

Energy Efficiency in the Building Sector: an Emerging Economies' Perspective

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ABSTRACT

The rapid rate of economic growth and the fast pace of urbanization in emerging economies pose significant challenges for global energy consumption and security. According to the International Energy Agency, the total annual energy consumption in the buildings sector of non-OECD economies has recently outstripped the total annual energy consumption of OECD economies buildings sector. According to the Global Buildings Performance Network, China's building stock will nearly triple between 2012 and 2030 with a potential increase in annual energy use of 160% by 2050. During the next two decades, India plans to build 53 new cities - each with over 1 million residents.

Fast growing economies need to renovate their existing building stock and to ensure that new buildings are energy efficient. To address this challenge, international organizations have established programs to promote exchange of international best practices and build on relevant national policies.

This paper examines programs implemented in Brazil, China, India, Russia and South Africa. Twelve projects financed by the Global Environment Facility, United Nations, regional development banks, and bilateral development agencies are evaluated to determine the most efficient tools used to leverage national initiatives that promote energy efficiency in buildings, municipalities and cities. It presents a typology of the projects to provide information on: (a) best available technologies, (b) best practices for increased energy efficiency and use of renewable energy, and (c) lessons learnt from national policies and the efforts to complement them with international support.

Introduction¹

Emerging economies are facing important energy-use challenges. Firstly, economic and social changes lead to a pressing need for new buildings. It is estimated that China's building stock will nearly triple between 2012 and 2030. Meanwhile, India is planning to build 53 cities in the coming two decades, each with over 1 million residents. These building projects will increase domestic energy consumption. By 2050, China's building annual energy use is likely to increase by 160% (GBPN, 2012). In Africa urban population is expected to double across the continent between now and 2030. Secondly, consumer behavior amongst the emerging middle classes is likely to change in the quest for greater comfort. For instance, in India, room air conditioners demand has been growing at an average rate of 20% per year over the last ten years. This trend is likely to accelerate as in 2010; the room air conditioners saturation in urban households was limited to 3% (compared to 100% in China) (SEAD 2013). Finally, emerging economies such as China or India cover different climate zones, which appear as an additional difficulty to design and adjust national building policies and standards compare to smaller countries.

¹ The author wishes to thank Benoît Lebot, Sung Moon Jung and Lupita Johanson for their advices and review.

International donors such as the World Bank or United Nations entities have been providing policy, technical and financial support for the design and implementation of building energy efficiency (EE) and renewable energy (RE) programs in these countries. These programs do not have the ambition to address all the issues of the sector as they are designed to complement national policies, and to support them by bringing international knowledge and expertise through pilot projects to be later replicated by the national authorities. They “seek to build basic organizational capacity in governments, technical competence among officials and professionals, and awareness among all these constituencies about how and why to pursue energy efficiency” (UNDP 2012, p. 1). Most of these programs consist of “*on-site*” project implementation and have resulted in the identification of local best available technologies, best practices, and lessons learned. This paper provides an overview of the programs implemented in Brazil, China, India, Russia and South Africa. It is based on the Making Energy Efficiency Real (MEER) database developed by the International Partnership for Energy Efficiency Cooperation (IPEEC) and available online (IPEEC 2014).² These programs have generated practical and useful lessons as well as best practices that are often underrated.

Table 1 summarizes each program, target country, main donors, implementing agents, project type, and budget; along with a short description for each project. Project types include capacity building (CB), institutional strengthening (IS), standardization (S), information campaigns (IC), TA, EE, and RE. Most of them are implemented in China (7 projects out of 13) and Russia (4 projects). These projects focus on a broad range of topics within the building efficiency sector. Some are city-level projects (see projects 1, 4 and 5). Others focus on a specific sector or sub-sector (project 6, 7, 8, 9 and 10) or to a broader range of issues at the national level (project 2 and 13). Some projects identified specific lessons learned in EE finance and Energy Performance Contract (EPCs - projects 4 and 9), building codes (project 5), and in energy consumer behavior (project 6). Seven of these projects involve loans from a development bank. Most of the projects aim at capacity building, technical assistance (TA), and/or strengthening institutions. Overall, the purpose is to enhance human and technical capacities of domestic institutions in order to promote EE in the built environment.

