POLICY

ENERGY EFFICIENCY TOOLKIT – TECHNICAL GUIDE

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DISCLAIMER

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LIST OF ACRONYMS

ACEEE	American Council for an Energy-Efficient Economy
EEO	Energy Efficiency Obligations
GHG	Greenhouse Gases
IEA	International Energy Agency
INMETRO	National Institute of Metrology, Quality and Technology
IRP	Integrated Resource Planning
kWh	Kilowatt-hour
MT	Market Transformation
U.S.	United States

VISUAL REPRESENTATION OF SECTORS

This guide includes examples of energy efficiency policies from around the world. Links to full descriptions of these policies are listed in the Policy Examples Resources section of the guide. The icons below are used to indicate which sector these policies target.

Industrial

Commercial and Institutional

Residential

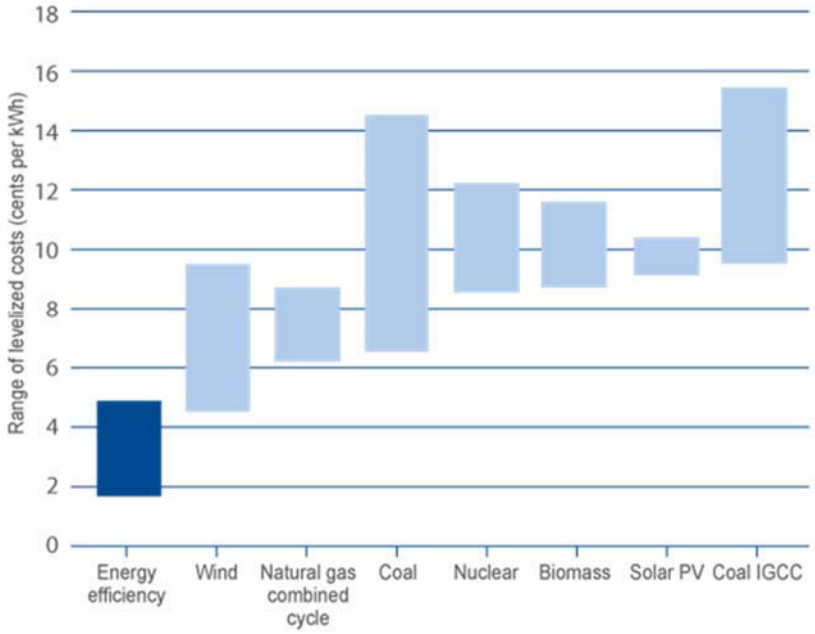
Agricultural

Transportation

OVERVIEW

Energy efficiency is a way of managing energy consumption through efficient end-use technologies and practices in order to meet growing energy needs in power and fuels markets around the world. The United States (U.S.) has demonstrated that energy efficiency is the cleanest and most cost-effective method of supporting a growing economy while providing universal access to energy. According to a recent report by the American Council for an Energy-Efficient Economy (ACEEE), electric utility energy efficiency programs, at an average cost of U.S. $0.28 per kWh, are about one half to one third the levelized cost of alternative new electricity resource options.

Figure 1: Levelized costs of electricity resource options (Source: ACEEE 2014)



The Energy Efficiency Market Report 2015 published by the International Energy Agency (IEA) projects that investments in energy efficiency are set to continue to increase worldwide driven primarily by more aggressive and comprehensive policies. Countries around the world recognize that energy efficiency is one of the most cost-effective means of helping to provide energy security, increase economic productivity, reduce local air pollution, and help mitigate Greenhouse Gas (GHG) emissions. This guide is designed to help develop such policies and unlock energy efficiency's vast benefits.

