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Unlocking the Potential: Subnational Policies to Improve Energy Efficiency Financing

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Introduction

Energy efficiency (EE) measures provide one of the most cost-effective ways to reduce global greenhouse gas (GHG) emissions. However, EE measures have not yet reached their full potential due to several barriers, one of the largest being financing. Government policies that enable energy efficiency financing (EEF) have significant potential to scale up EE measures across households, commercial buildings, municipalities, and industries.

In this policy brief, we examine two key issues facing policymakers today:

- What are the key barriers to widespread deployment of EEF policies?
- How have other subnational regions implemented EEF policies, and what commonalities do their policies share?

We then develop a stepwise framework and policy recommendations that address a wide range of EE challenges. Our motivation for undertaking this project is to address the knowledge gap on EEF policies that currently exists among policymakers. This will enable other national and subnational governments to leverage the power of existing programs and better address this pressing global challenge.

Barriers to Energy Efficiency Financing

The market for EE financing faces three types of barriers: economic, institutional, and informational (see Figure 1). These financing barriers negatively affect the supply of funding (i.e., private- or public-sector finance providers are unable or unwilling to provide the required financing) or the demand for funding (i.e., consumers, businesses, or governments are not aware of financing sources or EE measures) or both supply and demand, preventing the market from reaching the optimal EE levels.

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About the Authors

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This graduate team prepared this report as part of the graduate Practicum in Public Policy, a two-quarter sequence required for Master's students in both the Public Policy and International Policy Studies Programs. The client for this project was The Climate Group. The full report can be obtained from the Public Policy Program at publicpolicy@stanford.edu.

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This project was completed for **The Climate Group**, an independent, not-for-profit organization, which brings together a global coalition of the world's most powerful governments, brands and public figures across Asia, Europe and North America.

Existing Energy Efficiency Financing Policies

To address EEF barriers, policymakers have implemented a wide range of programs at both the national and subnational level, with varying degrees of success. For the purposes of this report, we developed detailed case studies on five subnational regions: California (CA) in the United States, North-Rhine Westphalia (NRW) in Germany, New South Wales (NSW) in Australia, Guangdong in China, and Gujarat in India. Table 1 below lists examples of successful EEF policies implemented across the residential, commercial, industrial, and municipal sectors in these regions.

Commonalities in EEF Policies

Through our case study analysis, we found a number of common factors across the five subnational regions. One of the key findings of our research is what we call the "enabling environment," defined as specific policy levers other than financing instruments for

Figure 1. Classification of EEF Barriers

Source: Authors' compilation
a Due to high upfront costs, it takes a long time to recover the initial investment.
b Low energy/electricity prices (negative externality not built in) result in no real incentive to invest in EE.
c The private sector also tends to underinvest in EE, because it may not capture all the benefits from switching.
d The party (owner) responsible for installing the EE upgrades is not the one reaping the benefits of lower energy bills (renter).

Table 1. Successful EEF Policies

Policy Type	Examples of Successful EEF Policies and Sectors
Concessional Loans[a]	On-bill for commercial, industrial sectors (CA); Low interest rate for social sector (CA); KfW[b] loans for buildings and ESCOs[c] (NRW); Electricity transmission efficiency (Gujarat)
Market Loans	Property-Assessed Clean Energy – PACE (CA)[d]
Subsidies	Audits for SME[c] (NRW and NSW); Municipals and ESCOs[d] for industrial (Guandong and Gujarat)
Grants	Schools, utility-level for residential and SME (CA); EE technology and buildings (NRW)
Rebates	Utility-level for residential and industrial (CA); State-funded for EE in residential (NSW)

