Super-Efficient AC Program in India
Experience of Bulk Procurement by EESL

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Feel the Land !!!

India is largely a hot country with uncomfortably hot summers, sometimes with very high relative humidity!

<table>
<thead>
<tr>
<th>Climate type</th>
<th>Summer temperatures (°C)</th>
<th>Winter temperatures (°C)</th>
<th>RH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot &amp; Dry</td>
<td>20 to 45</td>
<td>0 to 25</td>
<td>55</td>
</tr>
<tr>
<td>Warm-humid</td>
<td>25 to 35</td>
<td>20 to 30</td>
<td>70-90</td>
</tr>
<tr>
<td>Composite</td>
<td>27 to 43</td>
<td>4 to 25</td>
<td>20-95</td>
</tr>
<tr>
<td>Temperate</td>
<td>17 to 34</td>
<td>16 to 33</td>
<td>&lt;75</td>
</tr>
<tr>
<td>Cold</td>
<td>17 to 30</td>
<td>-3 to 8</td>
<td>70-80</td>
</tr>
</tbody>
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Source: LBNL (2014)
Key Points on Cooling Challenge in India

► Cooling Demand to Double by 2027

► Primary Energy requirement to grow by 2.1 times by 2027 @ 2017 baseline

► Tonnes of Refrigeration to grow by 3.1 times by 2027 @ 2017 baseline

► 25 GW of New Coal Based Power Plants can be avoided by Energy Efficient Cooling

► Potential to reduce 17% of energy demand, 20% of energy saving (20 mtoe), about 100 TWh of Electricity Saving

► 57% of Energy Demand for Cooling to come from Buildings

► Refrigeration is next largest contributor (about 25%)
In India, Air Condition Market has been fuelled by Efficiency Rating Programs

**Policy Drivers**
- Energy Conservation Act, 2001
- Standard & Labeling Program – Mandatory MEPS
- National Action Plan on Climate Change, 2008
- National Cooling Action Plan (NCAP), 2018
- Energy Conservation Building Codes

**Technology Drivers**
- Upgradation of MEPS – Standard get tightened in every 2 years for ACs
- Inverter ACs – 30% of sold ACs in 2017 are of Inverter Type

**Market Drivers**
- Rising energy demand for domestic / institutional and commercial sectors
- DSM and DR Programs by Utilities
- Bulk Procurement – by State Run entity EESL
- Consumer Awareness for EE products and increase in per-capita income
AC in India – Low Present Penetration, Huge Future Growth

- About 1000 BU electricity consumption in a year – increase @7%
- 30% consumption in Building Sector – 57% contributed by ACs
- About 5 million new AC enter into market every year – Existing fleet is over 20 million
- Average EER is 2.8 (w/w) – room for Efficiency Improvement

By improving its AC energy efficiency policies, India can save almost $17 billion cumulatively for consumers through 2030. If ‘access to cooling’ is to be prioritized as a development goal, India needs a strong facilitative framework, which will help reach a comprehensive solution for curtailing emissions from the cooling sector.

----- Ministry of Environment, Forest & Climate Change, India
AC Scenario in India – Efficiency Improves by 2.6% pa

Energy Consumption by Various Types of Cooling System (Total 126 TWh in 2017)

- RAC: 38%
- Chiller System: 32%
- VRF System: 9%
- Packaged DX: 9%
- Fan: 9%
- Air cooler: 3%

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Upgradation of Star Ratings in Split AC in Last 10 Years

- 1-Star: 2.3
- 2-Star: 2.60
- 3-Star: 2.91
- 4-Star: 3.2
- 5-Star: 3.5

Average EER (W/W) for Split ACs

- 2006: 2.3
- 2007: 2.59
- 2008: 2.60
- 2009: 2.69
- 2010: 2.72
- 2011: 2.72
- 2012: 2.91
- 2013: 3.07
- 2014: 3.2
- 2015: 3.2
- 2016: 3.2
- 2017: 3.2

Average EER (W/W) for Window ACs

- 2006: 2.3
- 2007: 2.46
- 2008: 2.43
- 2009: 2.62
- 2010: 2.68
- 2011: 2.72
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Value Chain and Key Participants in the Air Conditioner Market in India

1. AC Manufacturers
2. Bureau of Energy Efficiency (BEE)
   - Administers the Star Rating Program
   - BEE approves the Star Rating Labels to AC manufacturers or importers as per S&L Program under EC Act, 2001
3. Dealer / Distributor
4. Service Provider
   - Installation and warranty obligations
5. Financer
   - EMI Schemes or Zero Interest Schemes
   - Repayment through Equated Monthly Instalments (EMI) or as per Financing Terms & Conditions
6. Buyer
   - Buyer may go for upfront payment

Price @ (6) = (1) + (2) + (3) + (4) + (5)

Buyer approaches a retail shop to purchase an AC – the consumers may have the awareness about Star Rating of the product – **Initial Cost** is one of the prime factors
EESL’s Model of Super Efficient AC Program

BEE administers the Star Rating Program. Bureau of Energy Efficiency (BEE) test laboratories approve the 5-Star Rating Labels to AC manufacturers or importers.

