

DELIVERY OF ENERGY EFFICIENCY: Linking global, national and local levels. The case of Argentina

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Introduction

At global level we are witnessing a considerable progress in relation to the involvement of local institutions in programmes for climate change mitigation. Notwithstanding this progress, in many countries the coverage of policy and practice remains patchy between local and national levels, and does not always reflect international targets for clean energy, especially for energy efficiency policies. This issue brief presents a methodology to analyse gaps, which aggravate improvement of energy efficiency at different levels of governance, focusing on the case of Argentina and several selected municipalities.

Argentina – context and energy data

Situated in the Southern Cone of South America, Argentina is a vast country whose territory covers 2.8 million square kilometres with an estimated population of 44.9 million inhabitants (World Population Review, 2018), demonstrating one of the lowest population densities in the world with 14.4 persons per square kilometre (The World Bank, 2018a). Due to its great longitudinal extension, the climate of Argentina is very diverse with 13 climate zones varying from tundra, to warm desert, and humid subtropical areas (Peel, Finlayson, & McMahon, 2007).

Climate diversity allows Argentina to be rich in natural resources, in turn contributing to the fact that Argentina is the second largest economy of South America, after Brazil (IMF, 2017). Argentina is classified as an emerging/developing economy and is a member of the G20, having served its presidency in 2018 (G20, 2018).

KEY INDICATORS

- Population: 44.9 million people
- GDP PPP: 844.71 bln. 2016 USD
- Emissions/population: 4.75 CO₂ metric tons/capita (global average = 5.16; Latin America & Caribbean average = 3.06)
- Primary Energy intensity: 4.34 MJ/\$2011 PPP GDP (global average = 5.47; Latin America & Caribbean average = 3.82)

Sources: (World Population Review, 2018); (The World Bank, 2018a); (IEA, 2018)



Figure 1. Total final energy consumption by sector

Source: IEA (2018)

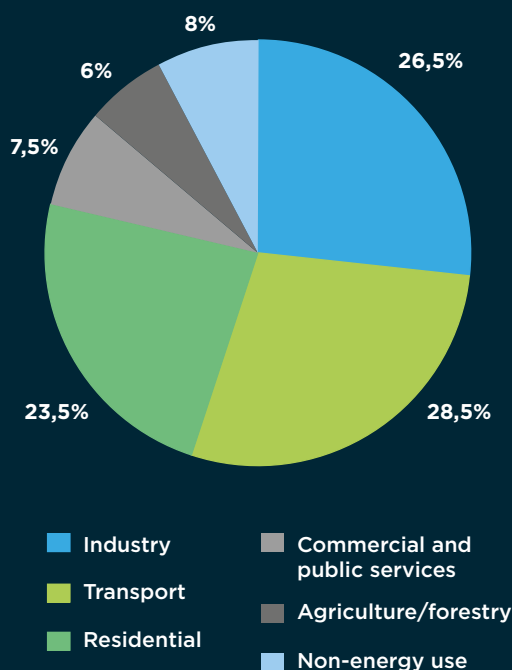
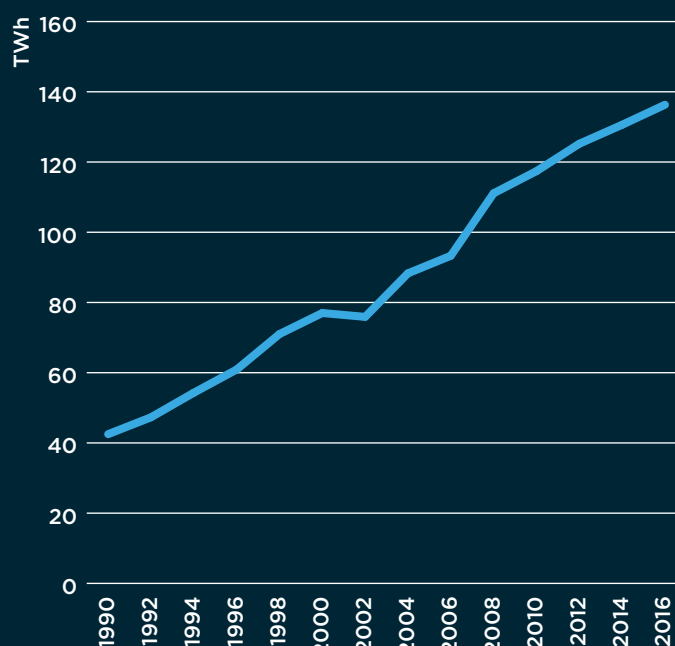


Figure 2. Total electricity consumption per year in TWh

Source: IEA (2018)



With an estimated growing urban population, which has already reached 92% of the total population (The World Bank, 2018b), the agriculture sector constitutes only 6% of GDP, while industry and construction together account for 22%, resulting in the tertiary sector having the largest share (72%) of the Argentinian economy (Secretaría de Política Económica, 2018).

Argentina is a federal presidential representative democratic republic with a bicameral congress and is composed of 23 districts, which are further subdivided into departments, and one Autonomous City, the capital city – Buenos Aires. The provinces, as well as the capital city, are fully autonomous as they can enact their own constitution and manage their own resources, in line with the national constitution and regulation (National Constituent Convention, 1994).

