
Promoting energy efficiency in the Indian electricity sector: Utility incentives and regulation

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International Energy Studies

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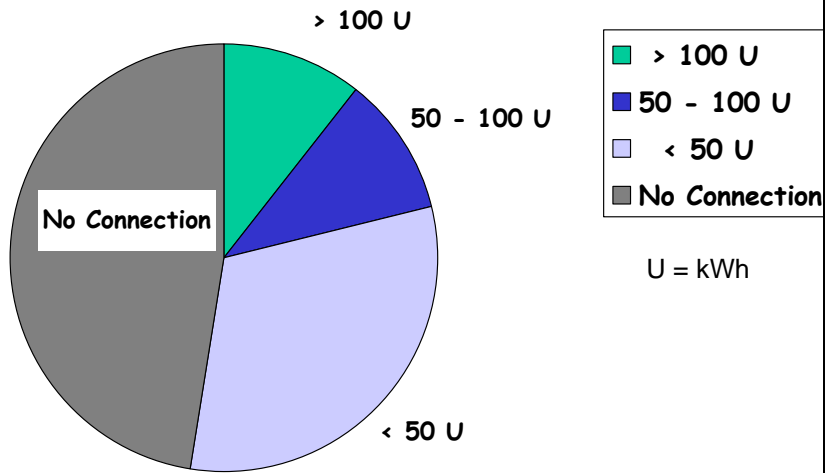
LBNL and International Energy Studies Group

- **Lawrence Berkeley National Laboratory (LBNL): US National Lab. Managed by the University of California**
- **Energy Analysis Department**
 - **Technical and policy analysis of national and international energy issues**
 - **Over 30 years of history working on these issues**
- **International Energy Studies Group focused on**
 - **Energy efficiency**
 - **Energy-climate modeling**
 - **Land use and forestry**
 - **International focus**

Outline of the presentation

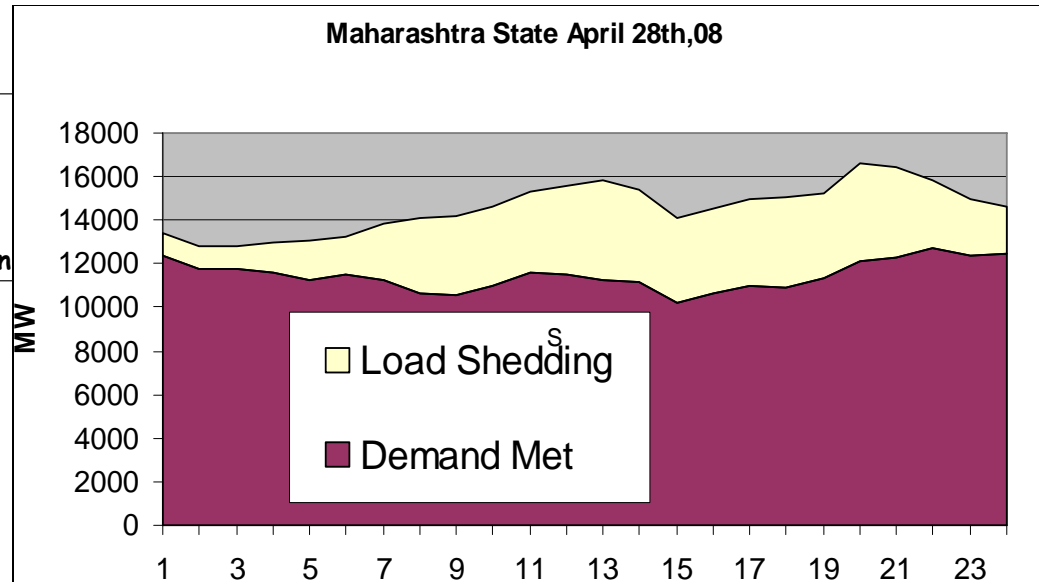
- **Background**
 - **Indian electricity sector and energy efficiency**
 - **LBNL initiatives**
- **LBNL Asia Pacific Partnership (APP) India DSM project**
- **Promoting DSM in the electricity sector: Experience in Maharashtra State, India**
- **Lessons learnt and way forward**