EESL procures ACs through an open bidding process. EESL’s selected Manufacturer has obligations for installation and warranty.

EESL creates demand from institutional consumers, typically as a retrofit program under EESL’s Building EE Program (BEEP).

Price @ (A) = Discovered price through bidding + PMC Charge (5%) + Financing Charges (if ESCO model).

EESL raises fund from open market and pays back as per T&C. Repayment through Equated Monthly Instalments (EMI) or as per Financing Terms & Conditions.

Investment by EESL

Banks / FI

Project Management Consultancy (PMC) Model or ESCO Model

Institutional Consumers

Buyer may go for upfront payment i.e. Project Management Consultancy (PMC) Mode.
Attributes of Super-Efficient AC Program

- **15% reduction in Price due to Bulk Procurement**
- **No-upfront investment by consumer**
- **Pay-as-You-Save (PAYS) model**

About 48% more efficient than Avg. 5-Star and 30% than highest 5-Star AC

**EESL AC Program**

- ISEER = 5.2

**Baseline**

- No Star
  - ISEER < 2.2
- 3 - Star
  - ISEER = 2.9
- 5 - Star
  - ISEER = 3.5

**Estimated Retail Price (Rs.)**

- 39,288
- 56,076
- EESL Price

Extended Warranty: 3 Years

Target of **100,000 AC in 1st Phase**

- **10,000 Govt. Buildings**
- **800 Railway Stations**
- **125,000 ATMs**
Cost-Benefit Analysis of EESL’s AC Program

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<th>Parameter</th>
<th>CAPEX Model</th>
<th>ESCO Model</th>
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Approach & Methodology of AC Program

Finding Opportunities in Lighting, AC, Water Pumping, DG Sets etc.

Procedure:
1. Inventory Collection
2. Walk-Through Survey
3. Estimate Baseline
4. Prepare Scheme
5. Sign Agreement

Deemed Saving = (Baseline Watt – New Watt) x No. of Inventory x Run Hour per day x Days per Year

Implementation:
- Quarterly Repayment to EESL
- After Implementation
- 2-6 months

Procurement of Material:
- Price Discovery
- 1-3 months

Open Competitive Bidding

100% upfront investment by EESL
Shared Saving Approach

Baseline kWh

Estimated kWh

Deemed Saving

Deemed Saving is estimated based on the reduction in wattage due to retrofits and operating Hours

Annual Monetized Saving (Rs.)

Annual Repayment to EESL (Rs)

Annual Retain of Saving by Client

60-80 %

20-40 %

Project Period: 3-5 Years

Project Cost: Material Cost + PMC + ROI

3 Years Warranty
Successful ESCO Project by EESL: A Case

**Project:** Energy Efficiency Retrofit Program in a High-Rising Building

- **Energy Audit (Walk Through)**
- **Preparation of Scheme**
- **Identification of Intervention**
- **Signing of MoU with Client**
- **Implementation**
- **Warranty Support & Payment Recovery**

**Deemed Saving Approach**

- **Lighting (LEDs)**
- **Air Conditioning (Super Efficient ACs)**

**Estimated Energy Savings:** 123638 KVAh

- **Fixed Tariff, Rs. per KVAh:** $ 0.125
- **Estimated Annual Cost Savings:** $ 15465

**AMC getting free for Client on Air Conditioning ($ 12.3/AC/Annun):** $ 332.30

- **Total Cost Savings:** $ 15796
- **Investment, Rs.:** $ 35888
- **EESL PMC fee:** $ 4306

** Estimated Capital Cost of the project:** $ 40194

- **Equity Portion (20% of capital cost):** $ 8039
- **Return on Equity (23.7%):** $ 5894
- **Debt portion (80% Cost of capital):** $ 32156
  - **Debt Interest (11%):** $. 10078

**Total Estimated Repayment to EESL:** $ 56167

- **Contract Period:** 5 Years
- **Pay out to EESL annually:** $ 11233
- **EESL Share:** 71%
- **EESL Quarterly repayment:** $ 2808
- **No. of repayments Quarterly:** 20

**28% Reduction in Energy Consumption**
Challenges in the Program

Challenges

► Demand Aggregation

► Participation by more number of manufacturers in the bidding process

► Buy-back arrangement

► Use of LGWP refrigerant
THANKS FOR YOUR ATTENTION

Soumya Garnaik
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Energy Efficiency Servicers Ltd.
Ministry of Power, Govt. of India