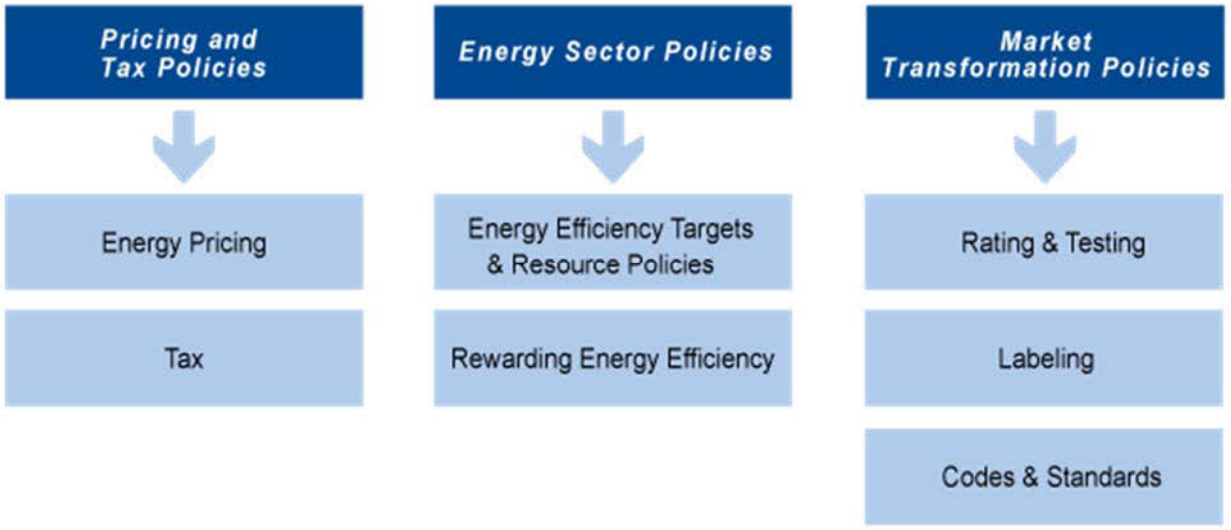
Energy efficiency is not typically the first choice among energy resources if a country's policy framework is not conducive to its implementation, despite its cost advantage over traditional electricity resources.

In order for energy efficiency to proliferate, there need to be policies at the appropriate level (national, provincial, local) to remove barriers and encourage the development and deployment of energy efficiency. Policies presented in this guide can help address some questions that may be facing countries as they develop policies that promote energy efficiency:

- How can broad government policies such as energy pricing and taxation support energy efficiency?
- How can energy sector regulations and other policies make energy providers effective as delivery agents for energy efficiency?
- How can targeted market transformation policies drive end-use markets toward efficient technologies and practices?

The purpose of this guide is to identify policies that have worked in U.S. and other markets, and that are widely adaptable to other national and subnational markets.

Figure 2: Policies to Support Energy Efficiency



Each country has its own level of policy development, history, and characteristics. Therefore there is no one policy or suite of policies that fit every country. Of the policies outlined below, some are more universal and applicable (such as energy pricing policies) while others have been effective in specific countries (energy efficiency resource targets). Generally, the most successful energy efficiency policy frameworks use a complementary mix of policies to suit their individual country context.

1.0 PRICING AND TAX POLICIES

Pricing and tax policies should be considered tools and leverage points that most governments can use to promote energy efficiency.

1.1 PRICING POLICIES

Energy pricing policies vary significantly in countries across the world. Many countries have a legacy of providing public subsidies for energy products and services which were originally intended to help businesses compete and to allow for households to access affordable energy. Such policies are particularly common in electricity but less so in the motor fuels and heating fuels markets. However, price subsidies have hidden costs: they prevent full cost recovery for energy supply infrastructure, thus hampering both system maintenance and system growth. More importantly, they encourage overconsumption and waste.

In recent decades, governments have moved to reduce or end subsidies so that retail prices accurately reflect the full cost of supply. Although such moves often entail economic and political challenges, rationalizing energy pricing is a fundamental element of encouraging energy efficiency in end-use markets. More information on subsidies in the developing world and energy pricing rationalization can be found in a paper by the World Bank titled "Subsidies in the Energy Sector: An Overview". Energy economists generally agree on the principles of energy pricing rationalization; however, it is also important to note that pricing policy alone is not sufficient to fully realize energy efficiency potential in many end-use markets. This is because significant non-pricing market barriers remain. For instance, decisions about installing efficiency technologies are made by builders or building owners but energy bills are paid by building occupants. This is commonly referred to as the "split incentive" barrier. Research conducted by the IEA has shown that the percentage of energy use affected by this particular barrier alone in markets such as residential heating, cooling, and hot water, and rental properties can be significant.