In Brazil, India, and South Africa only one project was identified. These three countries are not only large but also cover different climate zones which are an additional challenge for policies that aim to improve building EE. The sources of information used to identify lessons learned or best practices are taken from official documents such as project evaluations or project appraisals. Although these projects involve different actors in different countries, and sometimes focus on different sub-sectors; the conclusions and lessons learned tend to be very similar.

Most of the documents related to the projects listed here describe institutional arrangements for project management. Putting these arrangements in place included estimation of government capacity to support the project, identification of appropriate stakeholders, and development of collaborative and sustainable working relationships (UNDP et al. 2010).

² The IPEEC MEER database provides a list of multilateral energy efficiency initiatives in Brazil, China, India, Mexico, Russia and South Africa. MEER maps and evaluates international energy efficiency programs to explore how they complement national energy efficiency policies.

Table 1. International EE programs

#	Project Name	Target Country	Main Donors	Implementing Agents	Project Type	Budget
1.	Rehabilitating Buildings in Wuhan	China	French Development Agency (AFD), ADEME	Wuhan Municipality	CB, EE	EUR 20 million
2.	China End-Use Energy Efficiency (EE) Project (EUEEP)	China	United Nations Development Program (UNDP), Global Environment Facility (GEF)	China's National Development and Reform Commission (NDRC)	IS, TA, EE	USD 80 Million
3.	China Urban-Scale Building EE & Renewable Energy	China	GEF, World Bank	Ministry of Housing, Urban and Rural Development (MOHURD), Beijing & Ningbo municipalities	S, TA	USD 164.1 million
4.	Green Energy Schemes for Low-Carbon City in Shanghai	China	GEF, World Bank	Shanghai & Changing governments	TA, EE, RE	USD 246 million
5.	Sino-Singapore Tianjin Eco-City	China	GEF, World Bank	Sino-Singapore Tianjin Eco-city Administrative Committee	CB, TA, EE,	USD 64.1 million
6.	Heat-Reform & Building EE Project	China	GEF, World Bank	MOHURD	CB, EE	USD 18 million
7.	EE Improvements in Commercial Building	India	UNDP, GEF, Swiss Agency for Development & Cooperation (SDC)	Bureau of Energy Efficiency (BEE)	TA, EE	USD 180,000
8.	Market Transformation for EE in Buildings	Brazil	UNDP, Inter-American Development Bank (IDB), GEF	Ministry of Environment	CB, EE	USD 136 million
9.	Improving Efficiency in Public Buildings	Russian Federation	GEF, European Bank for Reconstruction and Development (EBRD)		TA, CB, EE	USD 78 million
10.	Improving Urban Housing Efficiency	Russian Federation	GEF, EBRD, World Bank		CB, IS, EE	USD 97.5 million
11.	Building EE in the North West of Russia	Russian Federation	GEF, UNDP	Local governments	CB, EE	29.2 million
12.	Promoting Energy Efficiency in Russian Residential Housing	Russian Federation	Ministries of Foreign Affairs, and of Employment and the Economy (Finland), International Finance Corporation (IFC), GEF	Government agencies	IS, IC, EE	NA
13.	Danish-South African Cooperation on Renewables & EE	South Africa	Danish Ministry of Foreign Affairs	South Africa's Department of Energy	CB, TA, EE, RE	NA

Table 1. (continued)

#	Project Name	Short Description/Objectives
1.	Rehabilitating Buildings in Wuhan	Rehabilitation of 30 Wuhan City public buildings
2.	EUEEP	Remove barriers to the widespread application and practice of energy conservation and energy efficiency in the major energy consuming sector (buildings and industry).
3.	China Urban-Scale Building EE & Renewable Energy	Support transformational scaling-up of EE & RE in urban centres through city pilots/demonstration and national replication/dissemination
4.	Green Energy Schemes for Low-Carbon City in Shanghai	Improve EE and increase the use of RE, natural gas, and advanced clean energy technologies in the Changning district (Shanghai).
5.	Sino-Singapore Tianjin Eco-City	Assist local governments to develop an energy & resource efficient and low GHG emission city in Tianjin, focusing on public transport system and green building pilot investment.