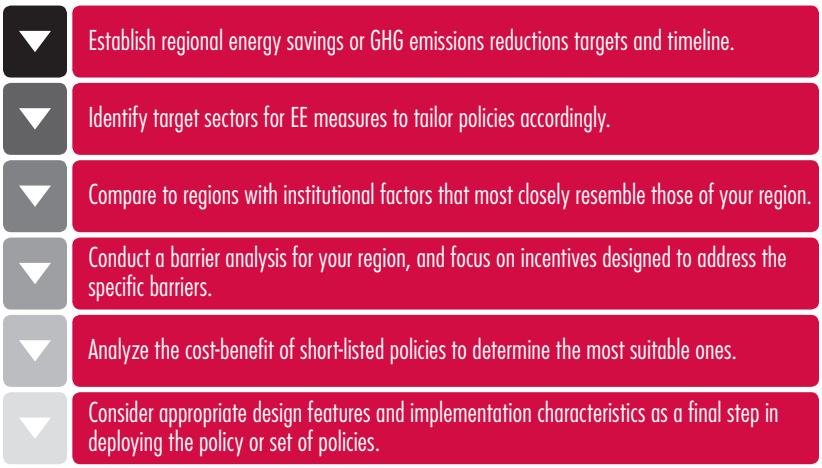
Source: Authors' compilation
a Low-interest rate or extended tenure loans.
b Federally funded German development bank aimed to provide financial incentives for social projects.
c ESCOs (Energy Service Companies), SME (Small and Medium Enterprises).
d The PACE program is currently stalled in many areas due to traditional mortgage providers' objections. We include it as a "successful" policy due to the large uptake of funding, with the caveat that impediments to program implementation need to be resolved for the scale-up of this program.

EE, which facilitate the adoption of EE, thereby enhancing the effectiveness of EEF programs. We found that these ultimately determine the scale of adoption of EE technologies and reductions in energy use and emissions. Some of these policy levers may not have been intended to promote EE specifically, but nevertheless contributed to the adoption of EE measures by creating the right implementation support or incentives to adopt EE. Policies that fall under this category include the following:

- Information dissemination on the potential for implementing EE measures, through free energy audits, online resources, consulting services, etc.;
- Workforce training programs for professionals in the EE sector;
- Policies to promote the Energy Service Company (ESCO) industry;
- Appliance standards and building codes to promote use of the best available EE technologies; and
- Overall climate change or EE targets and policy goals, as well as cap-and-trade schemes not specific to EE.

In addition to the enabling environment policies, all five regions had consolidated programs, targets, and a streamlined process, where a central authority coordinated these programs by setting legislation or an overall policy direction. Successful government subsidies or low-interest loan programs in the five subnational regions have focused on targeting a particular sector. Targeted financial incentives lower transaction costs in implementing the policy, particularly if these are provided to a few upstream companies rather than multiple end users.

Figure 2. Stepwise Energy Efficiency Policy Framework



Source: Authors' compilation

Policy Framework

Based on the case study findings, we have developed a framework to help policymakers determine which policy or set of policies will work best for their subnational region when considering new EE programs or scaling up existing ones. The framework also outlines policy design and implementation considerations as a final step in developing EEF policies. Figure 2 and the discussion following it provide the details of the framework.

a) **Establish regional energy savings or GHG emissions reduction targets and timeline.**

Today, reducing energy consumption and eliminating energy waste are among the primary goals of many countries. The regions we analyzed have set specific targets (USA 11 percent, EU 13 percent, China 27 percent, and India 8 percent of global reductions by 2020)[1] for reducing energy use or GHG emissions. These targets have helped governments implement policies that are geared toward meeting the desired goals in a timely fashion. Without a clear policy goal, the region — including its households, firms, and government entities — lacks direction on the scope and magnitude of what needs to be done to achieve targets.

GHG or energy reduction targets need to be realistic so that the regional economy neither suffers nor fails to deliver overly optimistic goals.[2] At the same time, targets need

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1 Climate Analysis Indicators Tool, World Resources Institute. http://cait.wri.org/figures.php?page=ntn/2-4 accessed on December 2, 2011

to be sufficient to protect the environment and generate associated economic and social benefits in the future. Policy should include both long-term targets and annual or intermediate targets to provide ongoing incentives for reduction.

b) Identify target sectors for EE measures to tailor policies accordingly.

There are numerous energy savings or GHG emissions reduction measures within specific market sectors that have favorable cost-benefit ratios for the end user, but they are currently not being implemented due to the various barriers discussed above. To achieve emissions or energy reduction goals, policymakers must target policies that first overcome barriers in sectors with the most favorable cost-benefit ratios.

c) Compare to regions with institutional factors that most closely resemble those of your region.

Policymakers should recognize that each region or country is starting from a different experience base, economic position, and cultural perspective. When looking for the most impactful instruments in the EE policy toolkit, policymakers should look to regions that most closely resemble their own in terms of cultural awareness about EE and climate change, political structure (federal government vs. subnational autonomy), utility structure, EE market maturity, and capital market sophistication. All these regional characteristics have tremendous bearing on the widespread deployment of EE measures. For example, in places with high levels of tax evasion or low overall tax burdens, tax credits as a policy instrument are less attractive and should be avoided or critically analyzed.