Transaction-related cost barriers also inhibit energy efficiency investments because energy investments are relatively small (such as the cost of a light bulb) and the ratio of savings-to-effort savings may not seem worthwhile. By contrast, energy supply investments such as power stations or pipelines are large enough to justify the engineering and financial analysis needed to develop the asset. The policy and program options outlined in the remainder of this section are designed to reduce these barriers.

1.2 TAX POLICIES

Tax policies are typically used to support energy policy goals in two main ways: (1) serving as indirect pricing policies (e.g. motor fuel taxes that raise retail prices) and (2) encouraging targeted investment (e.g. by providing tax credits or deductions for specific technologies or investment cost categories). These policies can be applied to excise taxes, such as those levied for the sale of fuel or electric power, or to personal income or business taxes. Excise taxes are most commonly used as part of pricing policies while also serving to support infrastructure costs (for example, many governments use motor fuel excise taxes to support roadway construction and maintenance). Income or business tax policies in the form of deductions or credits are most

commonly used to encourage targeted investment (for example, some governments provide income tax credits for specified energy efficiency equipment).

While some countries may face challenges in collecting tax revenues or processing tax credits, tax policies can be efficient in their design and implementation if governments have taxation authority and administrative staff already in place. However, tax policies are limited in the extent to which they can change markets. As described above, taxation used in concert with pricing policy is subject to those same market barriers. Targeted tax credits can be of limited effectiveness because the taxpayer must make an upfront investment but only receives the tax credit after the end of the tax year. As with pricing policies, these limitations point to the need for more specific policies, as outlined below.

2.0 ENERGY SECTOR POLICIES

Because utilities and other energy providers play such a key role in energy end-use markets, governments often target regulatory policies, program funding, and related practices to these energy sector entities to encourage market delivery of energy efficiency technologies and services. Energy efficiency also delivers benefits to energy providers and systems including lower energy system capital and fuel costs, reduced air pollution and greenhouse gas emissions, improved system reliability and improved customer service.

2.1 ENERGY EFFICIENCY TARGETS AND RESOURCE PLANNING

Setting long-term energy savings targets for energy providers like utilities can be an important element of crafting a country's energy sector development and climate change mitigation strategy. Government ministries can set such targets in the form of quantified energy efficiency obligations (EEOs) or directives, typically expressed as an annual percentage of total energy savings, with a calendar term included. For example, an EEO could require a utility to deliver energy efficiency programs that save at least 1% of its reference-year sales such that over a 10-year term, demand growth would be 10% lower than the baseline forecast. This helps utilities keep up with growing demand, limits the capital costs of system expansion, and improves system reliability.

Policy Example 1:
Energy Sector Policy (Brazil)

TARGETED SECTOR:

SUMMARY

Brazil's government policies fostered the development of an energy-efficiency market by creating mechanisms to channel resources into new energy-efficient projects. In 1998 the National Electricity Regulator required energy distribution companies to invest 0.5% of their annual revenues into energy-efficiency projects under the regulator oversight. The program served as an opportunity for many emerging Energy Service Companies in the country to thrive and supported the growth of the Brazilian energy-efficiency market. Today, the energy-efficiency program remains the largest source of financing for energy-efficient ventures with more than R$1.8 billion invested since its implementation.

Another approach to long-term resource planning is called Integrated Resource Planning (IRP), whereby utility regulators, government entities, or other designated parties can work with stakeholders in the power sector to develop resource plans to forecast demand growth and

examine options to meet that growth through both supply-side and demand-side resources. EEO targets, for example, can be set based on resource analysis conducted during IRP processes. Utility regulatory authorities can also set resource procurement requirements that prioritize key resources based on their energy sector and environmental benefits. For example, a procurement policy could require utilities to acquire all cost-effective demand-side resources, including energy efficiency and demand response, before building new power stations. Any such planning and procurement policies should also incorporate established principles of equity, environmental sustainability, reliability, flexibility and other country-or state-specific goals. Several states in the U.S, South Africa, and Thailand include energy efficiency in their IRPs and countries like India are starting to explore this as well.

2.2 ENCOURAGING ENERGY SUPPLIER ENGAGEMENT IN ENERGY EFFICIENCY

While many countries continue to provide electricity through government-owned enterprises, there is also a trend toward privatization in many countries where utilities have to function under regulatory structures but resemble private-sector entities, such as Bangladesh and India. Whether energy is delivered via a private or government entity, it is important to align the utility's planning, operational, and business goals with larger national policy goals.