Energy data: trends and projections

In 2016, the energy production in Argentina was 75.8 Mtoe, with net imports of 17.7 Mtoe (IEA, 2018). Transport, followed by industry and residential sectors, demonstrated the largest share of final energy consumption (Figure 1) (ibid.). The total electricity consumption has been growing with a threefold increase since 1990 (Figure 2) (ibid.).

Argentina's electricity market is the third largest in Latin America. In 2015, the total electricity production was 145 TWh with consumption of 136 TWh (ibid.). Electricity generation in the country is highly centralised and mainly comes from natural gas (48%), oil (39%) and hydro (<5%) (ibid.).

Institutional framework

In December 2015, Argentina established the *Ministerio de Energía* (Ministry of Energy), which among other responsibilities manages energy efficiency at the national level through the Under-Secretariat for Energy Savings and Energy Efficiency (International Partnership for Energy Efficiency Cooperation, 2017). In September 2018, however, the Ministry of Energy was downgraded to become a secretariat under the *Ministerio de Hacienda* (Ministry of the Treasury). This was due to the Cabinet's restructuring that occurred in 2018, where the number of ministries was halved to 10 (Decree 801/2018, 2018). Therefore, the former institutional framework was absorbed within the Ministry of the Treasury. This restructuring also affected other ministries related to energy efficiency. As stipulated in Argentina's Nationally Determined Contributions (NDCs), energy-related matters are also the responsibility of the *Ministerio de Ambiente y Desarrollo Sustentable* (Ministry of Environment and Sustainable Development). This ministry was also downgraded in September 2018 and became a sub-secretariat of the *Ministerio del Interior, Obras Públicas y Vivienda* (Ministry of the Interior, Public Works and Housing) (ibid.).

Energy efficiency standards and certifications are created by the *Instituto Argentino de Normalización y Certificación* (IRAM), which represent Argentina at the International Organization for Standardization (ISO).

Policy framework

The current regulatory and strategic framework on energy efficiency at the national level is comprised of a

combination of laws, plans and standards covering different aspects of energy efficiency, such as:

- *Ley 26.473*, prohibiting the commercialisation of incandescent light bulbs, targeting the residential sector in the country (Law 26473, 2010).
- *Programa Nacional de Uso Racional y Eficiente de la Energía* (National Programme for Rational and Efficient Use of Energy), in force since 2007. This Programme declares that “efficient and rational” energy use is a priority for Argentina, stipulating a series of short and long term actions for various sectors, namely: industry, residential and commercial sectors, as well as services, education, public lighting and transportation. It also notes the importance of clean development mechanisms and energy standards and labelling (Federal Decree 140/2007, 2007).
- *Resolución ENRE 0084/2017*, as National Plan for Public Lighting, focusing on LED retrofitting for selected municipalities. This Plan establishes that municipalities will receive either grants or lighting technologies to implement the National Plan. The requirements for the municipalities’ selection include: notable energy savings potential, adequate infrastructure, capacity in the field and implementation times (Ente Nacional Regulador de la Electricidad (Argentina), 2017).
- National technical standards on different components of buildings certified by the IRAM. They state the national standards for the thermal insulation of buildings (*Norma 11.625*), thermal conditioning (*Norma 11.605*), building classification (*Norma 11.603*), heating losses (*Norma 11.604*) and energy efficiency of building envelopes (*Norma 11.900*), lighting (*Norma 62404*), air conditioners (*Norma 62406*) and many others (Instituto Argentino de Normalización y Certificación, 2018).
- The revised NDCs submitted by Argentina (2016) set the target for the total country-wide net GHG emissions to not exceed 483 million tons of carbon dioxide equivalent (tCO₂eq) by the year 2030 (UNFCCC, 2016).

Actions at the local level

KEY INDICATORS:

- 2,284 municipalities (INDEC, 2019)
- 24 provinces (ibid.)
- Urban population: 92% (The World Bank, 2018b)
- Participation in city networks: C40 (Buenos Aires); ICLEI (82 municipalities); RAMCC (130); Mercociudades (131); Federación Latinoamericana de Ciudades, Municipios y Asociaciones de Gobiernos Locales (7); Centro Iberoamericano de Desarrollo Estratégico Urbano (12)
- 114 Argentinean municipalities had signed the Global Agreement for Climate and Energy in Latin America and Caribbean (Pacto Global de los Alcaldes por el Clima y la Energía en América Latina y Caribe) by January 2019, which was established by the Global Covenant of Mayors for Climate & Energy.

Argentina is divided into 24 provinces with the authority to adopt and enforce regulations, as elected provincial governors and congresses have significant power within their territory (Nachmany, et al., 2015). Many provinces have their locally elected governments and ministries,

which work with energy-related matters and develop corresponding policies (San Luis Province, 2018).

Some municipalities are utilising their local legislative powers in introducing regulations on energy efficiency. The legislative portfolio of provinces and municipalities related to the energy sector has been growing over the past several years (Chévez, Martini, & Discoli, 2016). A few examples are provided in the following paragraphs.

In 2011, the Autonomous City of Buenos Aires promulgated a law on climate change adaptation and mitigation, which included evaluation and implementation measures for the energy sector, reflecting the interest of the city in energy efficiency (Law 3871/11, 2011).