6.	Heat-Reform & Building EE Project	Improve EE in urban residential buildings and heating systems in China's cold climate regions
7.	EE Improvements in Commercial Building	Reduce energy consumption in large commercial buildings by integrating appropriate design interventions such as lighting, heating, ventilation, and AC systems.
8.	Market Transformation for EE in Buildings	Address the main barriers to the adoption of EE measures & technologies in buildings: poorly understood EE techniques, reluctance to invest, complexity of accessing 3 rd party financing & performance contracts, and lack of access to performance risk mitigation options.
9.	Improving Efficiency in Public Buildings	Combine technical assistance and financing to overcome common obstacles to financing EE improvements in public buildings such as kindergartens, schools, hospitals, and public offices.
10.	Improving Urban Housing Efficiency	Integrate all EE concerns into all phase of municipal housing, from planning to refurbishment and maintenance.
11.	Building EE in the North West of Russia	Build local capacities and demonstrate local solutions to improved EE in construction & maintenance of buildings in the North-West region of Russia
12.	Promoting Energy Efficiency in Russian Residential Housing	Create an effective legal and institutional platform to support local homeowner associations and housing management companies in obtaining access to financing for EE renovation of residential multi-family buildings
13.	Danish-South African Cooperation on Renewables & EE	Assist South Africa's Department of Energy to develop comprehensive policies & strategies that contribute to the efficient or RE & EE technologies by 2025.

According to the World Bank (2010), EE and other similar measures can increase the cost of building construction by up to 14%. As most of the real estate developers or consumers are usually reluctant to bear additional costs, governments must play a role in promoting EE through incentives and other mechanisms. Inter-governmental organizations can help by providing international technical and financial resources. For example, in Project 6, the World Bank implemented some standards in the Huayuan Borui Community (in China) that had not yet been carried out in the district (Baeumler et al. 2013, p. 189).

This paper will focus on the most commonly identified barriers in EE building projects, as well as on best practices to address them during the project design phase. It will then list lessons learned in several areas: government involvement, coordination between central and local governments, links between RE and EE and finally, energy consumer behavior.

Important Barriers in Project Implementation and How to Address Them During the Project Design Phase

Official project documents list barriers to the widespread implementation of EE policies and measures. The eight most important barriers are as follows: 1) policy frameworks, 2) data collection processes, 3) local human resources, 4) building EE standards, 5) building EE information dissemination, 6) technology and EE products, 7) financing mechanisms and split incentives, and 8) replicating projects.

Strategies to overcome these challenges should be discovered during the evaluation of each project and included in the next project design phase. As a starting point, international donors' actions in emerging economies should aim to support existing initiatives and to develop the current infrastructure capabilities within such countries. In order to successfully conduct the project, international donors need to have a good knowledge of the existing local capacities within each country. Practically, this involves stakeholder mapping, identification of potential partners, as well as the identification of proper cooperation mechanisms and subcontractors. This should also include appropriate evaluation studies of each project to provide feedback regarding

whether the project met its objectives. Such a mapping should not only consider the implementation of the project but also its evaluation and dissemination/replication. UNDP (2010) highlighted the need to identify the appropriate subcontractors and establish with them contracts that are easy to manage.

