevel governance. In fact, with still a strong reference and dependence to the national institutions, the local governments tend to be divided between "leaders" and "followers". In long term this division possibly affects the engagement of cities with energy efficiency measures by, for instance, discouraging them from implementing further actions. The higher coordination between the national government and larger cities may potentially allow them to enhance their position and to actively engage with the national energy efficiency agenda, thus better communicating local needs to the national authorities. This scenario, however, is hypothetical and may occur in longer terms. Nevertheless, it necessary to underline that when cities are differently coordinated with the nation government, this fosters the divide between "leaders" and "followers", limiting the engagement of the "followers" with energy efficiency improvements.

REPLICATION GAP

The replication gap is detected only in one municipality (as the majority of the cities were found to have either the action or coordination gap, thus not allowing for further advancing the methodological tree, Figure 1). This municipality is characterised by a large population and a positively perceived communication with the national institutions from the local stakeholders. This city implemented several actions to improve its energy efficiency rate, e.g. installation of energy efficient measures in public buildings, financial programmes to offer credit to citizens for the purchase of sustainable energy appliances, development of energy standards for residential buildings and of an auditing body on energy consumption, and trainings for municipal officers and technicians to teach them about energy efficiency. The city largely involved various stakeholders in the development of these actions, such as sport clubs and local schools, where they run student competitions to promote ideas and projects on energy efficiency. Moreover, the city established a partnership with the local university, which now provides technical advisory services to the municipality, to support the skills development of local officers, which demonstrated how energy efficiency actions need to be carried out with other actors to be successful. Hence, the city developed linkages with local entities, both governmental and not, while enjoying a well-perceived support from the provincial and national levels of governance. Yet, in spite of the local resources and capacity, the local legislation does not target energy efficiency and there is no roadmap or agenda on the matter. Thus, the lack of scalability of projects is determined by the limited planning of the city to replicate its action, demonstrating that the city does not have a long-term vision of improving energy efficiency in its jurisdiction, nor to export its model elsewhere. This is explained by the lack of targets and direction, which eventually turns into the implementation of successful actions, thanks to the local resources and the coordination with the national institutions, but still at a limited scale. Therefore, also this gap emerges from a vertical typology of multilevel governance. In fact, despite having a better coordination with the national level, the city in study was not able to develop its network horizontally. As the other municipalities did not enjoy the same situation, this city was prevented from upgrading its governance type towards the horizontal one, due to the lack of counterparts. Thus, the insufficient transfer of good practices and the export of local policies to other municipalities was principally caused by the fact that other municipalities are not experiencing the same dynamics with the national institutions, hence being entangled within hierarchical and vertical types of governance.

Discussion and conclusion

The detected gaps and their analysis through the lenses of multilevel governance theory present how energy efficiency actions are implemented with a top-down approach, which limits the potential of cities as institutional actors within a multilevel governance system. The linkages between the national government and the cities discussed by the interviewees demonstrate that the direction is univocal and that the support of the national institutions is highly needed by the municipalities. In fact, regardless of the gap, the dynamics with the national level determined how cities implemented energy efficiency actions. The insufficient resources of cities, the incoordination of the local priorities with the national commitments, and the enhancement of the internal divide of "leader" and "follower" cities, are some of the explanations why cities do not move towards the horizontal governance system. Yet, the horizontal type of energy efficiency governance expects that cities create networking spaces, especially for knowledge sharing. This, however, has not emerged from the data analysis and may limit the progression of the cities towards the horizontal governance.

The hierarchical typology of multilevel governance for energy efficiency precludes cities from exchanging good practices and successful examples of actions, which could benefit the cities with fewer resources and capacity. Moreover, by seeing the city as policy-implementer, the national government does not incorporate the local needs and priorities in its policy-making, which could for instance require further financial and technical support to the cities with less means. In a scenario where the limited local resources are acknowledged by the state, the consequent commitments may target this to increase the capacity of the city to implement actions and to gain further relevance in the governance system. Under the hierarchical type, however, the governance level of cities is not acknowledged in the multilevel system, thus impeding to have dynamic relations among the governance levels.

The vertical governance between cities and the state occurred for the majority of the municipalities in this study. The incoordination between cities' actions and national commitments picture a misalignment of interests at multiple levels of governance. The disconnection may stem from several factors, such as a better position of some cities in the dialogue with the national institutions, which leads to an increased internal divide among cities. This allows for exploring different spheres of governance, such as para-diplomacy, but it is prevented from advancing towards the horizontal type due to the impossibility of networking with other municipalities. This is due to the presence of diverse gaps under the same governance type and the lack of institutional channels to formalise good practices transfer or policy mobility. Therefore, the top-down dynamics between cities and the state are predominant also under the vertical type of governance.

