Energy Efficiency Standards and Labeling in India

“Current Situation and Challenges”

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Legal Framework for Energy Efficiency

- Energy Conservation Act enacted in 2001
- Bureau of Energy Efficiency set up as the nodal central agency
- State Designated Agencies at the state level created for implementation of the Act.

Energy Conservation Act

- Act empowers Bureau and Central Government to specify Energy Consumption Standards.
- Prohibit manufacture or sale or import of equipments and appliances that do not meet standards.
- Require display of Energy performance labels on equipments and appliances.
Bureau of Energy Efficiency


• Improve energy efficiency through various regulatory and promotional instruments
  – Plan, manage and implement provisions under the EC Act
    • Appliance standards and labeling
    • Industrial energy benchmarks
    • Energy Conservation Building Codes
    • Monitor energy use in high energy-consumption units
    • Certify and accredit energy auditors and energy managers
  
  – Provide a policy framework and direction to national energy conservation activities

  – Disseminate information and knowledge, and facilitate pilot and demonstration projects
Institutional framework for regulation for Energy Efficiency

• BIS – National Standards Body
  ➢ Formulation & Implementation of National Standards
  ➢ Production certification, Quality system certification, EMS certification etc.

• Bureau of Energy Efficiency (BEE)
  ➢ BEE is established to implement & monitor the Energy Conservation Act, 2001
  ➢ One of the key thrust areas of EC Act, 2001 is Standards & Labeling Programme
  ➢ Formulation of Energy Efficiency Standards.

• Laboratories accredited by National Accreditation Board of Laboratories

• Educational Institutions.

• Manufacturers and Manufacturing Associations

• Consumer Organizations

• Ministries and key stakeholders.
Mission – S & L Programme

- To reduce overall energy consumption by use of Energy Efficient equipments/ appliances 18 BU by 2012 (~3000 MW).

- Targeted an avoided capacity addition of over 3000 MW during XI plan of Govt. of India.
S&L Methodology

Step 1: Decide whether and how to implement Energy Efficiency Labels and Standards.

- The potential impact of the standards by quantifying their predicted environmental and monetary benefits shall be addressed.
- Screening and selecting which types of products are the highest priorities.
- Assessment of the data needs for the program.
- Backing up with the test procedures and testing facilities adopted in other countries.

Step 2: Develop a testing Capability.

All manufacturers’ product must be evaluated in a same way which requires a standard testing facility, test procedure and a process for assuring compliance with testing requirements.
Step 3 & 4: Design and implement a Labeling program and analyze and set Standards.

From consumers’ perspective, the energy label is the most important element of the program. Label design can be established involving consumer research as an important element.

A Standard can be set to:

• eliminate inefficient models currently in the market.

• avoid import of inefficient products.

• encourage local manufacturers to develop more economically efficient products.

Several types of analyses such as technical, market, national impact etc are conducted to ensure that a standard achieve its purpose.

Step 5: Design and implement a communication campaign.

Effective S&L program require a communication campaign to support acceptance and use of new standards and labels.
Step 6: Ensure program integrity.

After the program initiation, a verification regime (to determine the product energy performance compliance to the program) is needed to ensure program’s integrity.

Step 7: Evaluate the program.

To maintain the program over the long run, the government shall monitor the program’s performance to gather information to guide adaptation to changing circumstances and to clearly demonstrate the public that the expected benefits are actually being achieved.

Good program require periodic revision and update. Review cycle can typically range from 2 to 12 years.
The Energy Labeling Program

Above the water: what the consumer sees in the store

- energy label
- market and promote program
- monitor and enforce compliance
- define label steps and tolerances
- design label format

Under the water: the foundations of an energy-labeling program

- voluntary or mandatory?
- which products should be labeled?
- market research
- test reporting and registration procedures
- agree on test protocols
- establish test laboratories
Products covered under Indian S&L Program

Current List
1. Frost-free Refrigerators
2. Tubular Fluorescent Lamps (TFL)
3. Air-conditioners
4. Direct cool /Frost Free Refrigerators
5. Distribution Transformers
6. Motors
7. Pump sets
8. Ceiling fans
9. LPG Stoves
10. Colour TVs
11. Storage Water Geysers
12. Washing Machines

Launched on 18th May 2006, for 4 products by BEE
Future - Equipments / appliances for S&L Program

