Energy Efficiency is Everybody's Business

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Energy is one of the most critical inputs for an economy. The various forms of energy like electricity, diesel, petrol and natural gas are the lifeblood of every modern economy, involved in every activity from lighting homes to transporting imports and exports, powering schools to running hospital equipment, pumping water in fields to running motors in small industries, powering large manufacturers, and beyond.

INDIA'S ENERGY CONSUMPTION AND EFFICIENCY

India is the world's third largest energy consumer, behind China and the USA. India imports almost 28% of the energy it consumes every year, spending close to 6.3% of GDP, or US$ 120 billion on these imports. The fuel import bill is continuously rising and is expected to rise to as much as $230 billion by 2023. India's energy consumption is closely related to its economic development. While India is still behind most advanced countries in terms of its energy consumption per capita, rising economic strength and lifestyles will increase demand of electricity four to six times between 2010 and 2030. While the country has almost a fifth of the world's population, it has only 1/30th of the world's energy resources in its territory. Given the pervasive use of energy in all aspects of economic growth and improving citizens' well-being, it is crucial to ensure India has access to cheap, reliable, sustainable and secure energy supplies to power its ambitions. Energy efficiency is the idea of reducing the amount of energy required per unit economic output or per capita consumption.

While it is imperative to explore new resources and create new energy generation and distribution infrastructure, it is also critical to ensure that the least amount of energy is required for economic growth, increasing energy security and reducing the need for rising imports. Known by different names like energy productivity or energy sufficiency or economic output per unit energy, this concept of resource conservation can be understood as mainly comprised of the four steps demonstrated in Table 1.

Energy efficiency is a "low-hanging, low-cost" option to reduce future energy consumption without compromising on economic progress

[1] *At the time of writing, the authors were working as Lead Energy Specialist & Energy Specialist respectively with Global Energy and Extractives Practice of the World Bank, but the views expressed here are personal and do not represent World Bank's views, or that of its Management, or Board of Executive Directors.*

TABLE 1: Steps and Examples of Improving Energy Productivity

ENERGY CONSERVATION STAGE	EXAMPLES FROM DAILY LIFE
Reducing energy wastage	Air conditioning blast in meeting rooms, set at temperatures of 16C in peak summer, requiring use of jackets
Encourging energy conservation	Car-pooling, reducing car trips, etc.
Improved design for low energy consumption	High mileage cars designed for low fuel consumption, through better engines, acrodynamics, etc.
Design of infrastructure to reduce need for energy use	High public transport penetration to avoid cars; mixed-use development to reduce need for office commutes; high use of IT to reduce need for travel; bike lanes for secure travel of bicycles etc.

Reducing energy wastage and moderating energy demand can help the country to increase its industrial competitiveness, and also reduce outflow of foreign exchange for fuel imports. Many demand side energy efficiency measures ranging from efficient light bulbs to irrigation pumps provide a cost-effective alternative to adding more energy production capacities. Energy efficiency thus becomes one of the "low-hanging, low-cost" options to reduce future energy consumption without compromising on economic progress. In the current context, where there are huge deficits in supply capacities vis-à-vis rising demand, blackouts and brownouts have become common, which affects both economic productivity and quality of life, EE offers a unique opportunity to bridge the demand-supply gap in India in the short-term. It is estimated that if India improves energy efficiency by 15% over the next decade, it could save $32 billion per annum by fiscal 2023. Reforms in the energy sector could reduce India's annual energy import bill by $40 billion by the same year. These savings run across sub sectors like Agriculture, Domestic and Industries reflecting the cross-sectoral nature of interventions. Table 2 shows more than 15% savings that are feasible from Energy Efficiency (roughly translating into 15% avoided capacity equivalent to more than 35 GW).