The maturity of the EE market matters significantly for the success of EEF policies. For example, a country such as India, which has limited exposure to EE programs, will find it difficult to move straight to the advanced integration level of the KfW German program without first going through some of the earlier steps in terms of market education and institutional development.

d) Conduct a barrier analysis[3] for your region, and focus on incentives designed to address the specific barriers.

Policymakers should choose the type of policy or set of policies and policy design and implementation features that address the barriers prevalent in that region. Figure 3 can be used as a guide when selecting among various EE policies. For the barrier analysis, policymakers should consider the following questions:

- Which barriers exist in the market for their particular subnational or national region?
- What are the various policy instruments (including both EEF policies and policies that create an enabling environment) that other subnational regions have employed to overcome those barriers?[4]
- Which policies in that subset are most widely used and address the greatest number of relevant barriers?

From the barrier analysis, we note that multiple policies or program types can address the same EEF barrier within one or multiple regions. For example, Figure 3 suggests that where capital constraints exist, a range of financing instruments have been adopted to address that barrier; however, concessional loans[5] have been the most popular policy instrument across all five subnational regions. Also, the same policy generally tends to combat multiple barriers. This suggests that irrespective of the demographic, cultural, or institutional features in a region, where capital constraints exist, concessional loans are an effective means of overcoming this barrier and scaling EE.

In addition, Figure 3 shows that the barriers of high

2 The national APRDP program in India is a good case in point. It was revised to the Restructured-APDRP program in 2008, after it was found that the earlier project goals were too unrealistic, i.e., reduce T&D losses by 15 percent over five years.

3 Barrier analysis is to determine which barriers exist in the markets that prevent EE measures from being implemented.

4 Given the variety of impact measurement methods and metrics, it is difficult to order policies by their relative success. Since policies in a single region are often implemented at the same time, it is also difficult to isolate the effect of a single policy on the overall outcomes. The policies presented in Figure 3 are those that we believe have already had some success or have the potential to do so. We hope that the focus on barriers and the number of regions with different institutional features that have adopted a policy will guide policymakers in their selection process.

Figure 3. Aggregate Barrier and Policy Matrix

Barriers	Financing Instruments					
	Conc. loans[a]	Grants	Subsidies	Market loans[b]	Rebates	Tradable certificates for EE
High upfront costs						
Long payback period						
Low credibility						
High information costs						
Poor institutional environment						
Public good and private investment						
High uncertainty of return						
Agency issues/split incentives						
Low energy prices						

Barriers	Enabling Environment						
	Tax policies	ESCOs[c]	Codes, labels	Partnership building	Technical assistance[d]	De-coupling	Awards and recognition
High upfront costs							
Long payback period							
Low credibility							
High information costs							
Poor institutional environment							
Public good and private investment							
High uncertainty of return							
Agency issues/split incentives							
Low energy prices							

Source: Authors' compilation.
a. Concessional loans including both low-interest and extended tenor loans
b. Includes loans that the government provides at market rates of interest
c. Promotion of ESCOs/certifications and standardization of contracts
d. Awareness-raising, education and training programs, and audits etc.

Key: The different shades indicate the number of regions that have adopted that policy type.

5 regions 4 regions 3 regions 2 regions 1 region

continued...

transaction costs, uncertainty of return, and poor institutional environment can be dealt with effectively through enabling environment policy levers such as technical assistance, codes and labels, standardization of contracts and certification of Energy Service Companies[6] (ESCOs), and partnership building.

The aggregate barrier matrix above is simply a first step meant to simplify the selection of EE policies from the suite of policies applied worldwide. Despite the usefulness of Figure 3, policymakers will need to look into its breakdown by barrier and consider the design and implementation recommendations below, before finally selecting, designing, and implementing EE policies in their region.

e) Analyze the cost-benefit of short-listed policies to determine the most suitable ones.

In a cash-strapped economic environment, policymakers need to decide between various policy options available. The decision-making process is difficult; often it is hard to compare across policies. To level the playing field, policymakers should look at the cost-benefit of a specific policy. This refers to the relationship between the policy impact (energy saved, GHG emissions reduced) and the amount of capital needed to achieve this impact. A cost-benefit analysis should be based on clear, transparent assumptions and incorporate uncertainty regarding costs and outcomes. Given the poor data and difficulties in comparing metrics across regions, policymakers may not be able to conduct a robust cost-benefit analysis. Nonetheless, some consideration must be given to the costs and benefits listed above, because this will at least help to eliminate policies that are obviously more likely to do harm than create benefits.