Buenos Aires also adopted a city plan on adaptation and mitigation of climate change, which includes several energy efficiency measures and targets by 2030 (Gobierno de la Ciudad de Buenos Aires; Agencia de Protección Ambiental, 2012). The city further established a regulation in 2012 to enhance the implementation of IRAM’s standards, mainly focusing on the thermal insulation of buildings (Legislatura de la Ciudad Autónoma de Buenos Aires, 2012). Similarly, the municipality of Vicente Lopez implemented a regulation for establishment of mandatory application of technical air conditioning standards, *Normas de acondicionamiento térmico de edificios* (Municipio de Vicente Lopez, 2012).

A number of municipalities, for example, Rosario and Vicente Lopez, have demonstrated the possibility to complement the national framework with local legislation on energy efficiency in buildings. In fact, Rosario’s Ordinance 8757/2011 was established to regulate the city’s energy consumption for thermal comfort, including both space heating and cooling, by setting maximum allowed values for thermal transmittance for both new and existing buildings with floor area of more than 300 m² (Law 3871/11, 2011).

An important role in supporting policy development at the sub-national and local levels has been played by the *Red Argentina de Municipios frente el Cambio Climático* – the Argentine Network of Municipalities against Climate Change (RAMCC). RAMCC is “an instrument for coordination and promotion of local public policies addressing climate change in Argentina’s cities and towns”, which has a membership of 130 municipalities from 18 provinces (Argentine Network of Municipalities against Climate Change, 2018). Currently RAMCC is coordinating six task forces that are developing national strategies, including one on energy efficient retrofitting of public buildings and one on energy efficient street lighting. Moreover, the municipalities member of RAMCC have access to training, knowledge-sharing events and support to develop Local Plans for Climate Action (PLAC). In collaboration with ICLEI (Local Governments for Sustainability), the RAMCC has applied standards for reporting greenhouse gas emissions (GHG) in 80 municipalities. These standards are in line with the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC). In addition to supporting the development and implementation of local plans and actions, RAMCC has an agreement with national

Table 1. Municipalities in Argentina selected for the analysis

Municipality	Inhabitants
Caseros – Provincia de Entre Ríos	2,339
Chacabuco – Provincia de Buenos Aires	34,958
Chañar Ladeado – Provincia de Santa Fe	5,639
Godoy Cruz – Provincia de Mendoza	183,000
Lincoln – Provincia de Buenos Aires	28,051
Paraná – Provincia de Entre Ríos	247,863
San Antonio de Areco – Provincia de Buenos Aires	23,114
San Lorenzo – Provincia de Santa Fe	46,239
San Miguel – Provincia de Buenos Aires	157,532
Trenque Lauquen – Provincia de Buenos Aires	33,442

institutions, such as the former Ministry of Environment and Sustainable Development. This aims to coordinate their work under a programme for sustainable municipalities. It also serves the role of national coordinator for the Global Covenant of Mayors for Climate and Energy for Argentina (ibid.).

To analyse the experiences in policy-making at the municipal level and how they interact with national level policy settings, ten municipalities in Central Argentina were chosen as case studies for this paper (see Table 1). A series of interviews was conducted with administrative and technical staff from municipalities and the Director of RAMCC.

The information collected during these interviews, together with the data gathered through desktop research, were analysed in order to identify existing gaps at the national and local levels. The methodology for this ‘gap analysis’ is presented in the next section followed by its application to the selected municipalities in Argentina.

Gap analysis

This section presents the framework to identify gaps for the implementation of energy efficiency measures in relation to the coordination between different levels of governance (Figure 3).

National commitment gap: there are no formally established political commitments to improve energy efficiency in the country, e.g. executive directives, NDCs, targets or policies (Harris, Drimie, Roopnaraine, & Covic, 2017). Nonetheless, this does not necessarily impede municipalities from implementing local energy efficiency actions, as they may be driven by their own initiative and motivation. This gap often results from competing policy priorities and interests at the national level (Gifford, Kormos, & McIntyre, 2011). The presence of this gap,