None of the cities in analysis experienced a commitment gap, which is present when the national commitments are absent, but the local actions are taking place. Such gap, in theory, emerges under a horizontal governance type as cities implement actions ahead of the national institutions develop countrywide policies and create their own space in the governance scheme, where the levels are not fixed anymore but are dynamic. This situation, however, is present when municipalities have technical resources, capacity and the plan to develop energy efficiency actions. The possibility of encountering this type of governance increases when cities have strong international networks through transnational organisations and other knowledge-sharing spaces. Nevertheless, cities need to possess financial resources to implement a designed action, which may require lending from financial institutions and/or private sector. In this case, the dynamics between the state and the municipalities are secondary, as the primary ones are taking place between cities themselves.

Building off this, the horizontal typology of energy efficiency governance is presented as the most likely one to bring successful results, impacts and scale in a longer term. To achieve this scenario, city networks and other transnational organisations for cities are encouraged to worker further with local institutions. This eventually leads to an increased capacity of the cities to design and implement suitable and effective energy efficiency actions. By creating a channel to exchange expertise, cities will foster their role in the multilevel energy governance system and will be able to gain support from the national level to implement local actions and to coordinate their priorities. Moreover, in a horizontal governance system the capacity of cities will allow for developing bankable projects and, eventually, to finance to scale up their energy efficiency measures. Therefore, further research on the development of horizontal systems of governance are crucial to develop a social science theory for energy efficiency improvements in a multilevel system. In particular, studies on the role of city networks and transnational organisations in the multilevel governance framework may address the vast research gap on new levels of governance for energy efficiency. Conclusively, it is urgent to understand how to break down the national commitments, also envisioning the local institutions and the actors, which practically will implement the national policies. Thus, the dynamics between multiple levels of governance need to develop bi-directionally to have city actions being scaled up and replicated with success.

References

Andonova, L. B., & Mitchell, R. B. (2010). The rescaling of global environmental politics. *Annual Review of Environment and Resources, 35* (1), 255–282.

Argentine Network of Municipalities against Climate Change. (2018). *About RAMCC*. Retrieved from Argentine Network of Municipalities against Climate Change: http://www.ramcc.net/en/pages/view/1/about-ramcc.

Beck, U. (2005). Power in the Global Age. A New Political Economy. Cambridge, UK: Polity.

Bell, D., Gray, T., & Haggett, C. (2005). The 'Social Gap' in Wind Farm Siting Decisions: Explanations and Policy Responses. *Environmental* politics*, 14* (4), 460–477. doi:https://doi.org/10.1080/09644010500175833

Bertoldi, P., Kona, A., Rivas, S., & Dallemand, J. F. (2018). Towards a global comprehensive and transparent framework for cities and local governments enabling an effective contribution to the Paris climate agreement. *Current Opinion in Environmental Sustainability, 30*, 67–74.

Blake, J. (1999). Overcoming the 'value-action gap' in environmental policy: Tensions between national policy and local experience. *Local Environment, 4* (3), 257–278. doi:https://doi.org/10.1080/13549839908725599

C40. (2017). *C40 and COP23*. Retrieved from https://www.c40.org/other/cop23.

C40. (2018). *Why Cities*. Retrieved from https://www.c40.org/why_cities.

Carbon Disclosure Project. (2018, October 04). *2017 – Cities Community Wide Emissions*. Retrieved from https://data.cdp.net/Emissions/2017-Cities-Community-Wide-Emissions/kyi6-dk5h.

Evans, M., Yu, S., Staniszewski, A., Jin, L., & Denysenko, A. (2018). The international implications of national and local coordination on building energy codes: Case studies in six cities. *Journal of Cleaner Production,* 191, 127–134.

Flynn, R., Bellaby, P., & Ricci, M. (2010). The "value-action gap" in public attitudes towards sustainable energy: the case of hydrogen energy. *Sociological Review*, 158–180.

Fuhr, H., Hickmann, T., & Kern, K. (2018). The role of cities in multi-level climate governance: local climate policies and the 1.5 °C target. *Current Opinion in Environmental Sustainability, 30*, 1–6.

Gifford, R., Kormos, C., & McIntyre, A. (2011). Behavioral dimensions of climate change: drivers, responses, barriers, and interventions. *2* (6), 801–827. doi:https://doi.org/10.1002/wcc.143

Harris, J., Drimie, S., Roopnaraine, T., & Covic, N. (2017). From coherence towards commitment: Changes and challenges in Zambia's nutrition policy environment. *Global Food Security, 13*, 49–56.