In the electricity sector, ratemaking is a key area in which utility goals and larger policy goals can be aligned. Typically, utilities generate revenue "volumetrically," that is, total revenue is directly related to total energy sold. If energy efficiency reduces total energy sales, revenues suffer and the utility's business operations are compromised. To encourage energy efficiency in this context, utility policymakers in some countries have begun to de-couple revenues from energy sales; for example, some regulators have set up rate adjustment mechanisms that "true up" revenues as sales change. If a utility sells fewer kWh than forecast, revenue shortfalls are added to the adjustment mechanism to make up the difference. While this creates small fluctuations in customer bills, it keeps the utility whole financially and thus removes a key disincentive to energy efficiency. For privately-owned utilities, some governments have also created shareholder earnings mechanisms, so that utilities can earn rates of return on energy efficiency investments comparable to what they earn on traditional power sector investments.

Efficiency and other demand-side resource strategies can also create direct incentives for utilities to increase revenues. In many countries, utilities are chronically short of capacity and energy to supply customer demand; this typically results in power outages or "load shedding" patterns. During outages, utilities receive no revenue from the customers with curtailed loads. However, reshaping customer loads through energy efficiency and demand response may actually increase total revenues by shifting more load to lower-demand periods and by reducing total load shedding hours.

For example, the 2011-2012 Annual Report from the Bangladesh Power Development Board (BPDB) shows that the BPDB was able to reduce load shedding as a percentage of peak demand from 26% in 2006-2007 to 14% in 2011-2012 while increasing net revenue collection almost 100% over the same period. Although the reduction in load shedding through investments in energy efficiency was not the only factor responsible for the increase in net revenue collection, it did play a major role. If done systematically over the longer term, in concert with IRP, EEO, and other policies, strategies like the one described above can increase total revenues, reduce total costs, control rate and tariff increases, improve overall system

reliability, increase customer satisfaction, and make utilities more effective forces for low-emission development.

3.0 MARKET TRANSFORMATION POLICIES

Market transformation (MT) policies are designed to shift technologies and practices in specific end-use markets toward higher efficiency. They are typically viewed on a cyclic basis, in which efficient technologies are introduced into a market, gain market share through voluntary rating and labeling, and become locked in via mandatory building energy codes and standards. These cycles then repeat as newer technologies enter the market, gain market share, and then are locked into yet more stringent codes and standards.

MT policies often interact with utility sector policies. Utility programs, for example, can provide the incentives to drive market share for efficient technologies, which can accelerate MT cycles and magnify total market impacts. Codes and standards, by the same token, become baseline efficiency levels for utility program designs, defining the energy savings credited for promoting higher-efficiency technologies. The best MT policy strategies integrate all of these elements, and also engage utility programs to leverage their market reach. MT strategies typically involve the following elements:

- **Rating methods and test procedures** are the technical bases for measuring energy performance for a product, piece of equipment, energy system, or building. Country authorities typically develop or adopt officially-approved rating methods and test procedures as foundational infrastructure for their MT efforts. Along with them typically come test laboratories, accreditation procedures, professional certifications, and associated efforts needed to ensure accuracy, consistency, and transparency in the use of these methods.
- **Labeling** involves displaying energy rating or other energy performance indicator information on a product, piece of equipment, or building. Labeling can be voluntary or mandatory, or operate in a hybrid fashion. For example, Brazil through its INMETRO organization requires a mandatory comparative label for compact fluorescent light bulbs, while Bangladesh under its energy efficiency and conservation rules enacted a voluntary comparative labeling policy for compact fluorescent light bulbs. One way to view the voluntary/mandatory labeling issue is that mandatory labeling typically rates products comparing them to similar product models, whereas voluntary labeling denotes that a

Policy Example 2:
Building Codes (Kyrgyzstan)

TARGETED SECTOR:

SUMMARY

The Government of Kyrgyzstan in 2008 set a goal to reduce energy consumption and associated GHG emission in the building sector between 30 and 40 percent by 2020. The Government adopted internationally-recognized building energy performance codes, trained building and construction professionals in their implementation, and established a system to monitor energy consumption and GHG emissions in the building sector. The new codes and regulations took effect in 2010, resulted in an annual energy reduction of 55 kW per square meter in the pilot buildings. The building codes saw increased uptake and by 2012, 95% of all designs complied with the new codes, compared to 65 percent in 2011.

product has attained a certain level of efficiency above the minimum efficiency standard. For more information on rating and labeling, refer to the energy efficiency Standards, Rating and Labeling Technical Guide.