Home Appliances
- Electronic Ballast
- Computer Monitors
- Kerosene Stoves
- Consumer Electronics

Industrial Equipments
- Industrial Fans & Blowers
- Diesel Generating sets
- Boilers
- Compressors

Other Appliances
- Uninterrupted Power Supply (UPS)
- External Power Supplies (EPS)
- Battery Chargers (BCs)
- Standby Power equipments
- Vehicles

Refrigerator &AC Systems
- Adaptive Defrost
- Commercial Freezers
- Visi Coolers
- Chocolate Coolers
- Chest Coolers
- Heat Pumps
- Multi Split Systems
BEE Star Labels
20% improvement in efficiency in CRT and 5% in LCD/Plasma targeted

Addressing both Active and Standby Power Consumption, with a Growth rate of 7% for CRT, 10% for LCD and 2% for Plasma.
Market Transformation Potential: Storage Water Heaters

30% reduction in standby losses

Market Share of Various Water Heater Manufacturers

- MTS-Racold: 25%
- Venus: 9%
- Bajaj: 12%
- Usha Lexus: 7%
- Crompton: 6%
- Symphony: 1%
- Others: 40%

Market Future

IEEJ: February 2011
Market Transformation Potential: Pump sets

15% improvement in efficiency targeted

Total 1.2 mn Units (2003-04)
Pumps < 7.5 kW - 3 Phase

Growth rate over last two years - 5-8%
Negligible imports

National Mfrs. 30%
Regional Mfrs. 20%
Local Mfrs. 50%
Market Transformation Potential: Ceiling Fans

- Estimated market size (2003-04) - 25 mn. Units
- 55% ⇒ 45% Share among Regional/Local-National

12% improvement in efficiency targeted

Source: IFMA Annual Report 2003-04
Market Transformation Potential: Induction Motors

5% improvement in efficiency targeted

Market Share - EFF1 Motors (Nos.)

- Bharat Bijlee & Others: 7%
- Siemens: 37%
- Crompton Greaves: 40%
- ABB: 16%

Source: Primary Survey, AFF Estimates

Market growth CAGR of 2%, with 50% unorganized sector

IEEMA members
Small MM

Focus area
Minimum Benchmark

EE Motors: Current Market Status

Current Market Status

Market growth CAGR of 2%, with 50% unorganized sector
**Market transformation in Air Conditioners**

Benchmarking with efficient products leading Market to transform into Greener products

**Star Rated Products**

Graphical representation of labeled production sales data for 3 consecutive years shown above demonstrates the increase in demand / sales of higher star rating models in the market
Market transformation in Air Conditioners

Energy Efficiency Ratio

<table>
<thead>
<tr>
<th>Period</th>
<th>Weighted Avg. EER</th>
</tr>
</thead>
<tbody>
<tr>
<td>07 - 08</td>
<td>2.61</td>
</tr>
<tr>
<td>08 - 09</td>
<td>2.66 (△)</td>
</tr>
<tr>
<td>09 - 10</td>
<td>2.72 (△)</td>
</tr>
</tbody>
</table>

In order to examine the shift in market towards higher rating models, the weighted average energy efficiency ratio has been calculated for the last 3 consecutive years.

EER values mentioned above represents an increase of approx. 2% in the value of EER over the consecutive years leading industries and market towards higher energy efficient appliances.
Market transformation in Air Conditioners

Chart shown above illustrates the specific energy consumption, considering room air conditioners in overall there is a decrease in energy being consumed to achieve a cooling capacity from the year 2007-08 to 2009-10.
The chart illustrates the pattern of labelled production respective to the star band category. In comparison to the previous two years, the production for 5 star rated models has increased by more than 40% in the year 2009-10. Also, the maximum number of products sold in the year 2009-10 lies under the 5 star category, indicating a market shift towards more efficient appliances.
Market transformation in Refrigerators

Specific Energy Consumption

Chart shown above provides an overall pattern of specific energy consumption combining both direct cool type and frost free type refrigerator. The decreasing trend of specific energy consumption illustrates the fact that more number of higher efficient appliances are being sold in the market resulting in energy saving and market shift towards more efficient appliances.
Purchase Drivers of Energy Efficient Appliances