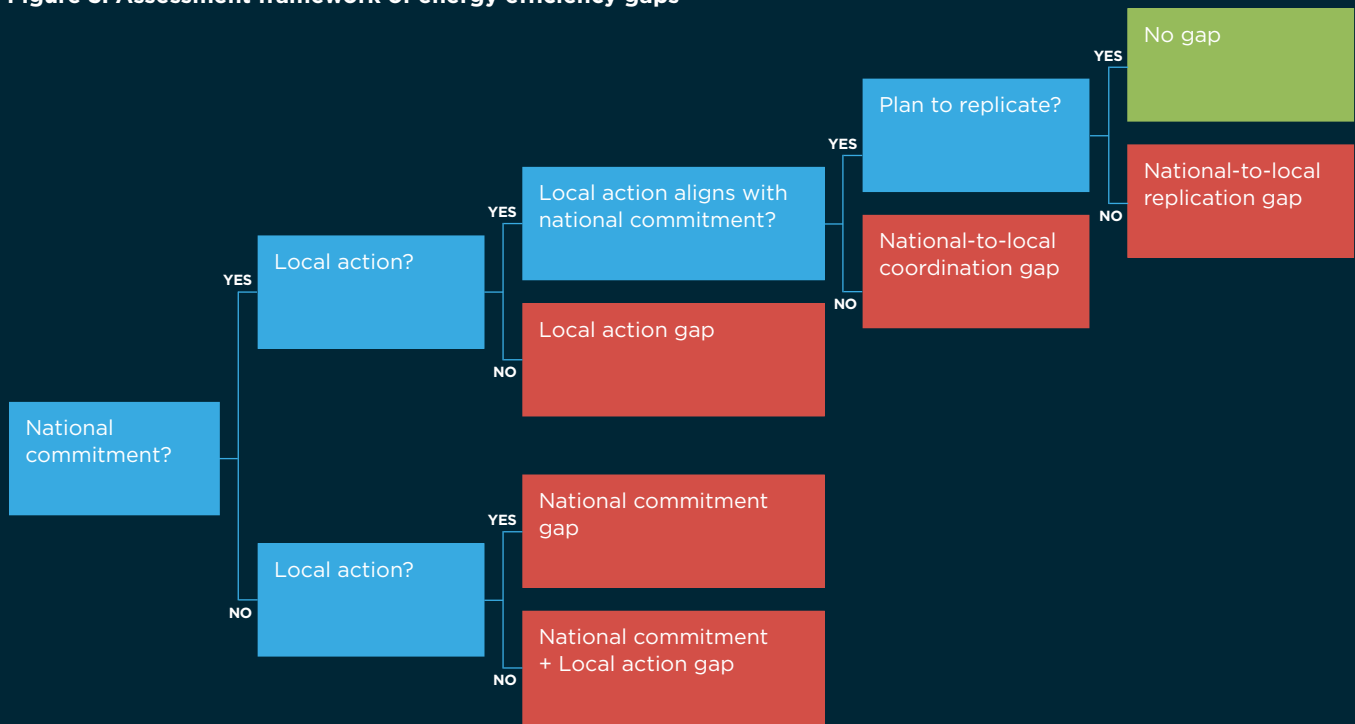
however, is likely to further limit the impact of actions and their across different municipalities.

Indicators of National commitment gap:

- National energy efficiency target is not set or not quantitative.
- Energy efficiency is not mentioned in the country's NDC among mitigation strategies.
- Energy efficiency strategic documents (national energy efficiency strategy, action plan, roadmap, etc.) are not adopted or are not ambitious/specific enough.

Local action gap: national commitments related to energy efficiency are present, while local actions to realise these commitments are insufficient or are not taking place. The action gap potentially emerges from contradictory planning policies, lack of governmental support, inadequate resources or contextual factors (Bell, Gray, & Haggett, 2005). This gap possibly stems from an unfavourable local policy environment for translating national targets into local actions (Blake, 1999). Availability and adequacy of financial,

Figure 3. Assessment framework of energy efficiency gaps



human, institutional and social capital are also important factors that influence the presence of the action gap and its magnitude. Therefore, the action gap stems from a multitude of reasons, which may be also interconnected. In practice, these factors lead to a weak project or programme design, which eventually results in an inadequate implementation (Wolsink, 2000).

Indicators of Local action gap:

- *Energy efficiency actions are not taking place in the municipality.*
- *Energy efficiency actions are present, but take place at a limited scale or have fragmented nature. This occurs also with pilots or demonstrative phases of projects.*
- *Energy efficiency actions have limited impact in terms of actual energy savings.*

National-to-local coordination gap: actions to improve energy efficiency are implemented by municipalities; however, often they do not align to full extent with the national energy efficiency agenda. Thus, there is a lack of coordination between the national and local levels in terms of directions and priorities for policy and project development. In practice, the explanation for this gap originates in a clash between the interests of the local stakeholders and the national priorities in terms of energy policy (Kostka & Hobbs, 2012). Furthermore, the coordination gap may be caused by a low success rate or insufficient impact of local actions required for achievement of the commitments (Bell, Gray, & Haggett, 2005).

Indicators of National-to-local coordination gap:

- *Actions at the local level do not correspond to the national level priorities (e.g. different sectors).*

- *Support from the national level to implementation of local energy efficiency actions is lacking or insufficient.*
- *Impact of energy efficiency actions in terms of actual energy savings is not sufficient to achieve national commitments.*

National-to-local replication gap: energy efficiency actions are implemented in the municipality and align with the national commitments, however, there is no plan or intentions to replicate or scale-up the actions. In relation to the replication of actions within the same municipality, the gap is potentially caused by limited resources to invest in further projects or by lack of planning to scale-up with related actions. To enhance the process of replication, however, national and local governments shall develop plans and guidelines on how to scale-up successful energy efficiency actions. In addition, the local capacity of governmental officials, as well of the private sector needs to be developed in order to channel required skills and competencies for the replication of actions (Rydin, Natarajan, Lee, & Lock, 2018) (Holtz, et al., 2018).

When the replication is related to different municipalities, multiple factors should be taken into account, e.g. whether local governments have access to similar resources and/or have similar sectoral priorities. In this case the national government plays a crucial role, as it is able to initiate replication efforts under national programmes targeting multiple municipalities. Alternatively, the initiative might directly come from the municipalities themselves, when driven by the motivation to learn from success stories or to reduce the transaction costs of implementation. In this case, it is very helpful for municipalities to have access to a platform or network that enables them to exchange experiences and seek opportunities for collaboration.