Figure 3: Examples of Energy Labeling from Around the World

- **Mandatory building energy codes**—these are minimum efficiency criteria that all new buildings must meet, typically affecting the building thermal envelope such as roof and wall insulation, windows and doors, air infiltration, and in some cases heating, cooling, and ventilation systems.
- **Mandatory appliance, lighting, and equipment standards**—these are minimum energy performance standards that often apply to the same product and equipment types covered by labeling policies and often use the same underlying test procedures. By using the same underlying "infrastructure," standards and labeling programs can operate in a coordinated fashion to drive market transformation progress through multiple cycles over decades.

KEY PLAYERS

Government

Governments, including legislative bodies such as parliaments or assemblies, and executive agencies such as energy ministries, set overall policy goals and frameworks through legislation, regulation, and program design and funding mechanisms.

Energy Sector Regulatory Agencies

Entities that govern/regulate energy companies such as utilities are instrumental in administering the specifics of broad energy efficiency policies. Through planning, analysis, ratemaking, and funding processes, utility regulators are key to ensuring that efficiency policy goals are served effectively through the details of program development and implementation.

Energy Companies/Utilities

Energy companies such as utilities are instrumental in funding, designing, and delivering energy efficiency programs, within the framework of IRP, EEOs, market transformation, or other policies.

Customer and Stakeholder Groups

Policy development and implementation is generally more successful when energy users, such as utility customers, and other stakeholders such as consumer and business associations and energy advocacy groups are engaged effectively.

POLICY EXAMPLE RESOURCES

Policy Example 1: Energy Sector Policy (Brazil)

"10 Big Ideas for Making Energy Efficiency Bankable in India," International Institute for Sustainable Development (2014): https://www.iisd.org/publications/10-big-ideas-making-energy-efficiency-bankable-india

Policy Example 2: Building Codes (Kyrgyzstan)

"Change in energy efficiency building policy in Kyrgyzstan," United Nations: http://www.un.org/climatechange/blog/2014/08/change-energy-efficiency-building-policies-kyrgyzstan/

ADDITIONAL RESOURCES

American Council for and Energy Efficient Economy: http://www.aceee.org

The ACEEE is a non-profit organization that advances U.S. national energy efficiency policies, programs, technologies, investments, and behaviors.

"Energy and Environment Guide to Action," U.S Environmental Protection Agency (2015): http://epa.gov/statelocalclimate/documents/pdf/guide_action_full.pdf

State Policies and Best Practices for Advancing Energy Efficiency, Renewable Energy, and Combined Heat and Power. A guide to help state policy-makers learn about what other states were doing to bring clean, cost-effective, reliable energy to the marketplace.

International Energy Agency:

"Capturing the Multiple Benefits of Energy Efficiency" (2014 Edition):
http://www.iea.org/bookshop/475-Capturing_the_Multiple_Benefits_of_Energy_Efficiency

"Mind the Gap: Quantifying Principal-Agent Problems in Energy Efficiency" (2007):
https://www.iea.org/publications/freepublications/publication/mind_the_gap.pdf

The IEA is an autonomous organization which works to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA has four main areas of focus: energy security, economic development, environmental awareness and engagement worldwide.

"National Action Plan for Energy Efficiency Vision for 2025: A Framework for Change," National Action Plan for Energy Efficiency (2008):
http://www.epa.gov/cleanenergy/documents/suca/vision.pdf

A public-private initiative to create a sustainable, aggressive national commitment to energy efficiency through the collaborative efforts of gas and electric utilities, utility regulators, and other partner organizations.

"Policies to Capture Energy Efficiency Potential," U.S. Environmental Protection Agency:
http://www.epa.gov/statelocalclimate/state/topics/energy-efficiency.html#a03

Policies adopted by states in the U.S. that support greater investment in and adoption of energy efficiency.

Regulatory Assistance Project: http://www.raponline.org/

RAP is a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors, providing assistance to government officials on a broad range of energy and environmental issues.