India's experience in implementing strategic schemes to enhance appliance energy efficiency & futuristic integrated policy approaches to adopt most efficient technologies

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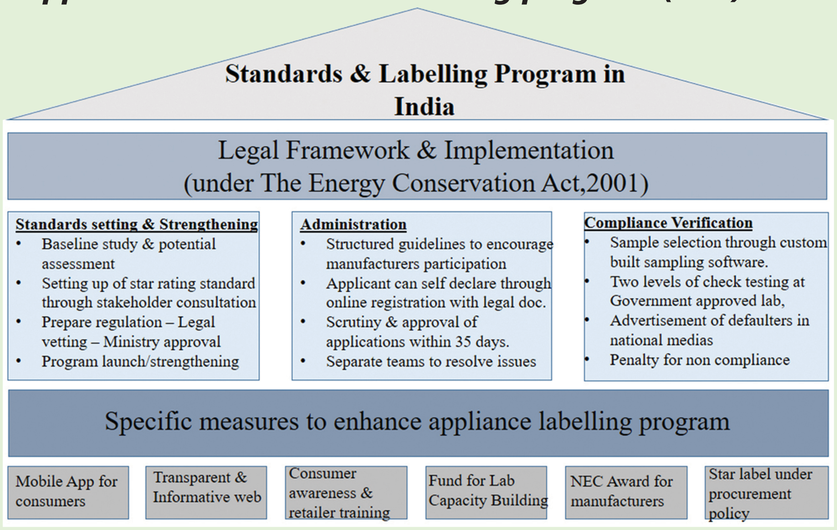
Aim: Analyze the implementation strategy of the GoI's existing schemes like appliance Standards and Labelling program (S&L), Unnat Jyoti by Affordable LEDs for All (UJALA)and propose integrated policy approaches to reduce the electricity demand by 2030.

Background: Experience in implementing existing schemes

1. Appliance Standards & Labelling program (S&L)



Journey so far:

- *2006: First voluntary labelling program for ACs and Refrigerators.*
- *2007 – 2010: 12 products in voluntary program.*
- *2010: 4 appliances in mandatory regime.*
- *2011 – 2016: 21 appliances in labelling program, of which 8 in mandatory regime.*

Target:

- *Total 28 appliances under the scheme by 2017 (as per CEA).*

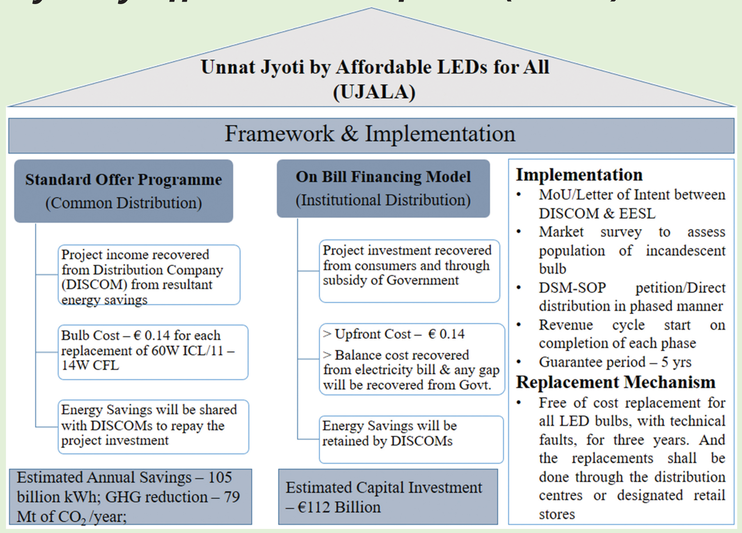
Key achievements:

- Cumulative savings of 29771 MW during 2006 - 2014.
- High penetration of labelled appliances among consumers:
  - Survey revealed that89% of respondents realized reduction in electricity bills on purchasing labeled appliances.
  - Consumer awareness of the star label increased to 63% in 2014 from 33% in 2010.
- Program built consumers' trust in labels and awareness for energy efficiency.
- Manufacturers' commitment to produce high quality and efficient products-S&L acts as a big motivator.

Key lessons:

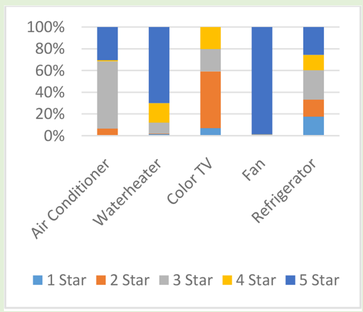
- The effectiveness of S&L is reflected by significant direct energy savings, as 77% of energy saving have been achieved from residential household appliances.
- A critical challenge to transform into a mature EE appliance market is insufficient demand-pull for energy efficient products.
- Higher cost of higher efficiency appliances is one of the key barriers.
- A strong need for suitable policy intervention to scale up the penetration of higher EE appliances and/or incentivize the consumer to purchase efficient appliances.