**Ranking factors for purchase of Refrigerator**

- **Long Life:** 17%
- **Running costs ie., electricity efficiency:** 12%
- **Price of product:** 16%
- **Advanced technology:** 11%
- **Brand name:** 9%
- **Resale value:** 12%
- **Looks & Design:** 8%
- **Hassle free performance:** 9%
- **Offer / discount available:** 7%

**Ranking factors for purchase of Air conditioner**

- **Long Life:** 26%
- **Price of product:** 14%
- **Running costs ie., electricity efficiency:** 14%
- **Resale value:** 18%
- **Brand name:** 8%
- **Advanced technology:** 10%
- **Hassle free performance:** 5%
- **Looks & Design:** 7%
- **Offer / discount available:** 3%

All figures in percentages

Base: Recent purchasers of ACs (261)

Source: CLASP-BEE Report, 2009

CLASP- BEE Report, 2009

Source: CLASP-BEE Report, 2009

IEEJ: February 2011
Awareness of the BEE Labeling Program

Close to $\frac{1}{5}$ of the General Public is aware about the BEE Labeling Program, this is without any pro.

There is higher awareness of the initiative in urban in comparison to rural areas.

Higher awareness amongst recent purchasers of Refrigerators and ACs.

<table>
<thead>
<tr>
<th>Category</th>
<th>Awareness (in percentage)</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>19</td>
<td>4776</td>
</tr>
<tr>
<td>Urban</td>
<td>36</td>
<td>1336</td>
</tr>
<tr>
<td>Rural</td>
<td>13</td>
<td>3440</td>
</tr>
<tr>
<td>North</td>
<td>6</td>
<td>1162</td>
</tr>
<tr>
<td>South</td>
<td>26</td>
<td>1187</td>
</tr>
<tr>
<td>East</td>
<td>32</td>
<td>1222</td>
</tr>
<tr>
<td>West</td>
<td>13</td>
<td>1206</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>37</td>
<td>1759</td>
</tr>
<tr>
<td>AC</td>
<td>67</td>
<td>261</td>
</tr>
</tbody>
</table>

Source: CLASP-BEE Report, 2009
Impact of BEE Media and Awareness Campaign

One of the major outcome of the Study was that there is a need of continuous Media Campaign by BEE for increase recall value among consumers.
Perceptions of Star rated Refrigerators Vs Non star rated Refrigerators

All figures in percentages

- Overall: 7.5 Non Star Rated, 7.5 Star Rated
- Price: 5.6 Non Star Rated, 5.9 Star Rated
- Resale value: 6.5 Non Star Rated, 6.5 Star Rated
- Energy Consumption: 5.3 Non Star Rated, 5.7 Star Rated
- Life of the product: 5.7 Non Star Rated, 6.8 Star Rated
- Cooling capacity: 5.8 Non Star Rated, 5.7 Star Rated
- Ability to retain freshness: 6.35 Non Star Rated, 6.35 Star Rated
- Hassle free functioning: 5.7 Non Star Rated, 6.41 Star Rated

Base: All recent purchasers of Star rated Refrigerators (1091)

Perceptions of Star rated AC’s Vs Non star rated AC’s

All figures in percentages

- Overall: 7.85 Non Star Rated, 7.7 Star Rated
- Price: 6.46 Non Star Rated, 6.44 Star Rated
- Resale value: 6.48 Non Star Rated, 6.48 Star Rated
- Energy Consumption: 5.54 Non Star Rated, 6.42 Star Rated
- Life of the product: 6.42 Non Star Rated, 6.48 Star Rated
- Cooling capacity: 6.35 Non Star Rated, 6.48 Star Rated
- Ability to ensure quality of air: 7.7 Non Star Rated, 7.7 Star Rated
- Hassle free functioning: 6.41 Non Star Rated, 7.7 Star Rated

Base: All recent purchasers of Star rated Refrigerators (1091)

Source: CLASP-BEE Report, 2009
Consumer / Sales Executives awareness and Educational program
If Rising Electricity Bills Are Bothering You, Switch to Electrical Appliances with BEE Label

Reading the label...