Indicators of National-to-local replication gap:

- *Local government does not have plans or allocated resources to replicate energy efficiency actions in other areas of the municipality.*
- *National government does not have plans or allocated resources to replicate energy efficiency actions across different municipalities.*
- *Municipalities themselves are not initiating the replication process of good practices in other municipalities within the country.*

Finding the gaps

The methodological framework was applied to analyse 10 municipalities in Argentina on the basis of interviews and desktop research. Below the results are presented, which explain whether a gap was detected in the municipalities.

National commitment gap

Not detected

At the national level, there are policies and other measures in place, which demonstrate the political commitment of Argentina towards improving energy efficiency (see the “Policy Framework” section for more details). The institutional framework has expanded in recent years, demonstrating the national commitment to improve the energy efficiency landscape (see the “Institutional Framework” section for more details). In addition, the policy portfolio incorporates energy efficiency through plans, laws and other forms of regulation, especially for energy efficient lighting. Therefore, the national commitment gap is not present.

Local action gap

Detected in 4 municipalities out of 10

The municipalities under analysis implemented few energy efficiency projects mainly targeting street lighting. The most recurrent actions included: installation of LED lights for street lighting and residential buildings; educational campaigns, also in collaboration with schools to increase awareness amongst students; installation of water metres to improve water efficiency in the residential sector and foster energy savings; energy audits of municipal buildings. These actions, however, emerged as stand-alone, relatively small scale projects, or as pilots. Therefore, their impact is considered limited, which indicates the presence of the local action gap.

The reason for the limited nature of the above-mentioned projects is the lack of strategic planning from the municipalities in matters of energy efficiency. In fact, the municipalities under analysis lacked local energy efficiency agendas and roadmaps, which the interviewed experts attributed to the lack of local capacity and technical expertise. Consequently, the policies developed in these municipalities did not lead to concrete implementation steps and the designed projects did not lead to the expected impacts. For instance, one of the municipalities experienced that, due to the lack of local capacity, a number of energy efficiency projects were not completed. Other interviewees explained how the limited skills of the personnel influenced the results of some projects, which produced sub-optimal outcomes in comparison to the planned ones. Hence, the lack of trained energy efficiency officers and the consequent

dependence on international expertise led to limited effectiveness of the project design. This was often not aligned with the local context, inducing the local action gap. Furthermore, the municipalities experienced challenges in the implementation phase of energy efficiency projects also due to limited access to financial resources. The interviewees explained that the current financing of energy efficiency projects comes mainly from the municipalities themselves, as it is difficult for them to access funds from external agencies. Funds and other forms of investments in energy efficiency tend not to be directed towards small and medium municipalities¹, and their constrained budgets further prevent the implementation of successful local actions.

National-to-local coordination gap

Detected in 3 municipalities out of 10

Municipalities with scarcer resources have to rely to a large extent on external funding and expert assistance in order to develop local energy efficiency actions in line with the national commitments. One of the interviewees, who was responsible for environmental matters in the municipality, explained that in order for the local actions to take place *“the support of the provincial government is needed”*. The multilevel governance system with different priorities, resources and capacities demonstrates that a well-functioning coordination between local and national or provincial governments is compelling to enhance energy efficiency improvements. The municipalities under analysis argued that the national government provides very limited support to small and medium municipalities, as the national funds tend to prioritise larger cities. Consequently, the implementation of policies and programmes is limited in smaller urban areas. Moreover, international investors and financial institutions tend to target larger municipalities, as these potentially demonstrate a more reliable borrowing capacity and offer project opportunities of a larger size. The preference for larger municipalities over the smaller ones aggravates the access of the latter ones to project finance, limiting the implementation scale of actions.

During the interviews, a number of municipalities emphasized that the lack of coordination with national actors was one of the main reasons for the limited nature of local energy efficiency actions. These municipalities reported that they are allocating the internal resources to strengthen collaboration with provincial and national institutions, as they see them as driving forces for energy efficiency improvement. At the same time, the support from the high levels of governance² to the local level is often perceived as insufficient and the coordination between national and local actors is limited. Therefore, it is demonstrated that the national-to-local coordination gap is present and that there is a strong reliance of the local governments on the guidance and assistance from the higher levels of governance.

¹ In this paper, based on the consultations with local stakeholders, the authors refer to a municipality as ‘small’, if its population is less than 50,000 people, and as ‘medium’ if between 50,000 and 100,000 people. When the population is above 100,000 people, the municipality is considered as ‘large’.

² I.e. provincial and national levels.



