

## Utility-driven programs – large AC systems

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### Outline

- Current stock of large air-conditioning systems
- Types of technical interventions
- Programmatic interventions
- Possible transactions

## Current stock of large-scale/central HVAC systems

Utility	No. of HT customers (Hospitals, malls, Multiplexes, comm. bldg, cold storage etc.)	CMD	No. of LT commercial customers
Reliance Energy	500	340	13,350
BEST	134	114	7500
Tata Power	68	106	2885

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## Type of technical interventions – energy savings

- Energy efficiency improvement in central ACs
  - Changing old units to new
    - > 10 years vintage and specific energy consumption of > 1.6 kW/TR ~ target 0.6 to 1 kW/TR (*costs: INR 15,000/TR?*)
    - Types ~ screw or scroll chillers
  - Change auxiliaries (reduce SEC by 20%)
    - Air-cooled to water-cooled (Availability of water?)
    - Change chilled-water pumps, AHU motors, automation
    - Ducting/maintenance, leakage control
  - Operational features
    - Set temperatures, other controls
    - Variable frequency drives (VFD)

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## Type of technical interventions – energy savings

- Energy efficiency improvement in packaged units
  - Changing old units to new
    - > 10 years vintage and specific energy consumption of > 1.6 kW/TR ~ target 0.6 to 1 kW/TR (*costs: INR 15,000/TR?*)
    - Types ~ Variable Refrigerant Volume/Flow units (VRV/VRF)
  - Change auxiliaries (reduce SEC by 20%)
    - Ducting/maintenance, leakage control
    - VRF drives
  - Operational features
    - Set temperatures, other controls
  - Demand-response
    - Cooperative load management in buildings with discrete windows/split systems?

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## Type of technical interventions – demand shifting

- Thermal storage
  - Retrofit set temperatures of chillers (4 deg C to sub-zero)
  - Requires additional storage (*space?*), typically a plate heat exchanger, three-way valves
  - Piping modifications and additional pumps requirements
  - *May cost INR 25,000/TRh*
- Demand response
  - Cooperative of large commercial sector users?

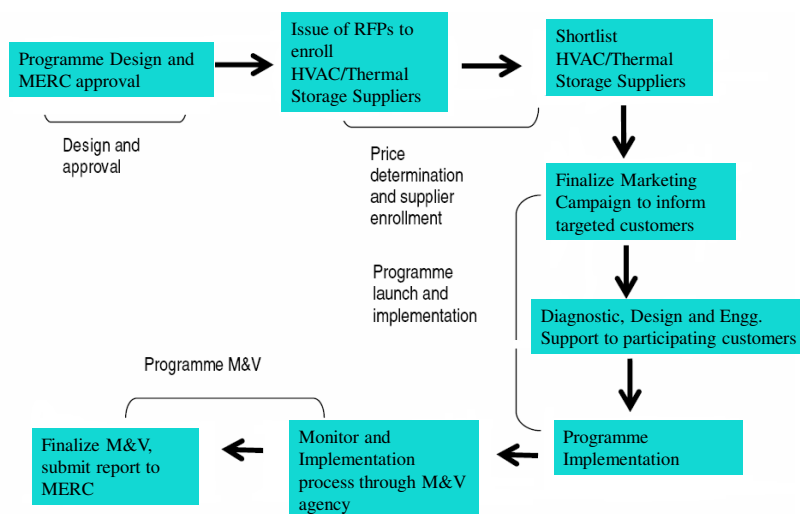
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## Programmatic interventions

1. **Awareness campaigns (Soft-options)**
  - Targeted campaigns
2. **Diagnostics, design and engineering support (Soft+engg)**
  - Energy audit support
  - Support to design retrofits
3. **Tariff interventions (policy-directives)**
  - Change ToD timing for Mumbai city selectively?
  - Increase maximum demand charges?
  - Exemption on Electricity duty and tax on sale of electricity.
4. **One-time subsidy (policy-directives)**
  - Upfront rebates
5. **Financial support model (market-based)**
  - Allow utility investments in HVAC projects and RoE

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## Proposed transactions on HVAC DSM Program



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- Thank you!