Indian Electricity Sector: Current Situation



National distribution of customers by monthly consumption of electricity

Residential average consumption ~ 10 units (kWh)/month or equivalent to operating one 60 W bulb for 5 hours

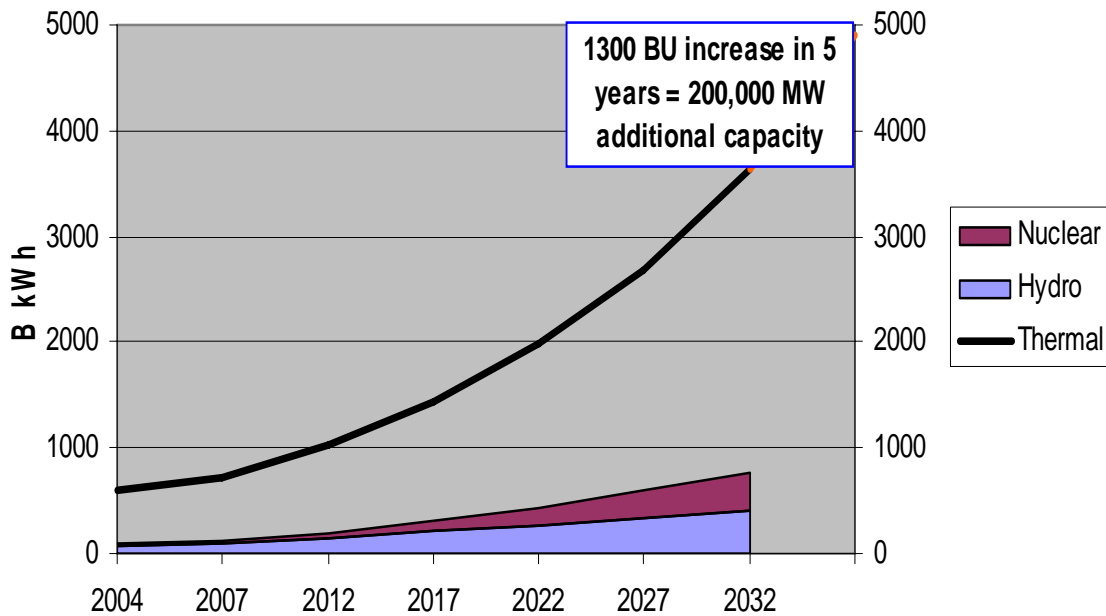


Severe Supply Shortages:

- Rolling black-outs every day
- 15 to 20% capacity shortage and
- 10% energy shortage