It is important to note that policies and programs that are relatively cost-efficient for the government are not necessarily the best from a societal point of view. That would mean that nonfinancial instruments would always be preferred over subsidy schemes for investment in energy savings measures. Ultimately, the choice of specific types of EEF policy should be geared toward addressing the regional EEF barriers in the most cost-effective manner.

f) Consider appropriate design features and implementation characteristics as a final step in deploying the policy or set of policies.

Once policymakers have selected a set of EEF and enabling environment policies suitable for their region, they should consider what specific design features to build into the policies to ensure maximum impact. Appropriate implementation tools are an equally important component to ensure success. These final design and implementation considerations are discussed in detail below.

Design and Implementation

Based on the case studies and the observed commonalities discussed above, we make a series of policy recommendations that policymakers should consider when designing and implementing EEF policies in order to achieve large-scale impact.

- **Specific target features within the policy design**: When designing an EEF policy, policymakers should make their goals clear and explicit, as follows:
  - Transparent and quantifiable targets, with clear and transparent guidelines for measurement;
  - Both intermediate and final targets (either energy savings or GHG emissions) over a certain time period, where the former is helpful in determining that the policy is achieving its intended goal and can be changed if needed;
  - Pre-determined time frame/expiration date, which is important because if there is no steady decline in the financial support over time, EE market growth tends to stall, as projects applicants continue to wait for their turn until they are awarded rather than move ahead on an attractive project;
  - Launch with small, pilot programs as in India and

5 Concessional loans refer to low-interest rate or extended tenure loans.

6 Commercial business providing a broad range of comprehensive energy solutions including design and implementation of energy savings projects, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management.

China (before spreading the net across the entire region) to test if the policy is adaptable to market needs.

- **Building a more conducive institutional environment**: As mentioned above, for any policy to have widespread impacts, the institutional framework (including regulation, legislation, and legal system) has to be functioning at an appropriate standard. Financial instruments can be deployed only if appropriate institutions are in place to facilitate investments. For example, ESCOs will be incentivized to provide EE measures only if adequate procurement contracts are enacted and enforced.[7]
- **Appropriate monitoring tools to gauge policy impact**: One of the barriers to EEF is that investors are unwilling to invest in EE projects due to uncertainty in capturing and monitoring energy savings, which are more difficult to measure than energy consumption. For this reason, policymakers should develop and standardize monitoring mechanisms. Monitoring tools aid in gauging the success of the policy as well as capturing the rebound effect[8], which if not addressed in time will dampen the anticipated impact in energy savings or GHG emissions reduction.
- **Implementing infrastructure to enable maximum outreach and impact**: One of the aims of EE proponents is to convert EE into a "household word." This requires significant technical assistance, including the availability of energy and finance professionals and energy auditors, both at a national and subnational level. The existence of this support structure is very important in understanding and bridging together the myriad EE technology and financing options, which are often quite complex.
- **Adoption of an integrated approach between various policies**: A major prerequisite for EE success is the integration of instruments that complement each other, including the following.
  - EE and EEF policies: On a stand-alone basis, EE policies such as codes and labels or knowledge and awareness-raising programs have limited impact. But financial incentives are not effective without informing target groups of their existence and benefits.
  - Complementary EE efforts in various parts of the supply chain: Manufacturers of EE technologies and consumers of such technologies should be given financial incentives in order to spur both supply and demand of a given EE measure.
  - Comprehensive policies within a given sector: Policymakers should target all areas within an EE grouping. For example, in dealing with commercial and residential buildings, policymakers should incentivize both heating/cooling systems and CFL bulbs for residential buildings.
  - Interaction between state- and federal-level EE policies and between different priorities of government agencies.
- **Standardization and streamlining of supporting tools and procedures**: Since most EEF policies are geared toward a large number of small but similar transactions, policymakers should standardize and streamline procedures to lower transaction costs and thus aid the faster and more widespread deployment and execution of programs.

Conclusion

Our analysis of different country experiences has revealed that there is no single policy that on its own is the most effective in overcoming all EEF barriers. In the choice of EEF policies, the four critical factors — the country's unique underlying conditions, the choice of policy instruments, their design and implementation method, and the enabling environment — should be regarded as complements.

7 2009 *"Lesson Learned from Energy Efficiency Finance Programs in the Building Sector,"* European Climate Foundation and GreenMax Capital Advisors.

8 Reduced energy costs might induce higher energy consumption, thereby negating the desired effects of the policy.

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