TABLE 2: Saving Potential across Selected Sectors in 2007-08 (in billion kWh)

SECTOR	CONSUMPTION	SAVINGS POTENTIAL
Agriculture pumping	92.33	27.79
Commercial buildings/establishments with connected load >500 KW	9.92	1.98
Municipalities Domestic Industry (including SMEs)	12.45	2.88
Domestic Industry (including SMEs)	120.92	24.16
Industry (including SMEs)	265.38	18.57
TOTAL	**501.00**	**75.36**

SOURCE: NPC, 2010

REALIZING ENERGY EFFICIENCY

Institutional Enhancements

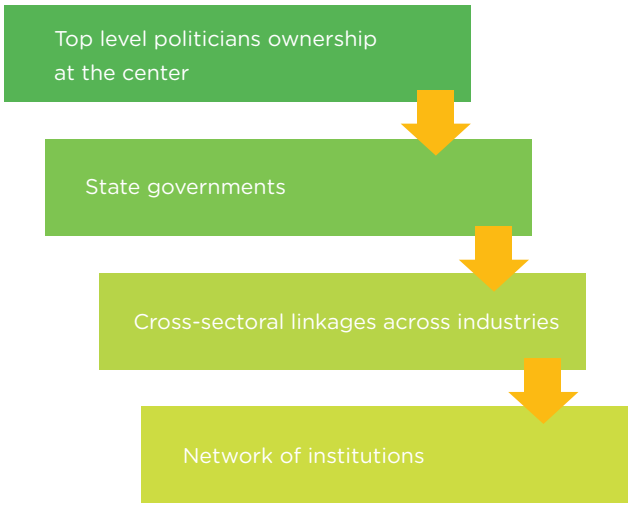
Energy efficiency is everybody's business. It goes across supply, demand, policy, and behavior change in citizens. Since EE is not a physical asset, it requires careful examination and identification of opportunities, based on research and analysis. It requires extensive applied research into trends and the nature of energy consumption in an economy, so that an ideal implementation can be identified.

FIGURE 1: Components for a Successful National EE Strategy

Successful implementation of energy efficiency requires several pieces to fall in together. As shown in Figure 1, robust and effective institutions need to facilitate an enabling framework for EE market transformation. Successful EE institutions are able to coordinate with both public and private sector stakeholders in the formulation, prioritization, implementation and monitoring of regulations and policies to address market failures. In addition, efforts are required in the area of research and development; developing appropriate financial incentives and instruments; and, induce behaviour changes to save energy through awareness and capacity building.

As experiences from other countries show, an adequate institutional framework with high level political support is critical for success, and lack of any of these components results in inadequate success. In India, as vast, untapped opportunities for potential EE improvements are spread across multiple sectors, an effective and robust institutional framework with appropriate governance and monitoring mechanisms would be critical to deliver energy efficiency improvements on a larger, ambitious scale. For energy conservation, the institutional requirements go across central and state governments, a network of implementation institutions, private sector, to work with citizens, as demonstrated in Figure 2.

FIGURE 2: Institutional Framework for Energy Efficiency Implementation



The private sector and private citizens need to undertake a majority of the interventions, but government support is required to provide impetus through policies, mandates, standards, labels, financial and regulatory incentives, and other financial tools.

Experience from other countries has demonstrated that all these factors need to work in concert for success in reducing an economy's energy intensity. Different models of promoting investments in energy efficiency have been tried in different countries, depending on the context. The government of PR China established targets

of 20% reduction in energy intensity from 2006-2010 and 16% during 2011-2015. To achieve these targets, the central government agreed with provincial governments, and held provincial leaders 'accountable' for reaching these targets.[2] Additionally, the central government signed 'responsibility contracts' for energy saving with the country's 1,000 top energy consuming enterprises that account for a third of the country's energy use. These contracts were supported by financial assistance of various kinds, as well as extensive technical assistance through various means, to disseminate knowledge on these efforts. China also extensively supported its energy utilities to reduce energy consumption. Japan created a network of institutions like banks, utilities energy service companies (ESCOs), and technical assistance entities, to reduce energy intensity.[3] South Korea has also initiated innovative programs on energy efficiency projects, through the private sector. Almost all major economies have taken on initiatives to reduce energy wastage in all sectors like industries, transport, households, etc. The United States has a range of programs at federal, state and municipal levels on industry and household energy efficiency that have been successful in introducing new technologies and institutionalize energy efficiency. All such initiatives are backed up by research institutions that can identify opportunities and design systems to harness those opportunities.

Since EE is not a physical asset, it requires careful examination and identification of opportunities

In India, improvement of the implementation institutions is much overdue, and there is a lack of a network for viable research institutes that can identify opportunities. Currently, institutions like the Bureau of Energy Efficiency (BEE), Energy Efficiency Services Limited (EESL), and state nodal agencies have been entrusted with the energy efficiency agenda, including research, project management and implementation, regulation, and monitoring and evaluation. However, the implementation has fallen short of the expectation. The state nodal agencies, and state distribution companies entrusted with Demand Side Management (DSM) programs have weak institutional capacity and need regulatory clarity on funding and inherent incentive structures in undertaking these programs.

