Cooling Challenges & Opportunities

Bureau of Energy Efficiency

Saurabh Diddi
Energy Economist

Cooling Market

Segment Share of Air Conditioning (2011-12)

Room Air Conditioner Market (2011-12)

- Room Air Conditioner
- Central Plant (Chiller)
- Duct/Package
- VRF
- Precision

- Commercial
- Residential
Cooling Profile - India

Electricity Consumption - 750 BU (2013-14)

- **Domestic**: 27%
- **Commercial**: 10%
- **Industry**: 35%
- **Agriculture**: 20%
- **Public**: 1%
- **Lighting**: 2%
- **Misc**: 3%

**Air Conditioner Contribution:**
- Household: 20-30%
- Commercial: 40-50%

- **70-80 GW connected load is only due to Cooling and consumes about 40-50 BU annually**

Urban Households Possessing Appliances per 1000 households

<table>
<thead>
<tr>
<th>MPCE decile class</th>
<th>MPCE (Rs. per person per month)</th>
<th>Television</th>
<th>Electric Fan</th>
<th>Air Conditioner, Cooler</th>
<th>Refrigerator</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-733</td>
<td>599.27</td>
<td>429</td>
<td>964</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>733-929</td>
<td>830.95</td>
<td>597</td>
<td>822</td>
<td>73</td>
<td>70</td>
</tr>
<tr>
<td>929-1101</td>
<td>1011.84</td>
<td>891</td>
<td>831</td>
<td>96</td>
<td>114</td>
</tr>
<tr>
<td>1101-1293</td>
<td>1196.08</td>
<td>758</td>
<td>902</td>
<td>143</td>
<td>218</td>
</tr>
<tr>
<td>1293-1502</td>
<td>1397.19</td>
<td>830</td>
<td>922</td>
<td>378</td>
<td>328</td>
</tr>
<tr>
<td>1502-1773</td>
<td>1633.42</td>
<td>827</td>
<td>938</td>
<td>190</td>
<td>359</td>
</tr>
<tr>
<td>1773-2097</td>
<td>1930.96</td>
<td>823</td>
<td>946</td>
<td>208</td>
<td>450</td>
</tr>
<tr>
<td>2097-2603</td>
<td>2329.87</td>
<td>818</td>
<td>943</td>
<td>236</td>
<td>537</td>
</tr>
<tr>
<td>2603-3665</td>
<td>3050.69</td>
<td>819</td>
<td>966</td>
<td>295</td>
<td>664</td>
</tr>
<tr>
<td>3665-More</td>
<td>5861.25</td>
<td>778</td>
<td>970</td>
<td>433</td>
<td>658</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td><strong>1856.01</strong></td>
<td><strong>758</strong></td>
<td><strong>906</strong></td>
<td><strong>214</strong></td>
<td><strong>390</strong></td>
</tr>
</tbody>
</table>

Source: NSSO 66th round (2009-10)

Approx. 6% in Urban Household
Opportunities & Challenges

- **Opportunity**
  - Higher Penetration
  - Sales growth
  - More cooling requirement due to climate change & rise in incomes
  - Efficient Air Conditioners

- **Challenges**
  - Significant peak load contribution due to cooling requirements
  - High Electricity consumption
  - High cost of Efficient Air Conditioners
  - Inefficient air conditioners installed
  - Maintenance & Power Supply issues
Room Air Conditioner

Mandatory Appliance

Standard: IS 1391:1992
Section 14(b): S.O.180(E) dated 12.01.2009
Section 14 (a): S.O. 181 (E) dated 12.01.2009
Regulation: No.2 /11(5)/03-BEE dated 06.07.2009

Star Labeling Parameter
Energy Efficiency Ratio

ISEER

- ISEER – Indian Seasonal Energy Efficiency Ratio
- Testing standard – IS 1391 Part II
- Calculation procedure – ISO 16358
- Weather profile for 54 cities across India were analysed to arrive bin temperature and hours

| Temperature in °C | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | Total |
|-------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|     |
| Average Annual    | 527| 590| 659| 660| 603| 543| 451| 377| 309| 240| 186| 165| 150| 125| 104| 86 | 67 | 54 | 46 | 36 | 28 | 22 | 16 | 12 | 9  | 6  | 3  | 1609|
| Hours             |
| Fraction          | 8.1| 10.2| 11.1| 11.4| 10.4| 9.4 | 7.8 | 6.5 | 5.4 | 4.2 | 3.4 | 2.9 | 2.3 | 1.7 | 1.4 | 1.0 | 0.8 | 0.5 | 0.3 | 0.2 | 100 |
| Bin Hours         | 146| 163| 177| 183| 167| 150| 125| 104| 86 | 67 | 54 | 46 | 36 | 28 | 22 | 16 | 12 | 9  | 6  | 3  | 1609 |
**Room Air Conditioner (Split AC)**

<table>
<thead>
<tr>
<th>Star Label Up-gradation for Split AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Star 1</td>
</tr>
<tr>
<td>Star 2</td>
</tr>
<tr>
<td>Star 3</td>
</tr>
<tr>
<td>Star 4</td>
</tr>
<tr>
<td>Star 5</td>
</tr>
</tbody>
</table>

**From January 2018**

- All Room AC based on ISEER Methodology
- Mandatory labeling for Inverter AC
- Merger of fixed speed and inverter AC label

**Change in Label**

![Old Label](image1)

![New Label](image2)

**Jan 2018**
Inverter Type Air Conditioner

- How to compare Inverter Split with Normal fixed speed split AC

![Graph comparing Inverter and Normal split ACs](image)

EER value is equivalent to ISEER

Annual Energy Consumption with ISEER methodology is available on [www.beestarlabel.com](http://www.beestarlabel.com)

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Star Labeling Impact

**Air Conditioners Market**

<table>
<thead>
<tr>
<th>Year</th>
<th>1 Star</th>
<th>2 Stars</th>
<th>3 Stars</th>
<th>4 Stars</th>
<th>5 Stars</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1</td>
<td>9%</td>
<td>14%</td>
<td>5</td>
<td>31%</td>
</tr>
<tr>
<td>2015</td>
<td>1</td>
<td>2%</td>
<td>15%</td>
<td>25%</td>
<td>57%</td>
</tr>
</tbody>
</table>

Bureau of Energy Efficiency
Market Transformation

2015 at 2010 Levels

Energy Efficiency Ratio (EER)

Way Forward

- Short/Medium Term
  - Differential taxation for 5 Star appliances
  - Incentive Program for Super Efficient Air Conditioners
  - Bulk Procurement of Super Efficient Air Conditioners to reduce higher 1st Cost
  - Recognition through awards for best available ACs
  - Star Labeling for Chillers and VRFs
  - Installation Practices
  - Strategic Retailer/Consumer Awareness

- Long Term
  - Disruptive technology for Cooling
Thank you for your kind attention