Advancing Energy Efficient and Green Cooling through Sustainable Public Procurement [SPP]

Ms. Nidhi Gupta
Associate Director
Environmental Design Solutions
Cooling Challenge

Key Drivers for Rising Cooling Demand:
- Rising Global Temperatures
- Rapid Urbanization
- Increasing Disposable Income

Globally cooling is responsible for close to 10% of all annual GHG emissions, more than those from air travel and ocean shipping combined.

Space cooling represents a significant proportion of the overall GHG emissions. 50% of the energy consumption in office buildings is due to air-conditioning.

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Escalating Cooling Demand results in growing demand room air conditioners.

Globally, the number of room air conditioners is estimated to be **4.5 billion units by 2050**.

67% of households across the globe will own ACs by 2050. → 70% of this demand is from emerging economies.

**Air conditioner sales in India** → Annual growth rate 10% - 15% per year.

**India’s cooling-related energy demand from room air conditioners** will increase **20-fold** from 94 TWh in 2016 to 1,890 TWh in 2050.

Sachar, Sneha, Iain Campbell, and Ankit Kalanki, Solving the Global Cooling Challenge: How to Counter the Climate Threat from Room Air Conditioners. Rocky Mountain Institute, 2018.
Public procurement as a lever for market transformation - Green and Energy Efficient cooling.
EESL (Energy Efficiency Services Ltd)
Super-Efficient Air Conditioning Program

The program was rolled out in 2019 to support India’s commitment to Paris Climate Agreement, Kigali Amendment, and India Cooling Action Plan.

Designed on the bulk procurement model to push the cooling technology markets in India toward competitively priced, high energy-efficient ACs that also use climate-friendly refrigerants.
Learnings

New products need to be tried by the consumers before their interest translates into orders – factor in time for field testing.

Public procurement is multilayered and multi-stakeholder approach is required map the procurement process across the value chain.

Address manufacturers’ concern about cannibalizing their existing market with a lower cost and better product – focus on new demand creation.

Consumers may value other features as much, or more than efficiency – market research should factor this.

Impact

Introduced India’s first super efficient ACs - 30% more efficient than the best available in the market.

100,000 ACs procured.

USD 79 million investment mobilized.

Market creation - New competing super-efficient ACs introduced by other companies, at an even lower cost.

Approach

Extensive, structured research to get the contours of the air conditioning market in India and globally.

Product selection based on growth projection and energy efficiency savings potential.

Business model and roll-out strategy: Focused on public building retrofit.

Developed procurement specifications.

Developed marketing materials and outreach strategy.

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Government e-Marketplace (GeM)
Green Room Air Conditioner

The Government e Marketpla...e-Procurement in India.

Building on the success and lessons learnt from the EESL’s super-efficient air conditioning program,

a) Developed an SPP framework for India.

b) Integrate sustainable procurement (pilot product) in the national procurement ecosystem.
## Lifecycle of a typical room air conditioner

### Key Environmental Impacts

<table>
<thead>
<tr>
<th>Phase</th>
<th>Impacts</th>
</tr>
</thead>
</table>
| Manufacturing phase    | 1. Finite resources.  
                        | 2. Pollution (air, water, soil) 
                        | 3. Bioaccumulation due to hazardous constituents.                     |
| Use phase              | 1. GHG emissions.  
                        | 2. Leakage of refrigerants.                                            |
                        | 2. Refrigerant disposal.                                               |

### Sustainable Public Procurement Approach

**Procurement of RAC’s from manufacturers:**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Sustainability Measures</th>
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</table>
| Manufacturing phase    | 1. Use recycled materials  
                        | 2. Follow relevant environmental protection & waste management rules.               |
| Use phase              | 1. Minimize CO\(_2\) emissions.  
                        | 2. Minimize or eliminate use of refrigerants with high GWP.                        |
| End-of-life phase      | 1. Procurement of RAC’s from manufacturers that follow sustainable end of life practices.  
                        | 2. Minimize or eliminate the use of refrigerants with high GWP.                    |
Sustainable Procurement Tender Process

1. Procuring agency defines Conventional Criteria
2. Tender is floated and bids are received
3. Technical evaluation based on Conventional Criteria
4. Financial evaluation (selected on basis of least cost)
5. Evaluation for meeting Sus. Proc. criteria
6. Life Cycle Assessment (emissions from all life stages)

Least cost redefined as “Total cost of ownership”
Sustainable Public Procurement Framework

Criteria:

Conventional criteria → Business as usual practices.

Core criteria → are designed to allow for easy application of SPP, focusing on the key area(s) of the environmental performance of a product.