Indian Electricity Sector: Future

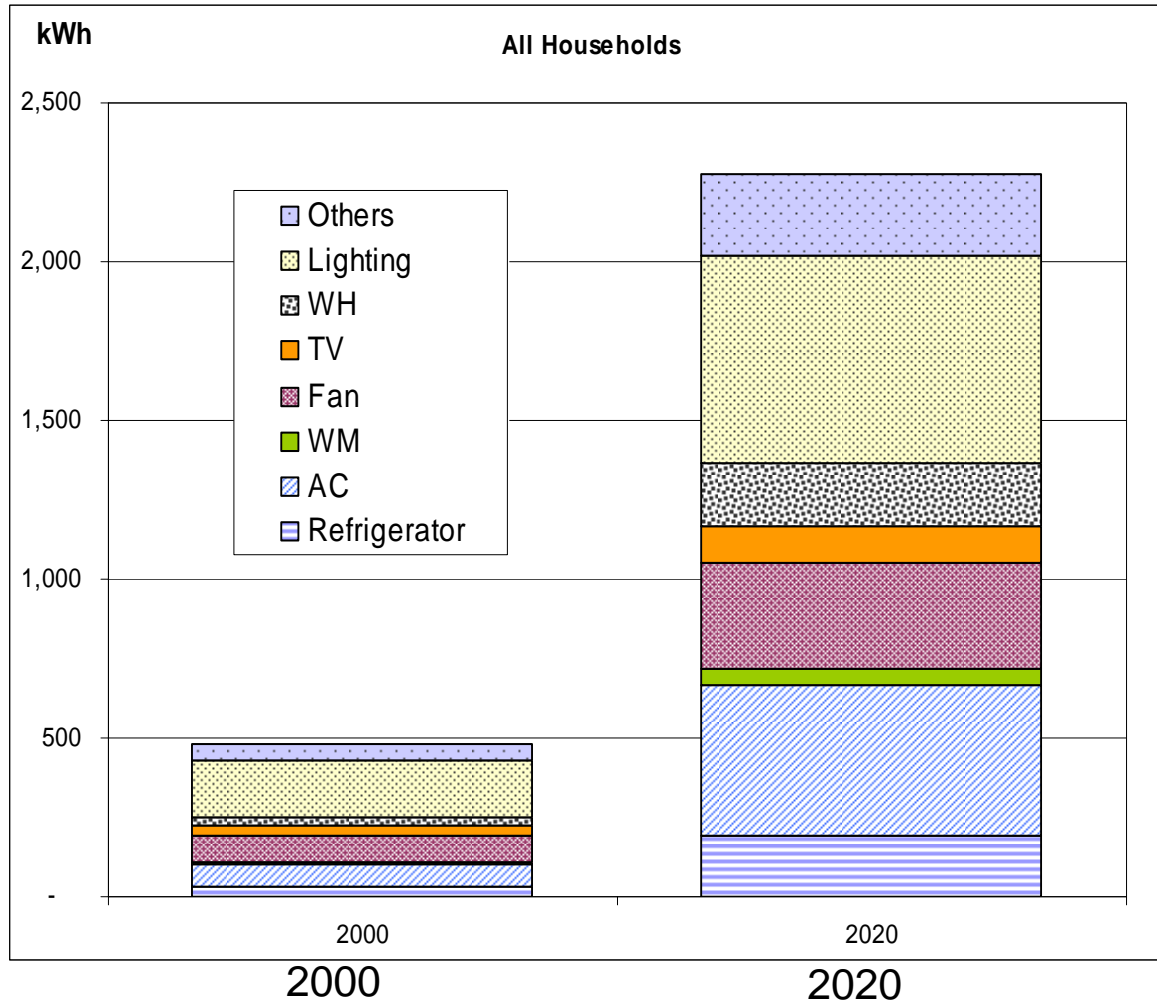
Electricity Generation from Various Sources



1300 Billion kWh increase from 2007-2022 (200,000MWs)

Adding capacity has been challenging: 50% below historically planned targets

Indian Electricity Sector: Future



Rapid growth projected in residential electricity consumption, double the rate of economic growth