Each organization usually has its own methodology for evaluating the projects. For instance, the “project results framework” or “logical framework” (logframe) is a project management tool used by GEF and other organizations, which establishes performance indicators. Logframes were at first developed by the USA International Development Agency (USAID) in the 1970s and have improved significantly over the past decades. Other tools include a *GEF Manual for Calculating GHG Benefits of GEF Projects* (2008 and currently under revision) (DSE 2006, UNDP 2010). In addition, a significant component of each project includes on-going monitoring and verification processes. The evaluations conducted during the project can sometimes lead managers to reorient their activities in order to ensure the success of the project. For instance, the International Finance Corporation (IFC)’s China Utility-Based Energy Efficiency Finance Program (CHUEE) was firstly designed to target Chinese utility companies. Due to some problems with the original participating companies, the program was reoriented in order to support financial institutions that provide loans to end users (Wang X. et al, 2013).

The project evaluation and design phase should also define the proper monitoring tools, sample size, site visits, analytical methods, and assessment of results. UNDP (2010 and 2012) insist on the need for solid project logical framework with both quantitative output and impact indicators, and with adaptive management. In terms of a building’s efficiency, the measurement of a building’s performance is a key indicator for success. Finally, English should be adopted as the language for the final project reviews. This makes assessment of the project results available to a wider audience.

Involve Governments

The first step of the project is to ensure the involvement of different level of governments. International donors and more specifically multilateral and regional organizations are well-positioned to coordinate government actions. This often starts with capacity building and training programs.

Capacity building for public officials is crucial to ensure sustainability and replicability of the project. This will also ensure that government officials in charge of policy implementation are engaged. The attention should first focus on the government capacity to support the project. For example, the UNDP End-Use Energy Efficiency Project (EUEEP) involved different representatives from the Chinese central government, including the National Development and Reform Commission (NDRC), Ministry of Construction, Ministry of Housing, and Urban-Rural Development (MoHURD), Ministry of Natural Resources and Environmental Protection (MoNREP), and Ministry of Finance. In addition, the UNDP involved stakeholders from provinces and municipalities such as Guangdong, Shanghai, Beijing, Tianjin, Jiangsu, Shandong, Hebei and Fujian. Most importantly, the UNDP developed relations with the NDRC (UNDP, 2010). Stability of contact persons within the state administration is important.

Maintaining relationships with the government during all the projects can be challenging as officials tend to be transferred from one department or locality to another. The GEF (2011) recommends targeting authorities that are specifically dedicated to the building sector. After the officials move from their positions, they can implement the lessons learned in other localities or

departments, and train their new colleagues. “On-site” training sessions need to be complemented with web-based activities, as this will ensure successive officials can be trained.

To be successfully implemented, policies and measures also need support from private stakeholders (GEF, 2010b). Governments do not have the capability to implement all phases of the project as there is little experience in conducting due diligence with sub-borrowers. Project managers need to identify the main stakeholders of the sector and establish sustainable working relationships with them (UNDP, 2010). According to the World Bank (2005), government oversight of these activities remains crucial.

Improve the Coordination Between the Central and Local Levels

City-level authorities are often the most relevant actors in developing and implementing building efficiency policies. The IBRD (2013a) notes the importance of the combination of national leadership and city-level innovation and actions in order to promote sustainable urban development. GEF (2009b and 2010b) insists on the importance of municipal legislations. All of these aspects can be crucial to implement EE reconstruction projects and can even promote innovative financial and institutional solutions within the national framework. The GEF also recognizes China’s experience in doing so. The World Bank has turned this lesson learned from China into a best practice. Most of the projects it finances or manages are conducted at the city level in China such as in Beijing, Ningbo (project 3), Shanghai (project 4), Urumqi, Tianjin, Tangshan and Dalian (project 6). The World Bank also finances EE projects in different Russia cities (project 11). Similarly, the French Development Agency and the ADEME chose to focus on the city of Wuhan in China to promote building EE. Finally, project 5 is about city-level cooperation on low-carbon technologies between two municipalities from two different countries (Tianjin in China and Singapore). All these projects act as “pilot projects” in order to be replicated by the national authorities. The implementing agent needs to make sure that there is no fragmentation of measures over the states and municipalities.