2. Unnat Jyoti by Affordable LEDs for All (UJALA) scheme



Key achievements:

- Reduction in retail cost -market price of domestic LED bulbs reduced from €11per bulb to €0.92 in 2-3 years.
- Verification & replacement mechanism – any failure or faulty lamp replaced free of cost.
- Triggered the market for tubular LED technology as a replacement for conventional fluorescent tube lights.



2016-Market penetration of star-rated products

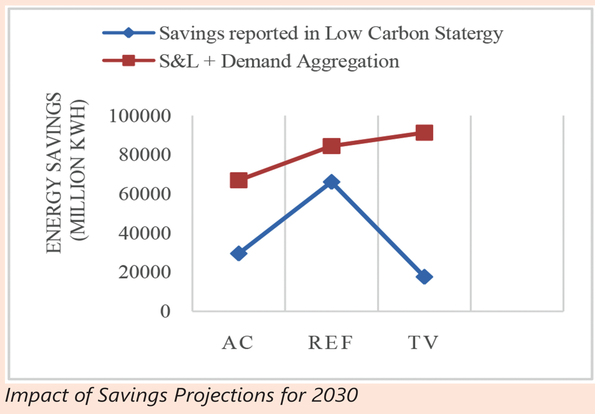
The figure shows that 5-star rated models of water heaters and fans has already witnessed significant market transformation while those of Colour Televisions (CTVs), Air Conditioners (ACs) and Refrigerators are still lagging.

Proposed Integrated Policy Approaches

1. Incorporate Star rating in procurement policy/demand aggregation scheme

- Bridge the price gap between different star-rating levels due to demand aggregation as proven by UJALA
- Enhanced credibility due to compliance check already in place for S&L, no separate mechanism required

An example to show the impact of a combined approach of demand aggregation and S&L in comparison with the business as usual (BAU) S&L approach.



Impact of Savings Projections for 2030

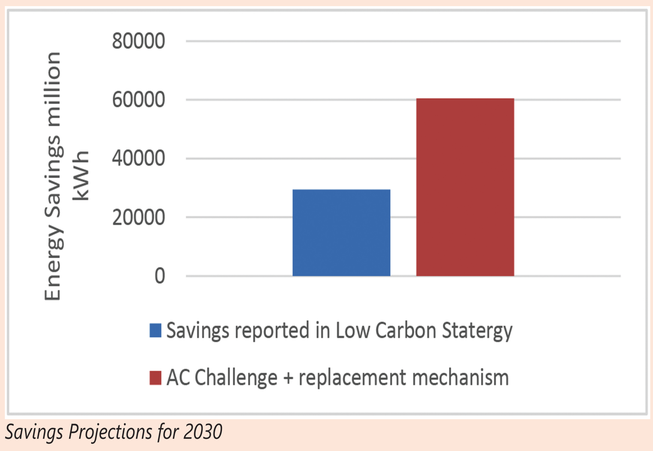
Assumptions & Potential savings:

- *Air Conditioner – 10% of current 4 Star penetration in 2030 results in 56% more savings*
- *Refrigerator –10% of current 5 Star penetration in 2030 results in 22% more savings*
- *Television – 10% of current 5 Star penetration in 2030 in 81%*

2. Combination of approaches in line with India's AC Challenge Program

An initiative aimed at market transformation towards super-energy efficientRAC of >5.5 ISEER.

A. Incentive based program approach-A scheme to replace old star rated appliances with super-



Savings Projections for 2030

Assumptions & Potential savings: 30% of ACs sold in 2011 replaced with SE AC + BAU penetration through S&L approach results in 52% higher savings

B. Seasonal electricity tariff rebate scheme: The rebate may depend on the resulting energy savings resulting from the use of superefficient appliances. The scheme can be implemented in partnership with the DISCOMs as:

- Direct deductions in the consumer electricity bill.
- Year-end claim by producing electricity bill at DISCOM or
- Discount of equivalent amount while purchasing any appliance having efficiency of Star 5 or above.

Table: Illustration for seasonal tariff rebate mechanism

Climatic Zones*	Average Hours (out of 8760 hours in a year) with temperature >35°C	Avg. Energy consumption of current 2 Star AC (kWh)	Avg. Energy consumption of SE AC (kWh)	Energy Savings (kWh) /AC/year	Rebate amount for 2 years for every SE AC (in €)	Actual cost of AC to Consumer (in €)
Warm & Humid	341	2.0	0.958	339	47	852
Hot & Dry	940	2.0	0.958	934	131	768
Composite	649	2.0	0.958	645	90	809

This would also result in annual peak demand reduction of 3836 kWh/unit of SE AC to the DISCOM.

Conclusions

- Appliance energy efficiency program regarded as a flagship program in India.
- Cumulative savings from S&L (2006-2014)&UJALA (until February 17)resulted in 35,227 MW of avoided capacity generation.
- Need to accelerate the pace of deployment of highly efficient technologies for transforming the markets.
- Periodic review and strengthening of the standards for higher stringency.
- Potential impact on energy savings can be exponentially higher through integrated policy approaches and move the market towards super-efficiency.

India's projected electricity demand is 2499TWh by 2030. This analysis establishes the potential to reduce the electricity demand in 2030by at least 10% of projected overall demand and emission reduction of 210 Mt CO_2 through integrated policy approaches.