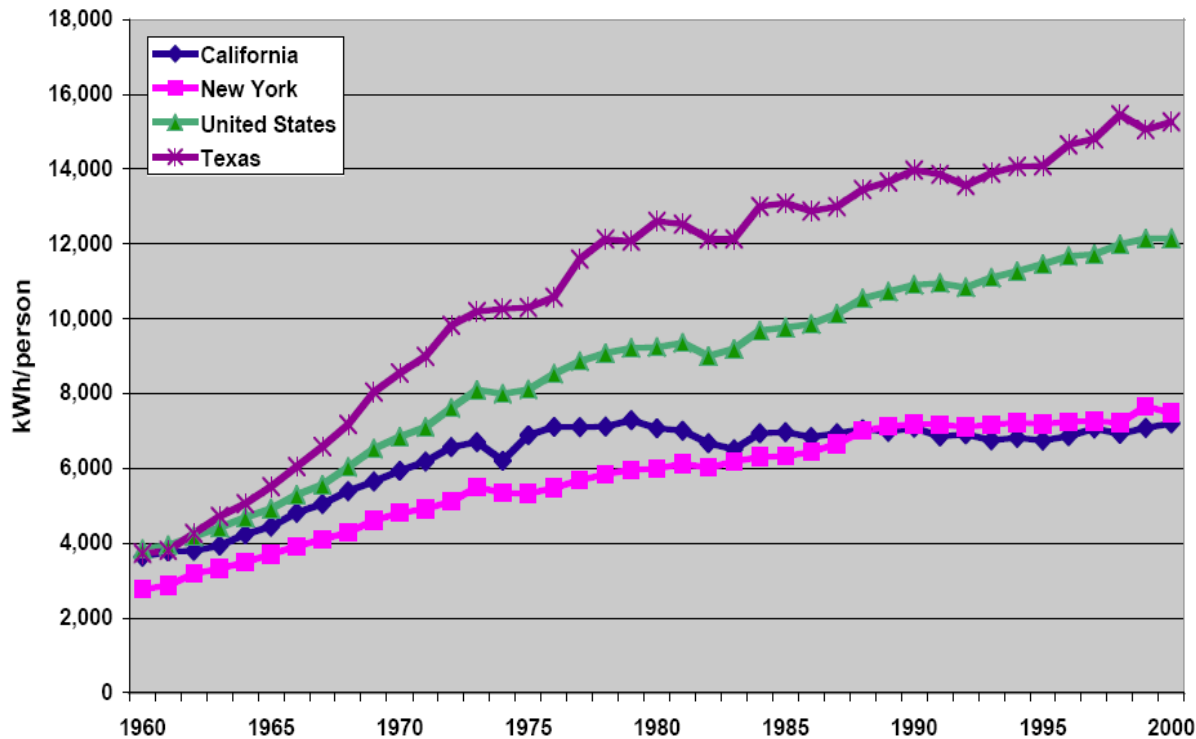
- One of the first things people do with rising incomes –
 - Buy lamps, TVs and Fans
- Residential electricity demand is likely to grow at the double the rate of economic growth

Advantages of Promoting Energy Efficiency (EE) and DSM in India

- **EE measures are cost-effective in India as they are in the US and other countries worldwide, however in India EE has several additional benefits**
- **EE will reduce electricity shortages, which in turn will**
 - Reduce the loss of industrial production and consumer welfare
 - Increase tax revenue (up to 20 cents/kWh) with improved industrial production
 - Reduce expensive and polluting back-up generation, and kerosene use for lighting
- **Promoting EE in consumer categories where tariffs are subsidized will**
 - Reduce government subsidy (\$5 billion in subsidized agricultural tariffs, more than the budget for health and education)
 - Improve the financial situation of the power sector
- **Case Study of Maharashtra State (MH), India (Phadke & Sathaye, 2006)**
 - EE will eliminate shortages, increase economic output, employment, and tax revenue
 - Results presented in public hearings of the Maharashtra Electricity Regulatory Commission (MERC) in 2004, which issued an order mandating utilities to undertake DSM programs
- **Large potential for rapid efficiency improvements: planting seeds of EE**
 - Rapid demand growth; opportunity to do things right the first time

Mainstreaming EE: What can we learn from California Success story

- More than half of the electricity demand is met by energy efficiency
 - Over a billion dollars of investments per year
 - 1500 MW demand reduction target in 2008
 - 5000 MW reduction by 2013



California Policies and Goals

- **Laws and Policies on Energy Efficiency**

- Electricity and natural gas utilities must "first meet [their] unmet resource needs through all available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible." *California Public Utilities Code §454.5(b), 454.56(b), see also, 701.1(b).*