AN AGENDA FOR ACTION

Bolder and More Ambitious on Energy Efficiency Targets

The current target of 19 GW of energy savings in National Mission on Enhanced Energy Efficiency could be enhanced by a multiple of three over next ten years given the level of urbanization and industrialization expected in India. The cross-sectoral nature of possible interventions, such as co-planned improvements in urban transport and manufacturing sector, should be incorporated in the overall target for energy efficiency. In addition, bolder targets across buildings, appliances, industries and agriculture are needed. Getting a low carbon intensity of growth is the best strategy for ensuring energy security of India, as corroborated by recent studies and models of Planning Commission.[4]

Monitoring and Policy Framework at Highest Political Level

The delivery and implementation of China's energy efficient program is monitored at the President's level through National Development Reform Commission. A similar oversight mechanism at the Central level in India is required. This body or office would monitor clearly defined performance targets and indicators for different ministries. This would also involve coordinated decisions on energy pricing (as a tool for encouraging energy efficiency), strategic communication including

[2] *Wang, Xiaodong, Richard Stern, Dilip Limaye, Wolfgang Mostert, and Yabei Zhang 2013. Unlocking Commercial Financing for Clean Energy in East Asia. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-0-8213-0020-7.*

[3] *Ibid.*

[4] *India Energy Planning Tool 2047, http://indiaenergy.gov.in/*

aspects on behavior change, and resource allocation for programs. The process of defining norms for standards as per these bolder targets would require capacity building of existing institutions like Bureau of Indian Standards, complimented by a panel of third party monitoring agencies at central and state level.

Strategic priority on energy efficiency through optimum focus on institutions, financing and behavior change could be the most important driver for energy security of India

Administrative and Financial Autonomy to Institutions (Involving Public-Private Partnership Models)

To achieve bolder targets, institutions would need to be strengthened accordingly. The Bureau of Energy Efficiency would need a significantly higher administrative autonomy from the parent ministry, further enhanced with clearly defined greater delegation of power even within the staff of Bureau. On financial resources, a useful illustration is the energy efficient equipment program where China has allocated a budget of USD 20 billion over the last five years to incentivize adoption of new technologies by large private sector enterprises and their adoption by consumers.[5] In contrast, the Super Energy-efficient Equipment Program (SEEP) of the Government of India has resource allocation of only Rs 100 crores (less than USD 20 mn) in the XII Five Year Plan, and is yet to take off due to myriad approval processes involved in decision making. For the BEE to design and implement larger projects to meet a bolder target, it will require increased financial allocation matched by corresponding administrative autonomy and institutional strengthening. This would include involving lateral entry of private sector professionals in areas with limited expertise within the public sector, like energy efficient technologies, innovation and strategic communication. A complimentary set up of institutions would also be needed at state level with clear accountability of performance targets along with required delegation of powers.

Network of Federal, State and Thematic Institutions on a Hub and Spoke Model

Since BEE alone would not be able to implement programs in the different ministries and at the Central and State levels, a network of institutions would be needed for effective implementation with a flexible monitoring mechanism. As an encouraging start, Energy Efficiency Services Limited (EESL), a super ESCO, and financial institutions like IDBI and Small Industries Development Bank of India (SIDBI) have already started expanding their services to promote energy efficiency. Appointing such agencies as hubs of select pillars of a broader energy efficiency strategy – like EESL for development of ESCO market and SIDBI for financial innovation – would enable other supporting institutions to emerge as spokes responsible for implementation. Similarly, as behavior change and awareness for energy efficient appliances, buildings and equipment is acknowledged as a key pillar of strategy, a network of agencies would be needed with a multi-year agenda on strategic communication. These would be a mix of central, state, autonomous and private sector institutions.

India has a unique opportunity in history to demonstrate to the world that low energy intensity based high economic growth is feasible and sustainable in the long term. Given significant increase in urbanization and industrialization expected over the next decades; strategic priority on energy efficiency through optimum focus on institutions, financing and behavior change could be the most important driver for energy security of India in the next few decades. The time for scaling up action is now.

[5] *Presentation made in South Knowledge Exchange on Energy Efficiency between China, India and East Asian countries held at Beijing, June 2014.*