Comprehensive work at different levels of government sometimes requires different layers within the projects. For instance, Project 2 (referred as EUEEP), implemented by UNDP and the NDRC and under a GEF funding aimed to train and build capacity of China’s provincial energy conservation centers including energy audit trainings. This work was later completed by another GEF-funded project, the China Energy Efficiency Financing (CHEEF), implemented by the World Bank. One of CHEEF’s components aimed to provide assistance to the NDRC in the establishment of a National Energy Conservation Center that would complement and reinforce the activities of local centers. It was also planned that the CHEEF would build on the EUEEP’s energy audit trainings to assess potential energy conservation financing opportunities. Finally, both of these projects coordinate with other programs that included a financial dimension. For example, IFC’s CHUEE program and other similar projects from the French Development Agency (AFD) (GEF 2008, p. 4). This example is a good showcase of how multilateral and bilateral organizations can combine and leverage their efforts.

Link EE and RE to Achieve Near-Zero-Emission Buildings (NZEB)

The net zero energy benefit (NZEB) standard has become a policy goal in some regions with high EE ambitions in the European Union³. NZEB can be achieved by a combination of RE and EE measures. Unfortunately, RE and EE tend to be clustered and there is little interaction between the two sectors. RE and EE projects are sometimes managed by different entities within public administrations and therefore involve different experts and different policy implementers. International projects in the building sector, however, combine the two. One of the objectives in project 2 is to remove the combined barriers to widespread application and practices of both EE and RE at the city level. More specifically, project 3 includes one component that focuses on EE in public and commercial buildings. Component 2 benefits from a USD 5.25 million GEF grant and a USD 13.28 million counterpart financing. Component 3 is dedicated to “scaling up commercially viable rooftop solar PV deployment”, with a USD 2 million GEF grant. Components 2 and 3 are used to complement component 1 on low-carbon urban forms (IBRD 2013b). Project 4 also combines RE and EE to promote NZEB, in order to support the Changning district (city of Shanghai) with meeting its carbon-intensity-reduction objectives (IBRD 2013a).

Facilitate EE Finance

Most of the international EE projects in emerging economies involve TA. Adding specific work on an EE credit line can help improve the TA’s effectiveness. Participating banks are then likely to develop EE finance activities after the project is completed. A number of international EE finance projects have already been successfully implemented. For example, the CHUEE which establishes dedicated EE credit lines along with training in private banks in China. The IBRD (2013a) lists the following requirements for a successful project: 1) strong management commitment, 2) involvement of dedicated teams both at headquarters and branches of participating banks, 3) establishment of specific incentives for staff, 4) technical assistance, 5) development of specific marketing and business development as well as new financial products, and 6) shift of bank’s underwriting criteria from balance sheet financing to project-based financing (focused on energy savings).

Another way to promote EE finance in parallel with TA is the development of energy performance contract (EPC). A significant number of projects from multilateral donors aim to develop frameworks for EPCs in emerging and developing economies. Senior experts recognize a number of these projects are extremely difficult to implement (KfW, 2013). The GEF (2010a) identified the following three policy barriers.

1) Legal and contractual limitations and complications in the target country. In Russia, for instance, local authorities suffer from restrictions in terms of long-term contracts involving pre-determined financial commitments beyond one year. It is difficult to reallocate financial savings generated by the EPC to repay the initial energy investments.

2) Lack of knowledge and of financial and technical capacity of energy service providers and municipalities. Public money might not be enough to finance EE investments that will often

³ NZEB is defined by the European Commission (article 2 of the Energy Performance of Buildings Directive) as “a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby”.

only pay off over the course of 5 to 7 years. EPC can help address this barrier, but the target country needs a sustained market for EPC products and services, and local expertise to implement measures.

3) National level barriers to implementation in many municipalities. Some countries lack nation-wide policies aiming at the development of building EPC at the municipal level. When the above-noted policies exist, the establishment of contracts between energy service companies and municipalities can turn out to be very complicated (GEF 2010a p. 11 – 12).