- **Long Term Goals**

- 5000 MW by 2013

- **Comprehensive Programs**

- **Stable Funding Mechanisms**

- Public benefits charge & utility procurement accounts

- **Robust Evaluation, Measurement and Verification**

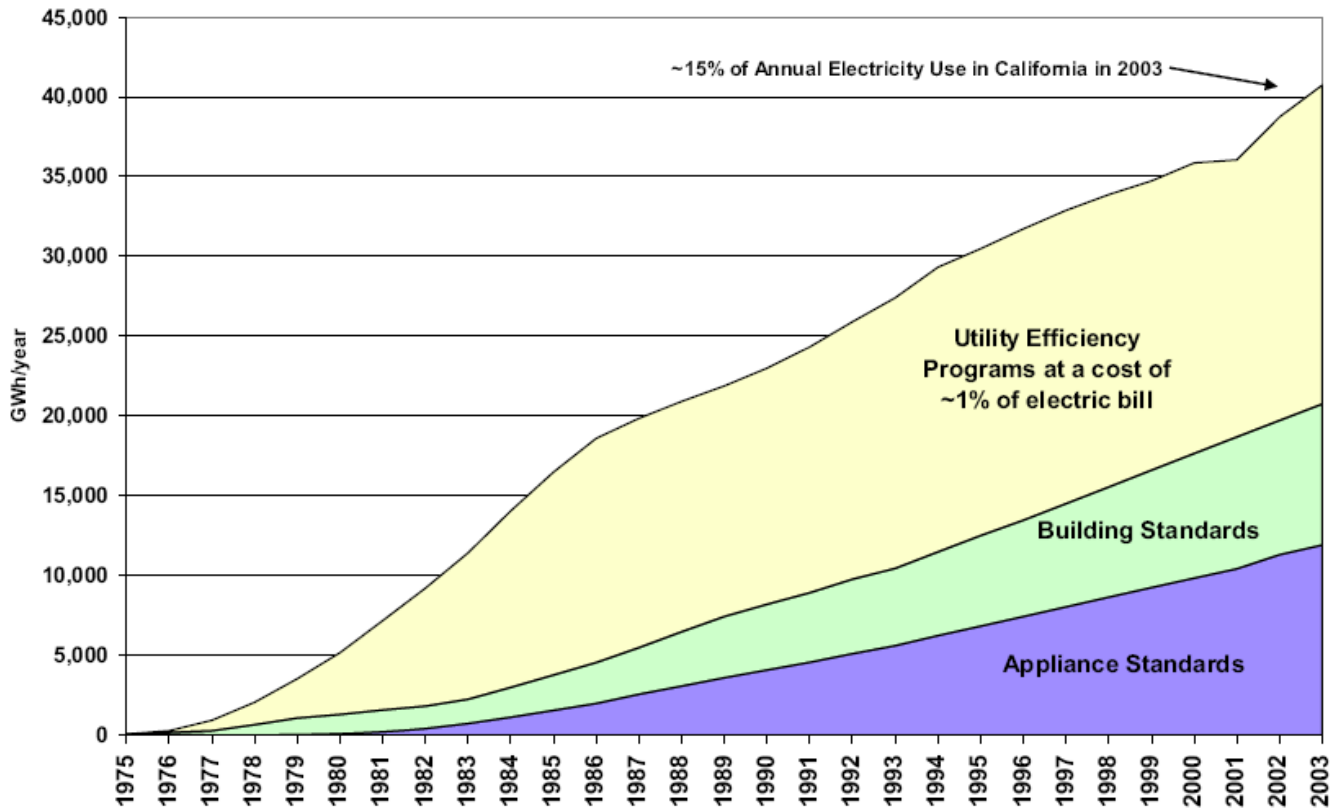
- **Alignment of Utility Incentives and Policy Goals**

- Utilities make money by investing in EE

Where are the savings coming from?