National-to-local replication gap

Detected in 3 municipalities out of 10

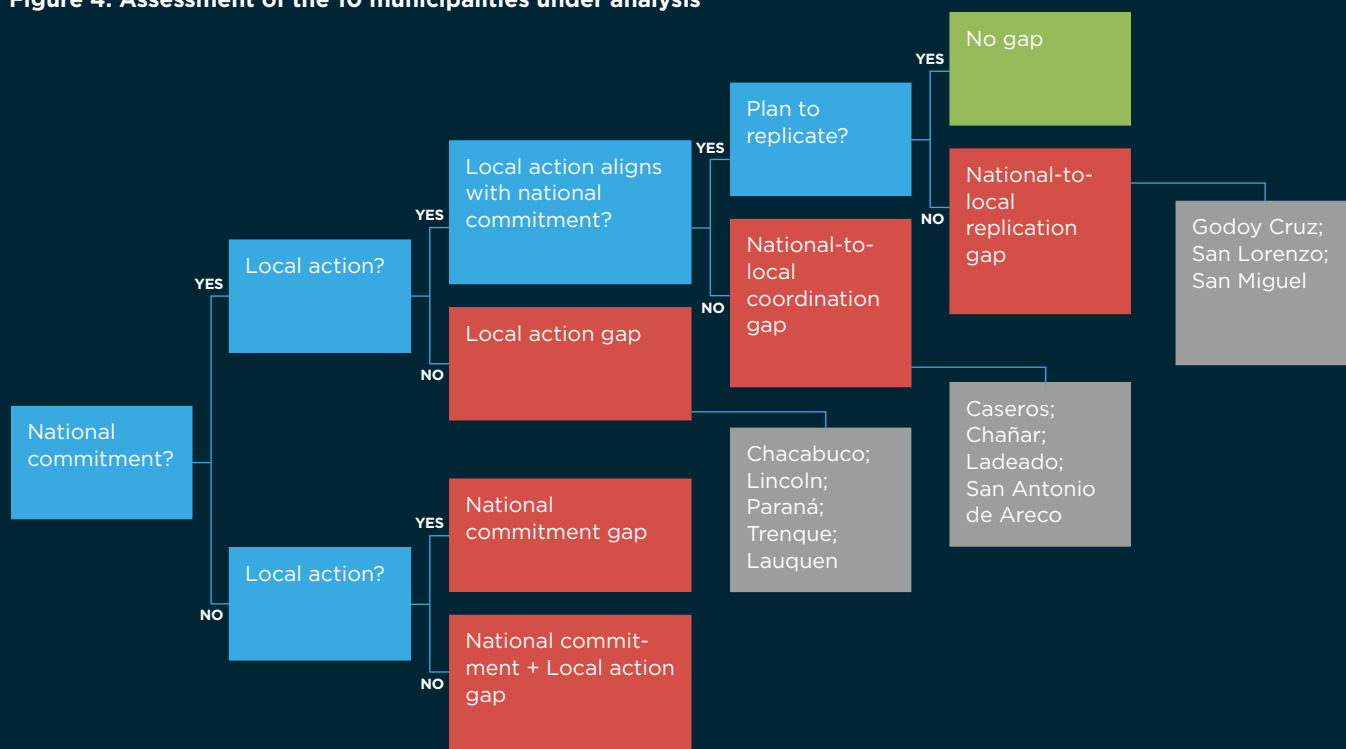
The municipalities implemented successful energy efficiency actions and benefitted from the support from and coordination with the national and provincial institutions. Yet, they have not demonstrated efforts to replicate their implemented actions, as of March 2019 (examples of such actions include: bicycle sharing projects, LED retrofits of street lights and residential buildings, energy efficiency training for stakeholders in the commercial sector, and update of buildings standards). The national government also has not expressed the intention to replicate lessons learnt from these good practices in other municipalities across the country. This provides the indication of a national-to-local replication gap. This gap reduces the impact of energy efficiency actions, which could have been much more significant if the potential for replication and the economies of scale were realised. Furthermore, the generated knowledge and the capacity built during the implementation of good practices might be lost or remain underutilised, if the replication of efforts does not take place. Replication of good practices is often hampered by insufficient planning at the local level and by the lack of specific targets and vision to achieve more significant impacts in terms of energy savings and GHG emissions reductions. Several interviewees stated that more cities should get involved in the development of energy efficiency frameworks, in order to have information channels for local policies, plans and projects. As such frameworks are not developed, the replication gap is present and restricts the upscaling of energy efficiency improvements.

Bridging the gaps

This section explores potential solutions that can assist the mitigation of the detected gaps. It starts provides a compilation of generic recommendations that any municipality in Argentina (and potentially in other countries) can benefit from in their efforts to bridge the respective gaps.

- Even though the **national commitment gap** is not present, as a number of national energy efficiency policies are in force, it is recommended to work on bringing the existing policies up to date. For instance, the National Programme for Rational and Efficient Use of Energy dates back to 2007, which, hence, was adopted prior to the Paris Agreement and the restructuring of the institutional framework for energy efficiency. Moreover, the NDCs should directly reflect the institutional commitment to energy efficiency and be retranslated into, for instance, quantitative country-wide targets for reducing energy consumption and/or energy intensity.
- There is an urgent need to develop functional business models for municipalities to access finance for design and implementation of energy efficiency projects. The significant reliance of municipalities on national support and resources, as well as international grants, limits the scale and magnitude of implementable actions. Making a business case out of energy efficiency investments and finding out financial models applicable in the local context is a crucial step to overcome financial constraints and boost the market for energy efficiency actions, thereby mitigating the existing **local action gap**.