Improve Energy Consumer Behavior

Consumer behavior or attitudes and responses to incentives of financing programs are sometimes more complex to track. These issues need to be addressed when dealing with residential building efficiency, provided that individuals are the main users of buildings. The World Bank (2005) notes that an important component of heating efficiency is to enable consumers to control the quantity of heat they use, and to be billed according to their needs. This type of measure provides financial incentives to purchase EE equipment and to reduce energy consumption. More importantly, the benefits of EE measures need to be clearly demonstrated to the consumers. These measures need to be complemented with building efficiency measures – it is important to combine the action on consumption behavior with technical measures. Finally, a good way to impact consumer behavior is to develop outreach programs that target students from schools and universities. Successful programs will encourage students to adopt energy efficiency measures in their schools and at home. The GEF (2009b) notes that specific attention should be given to universities as they have the potential to become a hub for the dissemination of information on energy efficiency. Other projects can also target middle schools and high schools, as well as utilities.

Analysis of Projects

The analysis indicates that projects need to work on five levels in terms of engagement of governments and coordination between central and local entities (see Figure 1). First, national governments which are project implementers need to ensure that policies promote and do not hinder the implementation of EE measures. For example, specific legislation establishing financial incentives for EE is required. Second local governments must support and help implement national EE policies. Third, all energy consumers especially large consumers must reduce energy use in the private and public sectors. This category is extremely diverse and most of the time focuses on the largest energy users in private or public sectors (project 9), and some projects specifically target private households (projects 6 and 11). Fourth, most of the projects need to involve the financial sector, to implement EE projects. Fifth, universities need to facilitate and dissemination information about best practices to match long-term local and national interests.

In terms of the best available technologies, while all projects are technology neutral, most combine RE and EE in order to achieve the NZEB standard. EPC implementation shows that EE finance mechanisms should be adapted to market maturity. Technologies will change from one building to another: for instance, in terms of lighting, the housing sector will favor interior lighting fixture and control; while the public service sector will promote lighting control systems (World Bank, 2010). Finally, the cost effectiveness and GHG abatement potential of these technologies also need to be considered and will change from one region and sector to another.

This can be done with a carbon abatement cost curve. For instance, IBRD (2013a) found that in Hongqiao (Shanghai) the deployment of hybrid vehicles can reduce carbon emission by almost 180 kton with a cost of almost 12,000 RMB/ton of CO₂. Technologies such as zero energy consumption building, vertical greening, pure Electrical Vehicle and regional public bike rental systems have almost the same potential, but for a cost of less than 6,000 RMB/ton of CO₂.

Capacity building and institutions strengthening are a prerequisite before establishing complex finance mechanisms. Acting on consumer behavior can be challenging, but can help disseminate good practices. It is crucial to ensure that consumers will benefit from EE measures. This analysis confirms that multilateral and bilateral donors are crucial to implement EE policies in emerging economies. They help coordinate the actions of different government entities, bring knowledge and experience, and make investments in EE attractive to investors, utilities and individuals.

Table 2. Lessons learned and best practices

#	Lessons Learned	Best Practices and/or Best Available Technologies
1.	Government support is an essential prerequisite	<ul style="list-style-type: none"> - The project should be consistent with national priorities and plans. This can be an issue as EE in buildings is not often a high priority in the political agenda; - The national government should have a minimum interest in EE. This interest can be strengthened with training, capacity building, advertising and other public outreach activities; - The support must be effective; i.e.: governments must be stable, resistant to corruption and able to enforce laws and regulations. They must be well organized, properly funded and staffed. This will translate differently according to the country: for instance, the articulation between national and local policies can vary from one political system to another; - The national agency in charge of the implementation of the project should have the capability to conduct the work. This might be an issue the EE in buildings tend to be assigned to different organizations (for construction, urban planning, energy, others).
2.	Programs should be prioritized	<ul style="list-style-type: none"> - Building codes should come first, and a strong emphasis should be given to enforcement, with emphasis on training for different stakeholders, publication of guidance manuals on EE building design; - Certification, rating and labeling programs are more complicated to design and implement.
3.	It takes time for policies to show their effect	<ul style="list-style-type: none"> - Projects should be planned targeting long term effects. This can be extremely challenging as most of the stakeholders favor short-term business models.