Electricity Sector DSM in CA

Annual Energy Savings from Efficiency Programs and Standards



Legal/Regulatory Mandates In India Creates Similar Options Which Have Brought Most Savings In The US/CA Electricity Sector

- **Energy Conservation Act 2001**

Created the Bureau of Energy Efficiency (BEE) under the federal Ministry of Power to

- ♦ Develop standards and labels for residential equipment -- refrigerators, air conditioners, motors, agricultural pumps, and distribution transformers
- ♦ Buildings and industry initiatives – Energy Conservation Building Code (ECBC), appliance labels and standards, annual awards, benchmarking exercises, etc.

- **Electricity Act 2003**

- Establishment of electricity regulatory commission
- Significant decision making authority and ability to raise resources
- Mandate to improve the cost effectiveness of the electricity sector
- Have many options to promote energy efficiency/DSM and other clean energy options
 - ♦ Maharashtra ongoing initiatives, and Delhi also interested in pursuing DSM

- Utilities need to consider EE in its portfolio of meeting future resource requirements

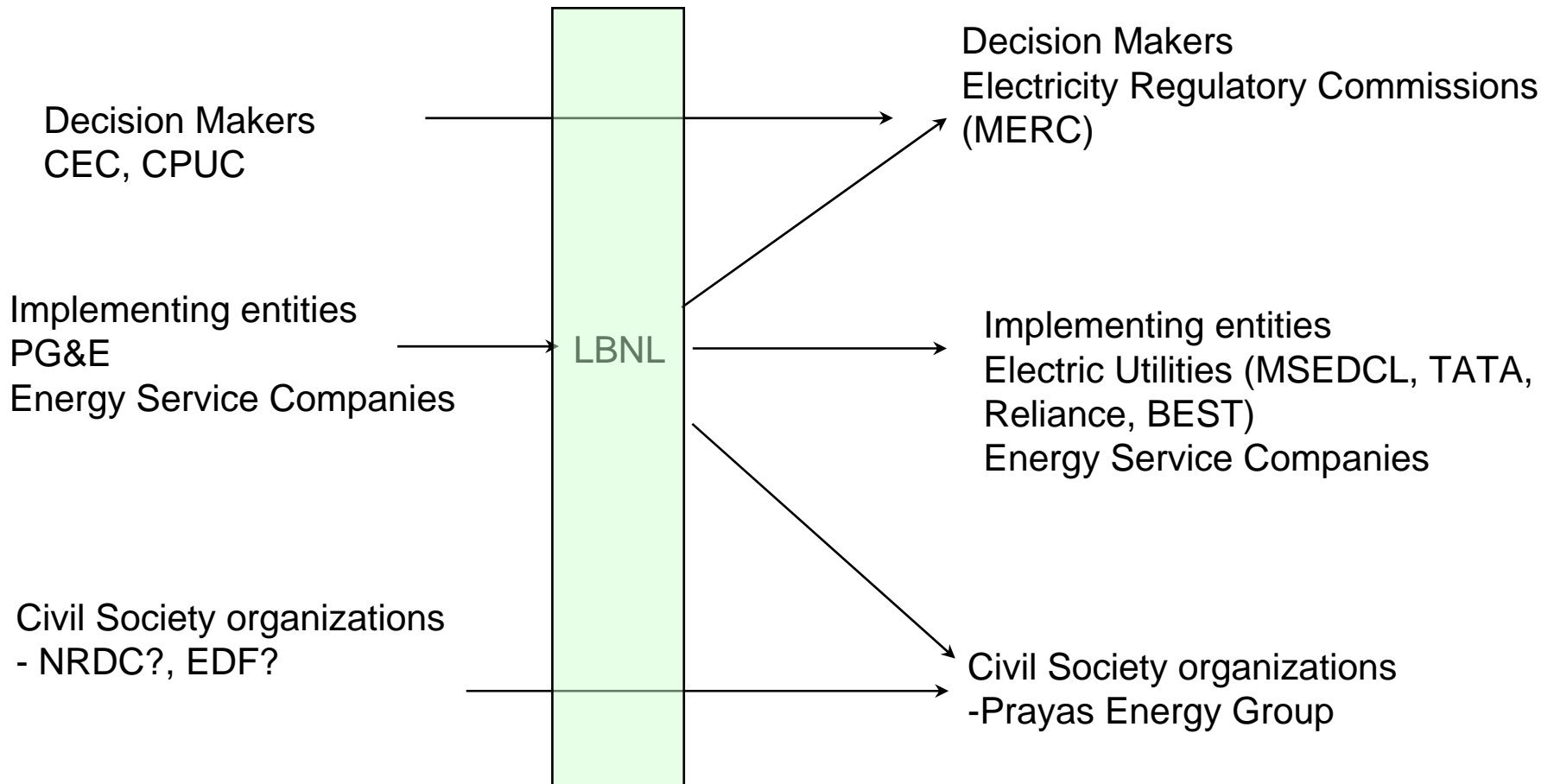
- Utilities should be required to consider all the cost effective EE options before undertaking conventional supply options