Figure 4. Assessment of the 10 municipalities under analysis



- Building new and improving existing local capacity to design and implement energy efficiency actions is crucial for mitigating all the detected gaps. The availability of skilled and competent human resources may be eventually increased by the introduction of education dedicated to energy efficiency. In addition, vocational training programmes, international experience exchange schemes and professional events would be highly beneficial. This will boost the effectiveness of local actions and improve the coordination with other levels of governance through more effective communication channels. Therefore, enhanced human resources would improve the alignment of priorities to the same goals across the country, thus addressing both **local action gap** and **national-to-local coordination gap**.
- Municipalities should lead by example and set their own local energy efficiency targets and priorities. This would demonstrate to the high levels of governance the need to develop this direction of work further. Having achieved a better understanding of what are the energy efficiency benefits and the opportunities at the local level, municipal governments should clearly communicate their needs to the institutions at provincial and national levels. These communication and coordination channels would encourage political changes regarding energy efficiency. Hence, the alignment between national, provincial and local priorities, as well as their translation into respective strategic documents, specific targets and indicators to track progress will reduce the **national-to-local coordination gap**, while encouraging further implementation of energy efficiency actions.
- The design of every energy efficiency measure should always go beyond the timeline of the current projects and include a strategy for replication and dissemination

of lessons learnt and good practices in other localities. It will reduce the transaction costs of implementing future actions and help to bridge **replication gaps** both at the national and local levels.

Closer look at municipalities

Ten municipalities in Argentina were closely examined as case studies during the preparation of this publication. Besides the generic recommendations presented above, the following context-specific recommendations are suggested for selected five municipalities under analysis to support the on-going work of local governments in improving energy efficiency.

Caseros [detected coordination gap]:

The municipality developed various actions aiming to improve the rate of energy efficiency improvement, based on the results of data collection of local energy consumption habits. These actions, for instance, include: investments to efficiently retrofit public buildings, design of a local energy plan, installation of LED street lights and educational campaigns on energy efficiency. The limited knowledge of the local technical experts on energy efficiency was mitigated by involving universities in the consultation and design of projects. Issues related to the coordination between provincial and national institutions, as expressed by one of the interviewees, challenge the implementation of energy efficiency actions, especially in light of limited financial support from other institutions. While at the national level energy efficiency policies are advancing, corresponding implementation actions at local level are missing, which creates a misalignment of efforts between these levels of governance, thereby creating the national-to-local coordination gap. The following recommendations can

be useful in order to bridge the detected coordination gap in Caseros:

- To establish more efficient communication channels between local and provincial level policy-makers on energy efficiency actions. It can be achieved, for example, through the establishment of a dedicated agency or a task force on energy efficiency, which would involve representatives from all the levels of governance, as well technical experts and other stakeholder groups. Such an institution should have a mission to come up with a roadmap and implementation plan for energy efficiency measures, clearly divide responsibilities among respective institutions and establish a framework for achieving the goals agreed upon.
- To develop training programmes on energy efficiency and project development for policy officials and vocational trainings for technical professionals to build local capacity. It is recommended to take into account international expertise and available good practices in the development of these programmes.
- To establish educational and information campaigns on the importance and multiple benefits of energy efficiency, to promote it among citizens and increase the political support towards this topic.

Chacabuco [detected action gap]:

In Chacabuco, a number of actions have been implemented over the recent years, e.g. educational campaigns on energy savings, promotion of good practices, development of a local GHG inventory, LED retrofits of street lights, and installation of energy efficient appliances for the water pumping in residential buildings. However, most of these actions had a more demonstrative nature, rather than systematic. Focus on pilot projects was driven mainly by the lack of financial resources for larger projects implementation and replication, as well as the lack of local technical skills. According to the local undersecretary of the Environment and Urban Development, Chacabuco receives limited support and investments from external institutions. The municipality also experiences lack of cooperation with national authorities, whose funds are seldom directed towards small municipalities as the priority is usually given to the larger ones. The data depicts that Chacabuco operates with limited self-financed resources and human and technical capacity, as well as without any municipal level strategic framework or action plan on energy efficiency. Thus, the energy efficiency related implementation so far has been fragmented and at a small scale, which is an indicator for the local action gap. The following recommendations aim to provide some starting points to bridge this gap:

- To develop a strategic framework on energy efficiency for Chacabuco in line with the provincial and national agendas. This framework shall set clear targets for energy efficiency improvements, identify priority action areas and suggest implementation steps and potential measures in these areas in order to achieve identified goals. The framework should clearly state the agencies and institutions responsible for its implementation.
- To improve the knowledge and skills of local officers on energy efficiency. This can be achieved through the

involvement of international experts, as well as other relevant competent experts from other municipalities. The design of projects and policies should be in line with the adopted strategic framework.

- To improve dissemination of information on energy efficiency success stories to boost the interest of policy-makers and of the general public, in support of projects on energy efficiency improvements.
- To participate in knowledge sharing channels related to energy efficiency measures implemented in other municipalities, also through RAMCC and other organisations, to learn how to attract external investments, manage the funds and ensure effective project implementation.