4.	Project management should be flexible	<ul style="list-style-type: none"> - Impact of EE measures in terms of GHG or energy savings are difficult to measure but projects should include mandatory continuous processes for monitoring and evaluation; - These processes should encourage an adaptive management, in order to allow reorientation of activities if the first results show that the project objectives are not likely to be met.
5.	Pilot buildings can be an effective tool to achieve market transformation	<ul style="list-style-type: none"> - Demonstration projects can be tested in specific areas before being spread to a whole city/country.
6.	Market conditions allowing, projects should include advanced technologies	<p>Projects should:</p> <ul style="list-style-type: none"> - Establish local carbon abatement cost curve in order to identify the most appropriate technologies, - Combine EE and RE, - Nearly-Zero-Energy technologies.

Source: UNDP, 2012

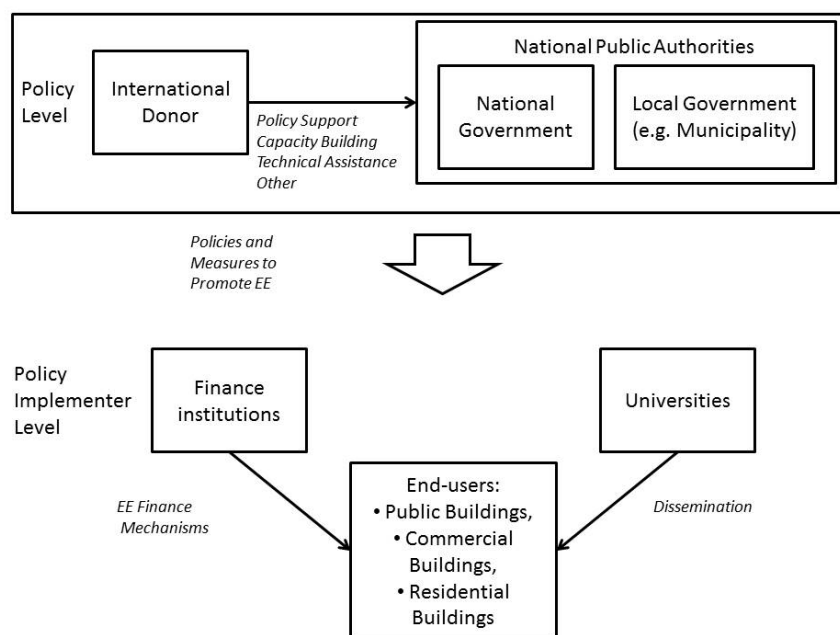


Figure 1. Different potential actors in building efficiency International projects.

Conclusion

The rapid rate of economic growth and fast pace of urbanization in emerging economies pose significant challenges for global energy consumption and security. Thirteen national initiatives that promote RE and EE in buildings are examined in Brazil, China, India, Russia and South Africa. The analysis shows that projects need to work on five levels. First, national government implementers need to ensure that policies promote and do not hinder EE measures. Second, local governments must support and help implement national EE policies. Third, all energy consumers especially large consumers must reduce energy use in the private and public sectors. Fourth, the financial sector must play a key role to enable financing EE projects. Fifth, universities need to facilitate and dissemination information about best practices to match long-term local and national interests. While all initiatives are technology neutral, most combine RE and EE in order to achieve the NZEB standard. EPC implementation shows that EE finance mechanisms should be adapted to market maturity. Capacity building and institution strengthening are a prerequisite before establishing complex finance mechanisms. Acting on consumer behavior can be challenging, but can help disseminate good practices. It is crucial that consumers will benefit from EE measures. Finally, projects should take into consideration the institutional development of the country (i.e. the country's capacity to implement the projects) and expected reactions from the market.

This analysis confirms that multilateral and bilateral donors' are crucial to implement EE policies in emerging economies. They help coordinate the actions of different government entities, bring knowledge and experience, and make investments in EE attractive to investors, utilities and individuals.

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