Comprehensive criteria → consider more aspects or higher levels of environmental performance. This can be in the form of stringent specifications, method of evaluation for bids and products, etc.

Identification of need - Air-conditioner as a product or “Cooling as a Service.”

Requirements - Quantity, type of air conditioner, capacity, nature of service - replacement or new procurement.

Support phase out of in-efficient products – Specify variable speed instead of fixed speed air conditioners.

Specify technical and functional performance specifications related to product criteria – Safety and performance, Product noise, Energy performance (EER), Refrigerant (Global Warming Potential, Ozone Depletion Potential), Recycled plastic component percentage, Paint and Packaging
Sustainable Public Procurement Framework

1. Identification of needs
2. Definition of specifications
3. Selection of bidding companies
4. Award of contract
5. Contract Performance Clauses
6. Management & Monitoring

**Green clauses for Safe Disposal**
Option 1: Include True Cost of end-of-life strategy.
Option 2: “Buy-back” or “take back”

**Evaluation Criteria** -
Option 1: Total Cost of Ownership (TCO)
Option 2: Life Cycle Based Evaluation - Climate Performance (LCCP) or Direct Emissions due to refrigerants

**Organization criteria** – Adherence to Laws and Regulations such as Hazardous substance management, Noise Pollution, Ozone Depletion, Environmental Management Systems (EMS) Certification, Corporate Social Responsibility

**Social Criteria** – Adherence to Labour laws, Requirements for employee well-being and Gender Inclusivity
## Total Cost of Ownership (TCO)

**example for 1.5 TR RAC**

### Comparing a 1.5 TR 5-star Split RAC with Green RAC

<table>
<thead>
<tr>
<th>Description</th>
<th>5-Star RAC Details</th>
<th>Green RAC Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initially costs</td>
<td>₹ 42,000 - ₹ 70,000 (558 - 930 USD)</td>
<td>₹ 42,000 - ₹ 75,000 (558 - 997 USD)</td>
</tr>
<tr>
<td>On an average, consuming</td>
<td>890 kWh/year</td>
<td>750 kWh/year</td>
</tr>
<tr>
<td>Total Cost of Ownership over 7 years is</td>
<td>₹ 141,880 (1886 USD)</td>
<td>₹ 122,090 (1622 USD)</td>
</tr>
<tr>
<td>GHG emissions over its lifetime</td>
<td>5,110 kg CO₂</td>
<td>4,300 kg CO₂</td>
</tr>
</tbody>
</table>

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### Green Room Air Conditioner Specifications

<table>
<thead>
<tr>
<th>Compressor Type</th>
<th>Variable speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and Performance</td>
<td>Conform to the requirements for quality, safety and performance prescribed in IS 1391 Revised / IEC 60335-2-40 (under preparation) and all requirements specified as under.</td>
</tr>
<tr>
<td>Product Noise</td>
<td>Air conditioner noise levels shall be as notified under the Environment (Protection) Act, 1986, and as per BIS (IS 1391Revised).</td>
</tr>
</tbody>
</table>
| Energy Performance | 3517 W to 5240 W (1-1.49 TR)  
5275 W to 6682 W (1.5-1.99 TR)  
**ISEER greater than or equal to 5.8**  
**ISEER greater than or equal to 5.4** |
| Refrigerants | Refrigerant should have **Zero ODP.**  
**Global warming potential (GWP) not exceeding 700 (100 years)** |
| Recycled Plastic Components | Product shall be designed to promote recycling  
Utilizing at least **80% by weight of plastics for recycled plastic components** |
| Paint | Paints used in the product shall not contain heavy metals or their compounds include mercury (Hg), lead (Pb), cadmium (Cd) and hexavalent chromium (Cr). |
| Packaging | The air conditioner packaging shall be made of recycled or biodegradable materials. Plastic packaging shall not contain halogenated hydrocarbon. |
| Green Disposal | **Take-back or buy-back option is available with the manufacturer.** |
RECAP: Key highlights of the specified criteria

1. **Organization & social criteria** in addition to product-specific sustainability criteria.

2. **Energy Efficiency**
   - Shift from fixed speed → Variable speed
   - Higher Energy Efficiency (ISEER) → Better than 5 star labelled products

3. **Low Global Warming Potential**

4. **Sustainable Packaging**

5. Contract clauses include – “take-back” / “buy back” options

6. Product evaluation is based on “Total cost of ownership”
Conclusion

1. Incremental change is a first step in public procurement.
2. Readiness in market is important for public procurement.
3. Multi-disciplinary team - Expertise in both domain / sector + procurement processes.
Thank You

Nidhi Gupta
nidhi@edsglobal.com