Godoy Cruz [detected replication gap]:

Amongst the analysed municipalities, Godoy Cruz is one of those that implemented energy efficiency actions in coordination with the national commitments for energy efficiency. Examples of such actions include: retrofit of street lighting using the LED technology, replacement of appliances in public buildings with more energy efficient alternatives, creation of trainings for energy managers for public buildings, and establishment of an energy consumption auditing body for Godoy Cruz. In fact, the municipality receives notable support from provincial and national institutions for the implementation of such actions, principally due to the fact that Godoy Cruz is a large municipality and one of the most populous ones in the Province of Mendoza. This support and coordination, according to the director of Environment and Energy for the municipality, is one of the most facilitating factors for the implementation of energy efficiency projects in Godoy Cruz. Nevertheless, the replication gap is identified, as the actions which were implemented so far have not yet been replicated and there are not definitive plans at the municipal or national levels to bridge this gap. The following recommendations are suggested for Godoy Cruz in order to mitigate the national-to-local replication gap:

- To analyse and document the lessons learnt from the successfully implemented projects.
- To develop a replication plan for other parts of the city, where similar projects can be implemented.
- To analyse needs for allocating resources and building capacity required to execute the replication plan.
- To allocate available funding and apply for additional funding, where it is possible to increase the scale of replication activities.
- To expand the credit programme that is currently facilitating the purchase of photovoltaic solar panels, in order to also include energy efficient appliances. This programme targets also private citizens and would provide substantial incentives to households to increase their energy efficiency.
- To participate in knowledge-sharing networks, to learn how other municipalities in Argentina and other countries replicate successful actions.
- To share the lessons learnt from design and implementation of energy efficiency actions with the national government and other municipalities for potential future replication efforts.



Lincoln [detected action gap]:

According to the local Coordinator for Renewable Energy and Energy Efficiency in Lincoln, there is a number of energy efficiency actions starting to take place in the municipality. These, however, as indicated by the interviewee, are mostly at the planning stage and include efficient retrofit of public buildings and development of capacity building activities for the commercial sector. Moreover, the municipality has been retrofitting the street lights with LED technologies for more than one year. The Inter-American Development Bank provided a subsidy to finance 70% of the costs of the retrofit, with the requirement for co-financing of the remaining 30% by the municipality. At the moment, the costs are being covered by the municipality as the external funds for this project have been provided. As of March 2019, 400 street lights out of the total 8500 were retrofitted and Lincoln intends to continue with this project. Nevertheless, the scarcity of funding and human resources impedes the full realisation of the project plan. In fact, the municipality is currently seeking for further external financial resources to support the continuation of this project. Therefore, until now, this action demonstrated a sub-optimal scale, as it has covered less than 5% of the street lights in the city. In addition, the project is suffering from limited financial and human resources available in the municipality. The municipality is not benefitting from sufficient support from provincial and national institutions, according to the interviewee, as national funds prioritise larger municipalities. The Law on improving sustainability of buildings (Ley 13.059) (both public and private) was adopted at the provincial level, which includes requirements for energy efficiency measures. However, the guidance for implementation of this law at the municipal level has not been provided, and at the moment the local enforcement of this law is insufficient. Thus, based on the detected local action gap and the contextual situation of the municipality, the following recommendations are proposed:

- To seek for international or local assistance in developing a business model to proceed with the LED retrofit project, for example through the involvement of private sector and establishment of a Public-Private Partnership (PPP), with the aim to replace all inefficient street lights in the municipality.
- To design a penalty system for non-compliance with the building codes, in line with the provincial law for sustainability of buildings. This shall be applicable to new buildings in the municipality and should be potentially linked to issuing of building and occupancy permits supported by independent building inspections, in order to comply with the building regulations.

San Miguel [detected replication gap]:

San Miguel started to develop its local energy efficiency agenda in 2017, to a large extent encouraged by the visits of the Danish Embassy and the Copenhagen Centre on Energy Efficiency, according to the interviewee. Consequently, since last year, the municipality has started to include energy efficiency in their local policy agenda. Since then, the municipality has implemented projects, such as LED retrofits of street lighting, which included large investments from San Miguel, and training local technical officers in energy management. Building off the trainings, the officers produced a plan to retrofit public buildings, focusing on lighting, appliances, insulation and windows. The general Director of the Department of Environment and Industry of San Miguel explained that the municipality aims to implement this plan in coordination with other municipalities, which will be based on an agreement across them. Moreover, San Miguel has been working on updating local building standards, which were first adopted in 1956 and have not been updated since 1986. This will include also a system of rewards for the most energy efficient buildings. Despite presence of energy efficient actions in the municipality and coordination with national

institutions, limited resources do not allow for replication of these actions. San Miguel's local government has a small technical team working on energy efficiency matters and their workload and resources restrict the capacity of the municipality to replicate and upscale their projects. The detected national-to-local replication gap is recommended to be bridged through the following measures:

- To include a replication plan in the program for public buildings retrofit, in order to coordinate the potential upscaling of efforts across the municipalities.
- To develop a set of energy efficiency standards for appliances. While the standards for the building sector are going to be updated, the municipality lacks Minimum Energy Performance Standards (MEPS) for appliances and energy-consuming equipment.
- To include actions to improve energy efficiency of space cooling. Its demand has been increasing in the city during recent years, caused by proliferation of high-rise buildings and insufficient usage of external shading in these buildings. The municipality could consider district cooling as one of potential measures to mitigate this problem and replicate it in several districts of the municipality in order to achieve a notable impact.
- To train technical officers on importance and benefits of energy efficiency as a cross-cutting topic relevant for multiple departments of the municipal government. The Department of Environment and Industry, as the key actor on energy efficiency, should be encouraged to collaborate with different departments and mobilise more human resources and relevant competencies through this engagement. Consequently, the increased availability of local resources is expected to facilitate replication and upscaling of energy efficiency projects in the municipality.

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