Energy and Cost saving for 250 Ltr. Freezer/Refrigerator at different Star Rating

<table>
<thead>
<tr>
<th>Star Rating</th>
<th>Energy Consumption (Watts)</th>
<th>Power Charge Rs. (approx.)</th>
<th>Energy Cost/Year (Rs.)</th>
<th>Refrigerator Cost in Rs. (Approx.)</th>
<th>Cost (Difference Rs.)</th>
<th>Pay Back Period in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND STAR</td>
<td>1500</td>
<td>2.50</td>
<td>2750</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1 (One)</td>
<td>977</td>
<td>2.50</td>
<td>2443</td>
<td>368</td>
<td>14400</td>
<td>0</td>
</tr>
<tr>
<td>2 (Two)</td>
<td>762</td>
<td>2.50</td>
<td>1955</td>
<td>795</td>
<td>15500</td>
<td>3.25</td>
</tr>
<tr>
<td>3 (Three)</td>
<td>626</td>
<td>2.50</td>
<td>1565</td>
<td>1185</td>
<td>16500</td>
<td>5.00</td>
</tr>
<tr>
<td>4 (Four)</td>
<td>501</td>
<td>2.50</td>
<td>1253</td>
<td>1498</td>
<td>17500</td>
<td>7.00</td>
</tr>
<tr>
<td>5 (Five)</td>
<td>400</td>
<td>2.50</td>
<td>1000</td>
<td>2350</td>
<td>30500</td>
<td>9.00</td>
</tr>
</tbody>
</table>

Energy and Cost saving for 1.5 Tnr. Windows or Split Air Conditioner at different Star Rating

<table>
<thead>
<tr>
<th>Star Rating</th>
<th>Minimum Efficieny Rating (EER)</th>
<th>Input Power (Watts)</th>
<th>Units consumption/day (WkHrs)</th>
<th>Per Unit Charge Rs. (approx.)</th>
<th>Energy Cost/Month Rs. Cost Saving Rs. Per Year (w.r.t. No-star) (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Star</td>
<td>2.50</td>
<td>2.50</td>
<td>4.85</td>
<td>709</td>
<td>0</td>
</tr>
<tr>
<td>1 (One)</td>
<td>3.00</td>
<td>2.50</td>
<td>9.64</td>
<td>678</td>
<td>308</td>
</tr>
<tr>
<td>2 (Two)</td>
<td>3.50</td>
<td>2.50</td>
<td>14.37</td>
<td>624</td>
<td>851</td>
</tr>
<tr>
<td>3 (Three)</td>
<td>4.00</td>
<td>2.50</td>
<td>19.70</td>
<td>678</td>
<td>1373</td>
</tr>
<tr>
<td>4 (Four)</td>
<td>4.50</td>
<td>2.50</td>
<td>25.00</td>
<td>624</td>
<td>1971</td>
</tr>
<tr>
<td>5 (Five)</td>
<td>5.00</td>
<td>2.50</td>
<td>30.25</td>
<td>678</td>
<td>2605</td>
</tr>
</tbody>
</table>

Note: Assuming 6 hrs. operation per day for five months in a year

Label For Tubular Fluorescent Lamps

- **STAR RATING**
  - at 0100 hrs. of use: <81 → <61 & <67 → >67 & <86 → >86 & <92 → >92
  - <52 → >52 & <67 → >57 & <77 → >77 & <83 → >83
  - >49 → >54 & <54 → >54 & <73 → >73 & <78 → >78

Know the Luminous per watt. More Luminous mean More Light.

Under test conditions when tested in accordance to IS 2418. Actual efficiency will vary as per site conditions.

BEE, Ministry of Power, Government of India and the International Energy Agency (IEA) are organizing the International Conference of Standby Power on the 2nd and 3rd April, 2009 in Stela Auditorium, India Habitat Centre, New Delhi, India. For more details please visit www.bee-india.nic.in and www.energymanagementtraining.com

Size: 33x25 cm
Challenges and Barriers

• Aggregation of Baseline Data.
• Lack of Established Testing Protocols for EE.
• Strengthening of Nationwide Testing Capacity
• Unorganized market for several appliances plays key role in regional markets.
• Institutional Challenges for upscale of such a nationwide scheme.
• Sustainable & Robust Model for Monitoring and Verification
• Continuous and Strategic Media Campaign
• Public Procurement and Payback based Purchases in terms of EE appliances
• Incentive based Promotion for Manufacturers in addition to the market based promotion.
• Technical and Manpower Support for further enlargement
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