Focus areas for capacity building and technical assistance under the Asia Pacific Partnership LBNL India DSM project

Utility DSM

- **Regulatory reform for DSM & EE**
 - Utility incentives need to be changed so that pursuing EE is profitable (private utilities)
 - Public utilities: reducing the political risk in undertaking EE
- **Designing, monitoring, and evaluating EE & DSM programs**
 - Technical assistance to various entities in the supply chain of energy- efficiency
- **Demand forecasting & load research**
 - Rapid changes in the structure of the demand
 - End-use based demand modeling important for analyzing supply and demand side options
- **Integrated Resource Planning**
 - Key for facilitating efficient investment in supply- and demand-side measures
 - Important for consideration of EE & DSM in utility resource planning

LBNL India DSM Project: Institutional Linkages



LBL India DSM Project: Strategies

- **Large scale implementation of EE & DSM possible if the existing legal/regulatory mandate is utilized**
 - Work with the decision makers (MERC & Bureau of Energy Efficiency)
 - Financial resources for DSM and EE implementation are no longer a constraint
MERC has approved \$100 million (PP) for DSM in FY08-09
- **Main thrust on “technical assistance” and capability building**
 - Primarily targeting regulatory commissions and electric utilities
 - Work with in-country advocacy groups
- **Utilize LBNL-wide expertise**
 - International Energy Studies Group, Electricity Markets and Policy Group, and Appliance Standards Group
- **Leverage expertise available in the US**
 - Regulatory commissions, electric utilities, NGOs

Activities conducted so far

- Collaborative agreements
 - MOU between MERC, CEC, CPUC, and LBNL
 - MOU between PG&E and MSEB underway
- Scoping work-shop and a week long training workshop on DSM, IRP, and load research conducted
- In MH state, ~ Rs 100 Cr (\$100 Million in purchasing power parity terms) have been approved by MERC to be spent on utility DSM
- MH utilities are at different stages of designing and implementing DSM programs and other related activities
 - Quick win DSM programs
- MERC is working on developing guidance for DSM
- Other states are showing interest

Plan of activities

- **Short term**
 - Preliminary regulatory guidance
 - Quick win DSM programs
- **Long term**
 - Load Research
 - DSM potential studies & large sale programs
 - Integrated resource planning
- **Expanding to other states**
 - DERC
 - FOIR

Insights gained: Utility DSM

- **Regulatory reform and creative interpretation of the regulatory mandate is necessary for mainstreaming EE**
- **Importance of facilitating peer to peer dialogue**
 - **Credibility**
 - **Ability identify and address key potential issues**
- **Need short term success to keep interest as well as a long term plan**
 - **Quick win DSM programs**
 - **Long term**
 - ◆ **DSM potential and plans**
 - ◆ **Load research & IRP**
- **Developing human resources is a challenge that needs to be taken seriously**

Questions & Acknowledgements

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