Holtz, G., Xia-Bauer, C., Roelfes, M., Schüle, R., Vallentin, D., & Martens, L. (2017). Competences of local and regional urban governance actors to support low-carbon transitions: Development of a framework and its application to a case-study. *Journal of Cleaner Production, 177*. doi:10.1016/j.jclepro.2017.12.137

Jörgensen, K., Mishra, A., & Sarangi, G. K. (2015). Multi-level climate governance in India: the role of the states in climate action planning and renewable energies. *Journal of Integrative Environmental Sciences, 12* (4), 267–283.

Kelly, S., & Pollitt, M. (2011). The Local Dimension of Energy.

Kern, K. (2014). Climate Governance in the European Union Multilevel System: The Role of Cities. In I. Weibust, & J. E. Meadowcraft, *Multilevel Environmental Governance: Managing Water and Climate Change in Europe and North America* (pp. 111–130).

Kern, K., & Mol, A. P. (2013). Cities and Global Climate Governance: From Passive Implementers to Active Co-Decision-Makers. In J. E. Stiglitz, & M. Kaldor, *The Quest for Security: Protection without Protectionism and the Challenge of Global Governance* (pp. 288–304). New York: Columbia University Press.

Kostka, G., & Hobbs, W. (2012). Local Energy Efficiency Policy Implementation in China: Bridging the Gap between National Priorities and Local Interests. *The China Quarterly, 211*, 765–785.

Kuzemko, C., Lockwood, M., Mitchell, C., & Hoggett, R. (2016). Governing for sustainable energy system change: Politics, contexts and contingency. *Energy Research & Social Science, 12*, 96–105.

Lund, D. H. (2019). Wider Theoretical Debates on Urban Sustainability Governance. In J. Delman, Y. Ren, O. Luova, M. Burell, O. Almén, & A.-S. Series (Ed.), *Greening China's Urban Governance* (Vol. 7). Singapore: Springer.

Marquardt, J. (2017). Central-Local Relations and Renewable Energy Policy Implementation in a Developing Country. *Environmental Policy and Governance, 27* (3), 229–243.

Popovski, V., Breakey, H., & Maguire, R. (2015). *Ethical values and the integrity of the climate change regime.* Ashgate Publishing Ltd.

Rezessy, S., Dimitrov, K., Urge-Vorsatz, D., & Baruch, S. (2006). Municipalities and energy efficiency in countries in transition. Review of factors that determine municipal involvement in the markets for energy services and energy efficient equipment, or how to augment the role of municipalities as market players. *Energy Policy, 34* (2), 223–237.

Rydin, Y., Natarajan, L., Lee, M., & Lock, S. (2018). Local voices on renewable energy projects: the performative role of the regulatory process for major offshore infrastructure in England and Wales. *Local Environment, 23* (5), 565–581.

Schock, R. N. (2013). Energy, cities, and global sustainability. *Sc Nucl Str*, 291–299.

Schwartz, S. (1996). Value priorities and behavior: Applying a theory of integrated value systems. In C. Seligman, J. M. Olson, M. P. Zanna, & I. Lawrence Erlbaum Associates (Ed.), *The Ontario symposium on personality and social psychology* (Vol. 8, pp. 1–24). Hillsdale, NJ, US: The psychology of values: The Ontario symposium.

Setzer, J. (2015). Testing the Boundaries of Subnational Diplomacy: The International Climate Action of Local and Regional Governments. *Transnational Environmental Law, 4* (2), 319–337.

Setzer, J. (2017). How Subnational Governments Are Rescaling Environmental Governance: The Case of the Brazilian State of Sao Paulo. *Journal of Environmental Policy and Planning, 19* (5), 503–519.

Sharma, S., Bose, A., Shekhar, H., & Pathania, R. (2017). Plugging the Implementation Gap. *Review of Market Integration, 9* (1–2), 27–44.

Totin, E., Traoré, P, S., Zougmoré, R, Homann-Kee, S., … Schubert, C. (2015). Barriers to effective climate change policy development and implementation in West Africa. *CCAFS Info Note*.

Wolsink, M. (2000). Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support. *Renewable Energy, 21* (1), 49–64. doi:https://doi.org/10.1016/S0960-1481(99)00130-5

Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social Acceptance of Renewable Energy Innovation : an Introduction to the Concept. *Energy Policy, 35* (5), 2683–2691.

Zambianchi, V., & Petrichenko, K. (2019). Bridging gaps from national energy efficiency policies to local actions. *7th ELAEE Conference 2019*. Buenos Aires: IAEE.

Acknowledgments

The authors would like to thank the interviewees and the personnel of the Red Argentina de Municipios frente al Cambio Climatico for their availability and time. The authors would like also to acknowledge the help from two colleagues at the Copenhagen Centre on Energy Efficiency for their feedback on this piece.