



# **Scope for deep decarbonisation in MSME manufacturing sectors: Cluster report**

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Pharmaceutical, Alathur





## Cluster Profile

The pharmaceutical cluster is one of the fastest-growing industries in the country and of high national importance, evidenced during the COVID crisis. Just south of Chennai lies the Alathur SIDCO industrial complex with 23 large and small industrial units working in the pharmaceutical sector. It provides a mix of API/intermediate manufacturing as well as the formulation of products such as ointments, tablets, injectables, oral liquids capsules, and hand wash.

**Location:** Alathur, Chennai

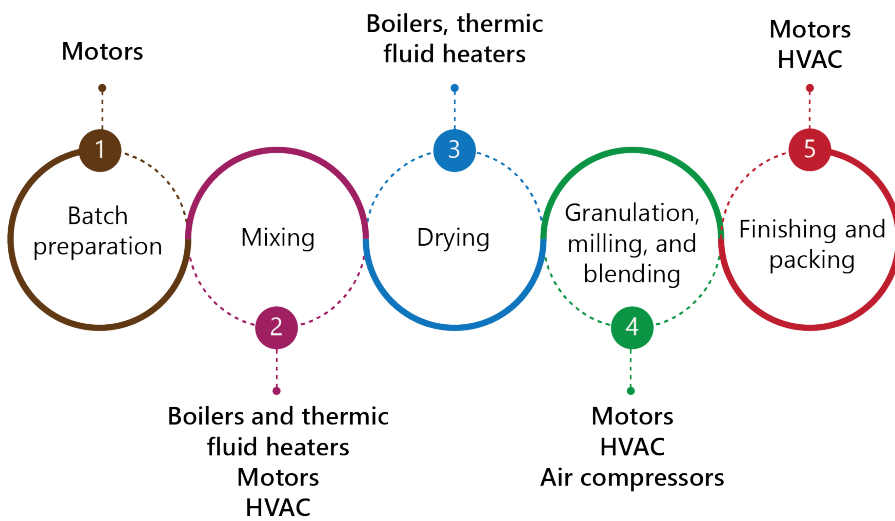
**Sector:** Pharmaceutical

**MSME sample size:** 9 (a mix of micro, small, and medium)

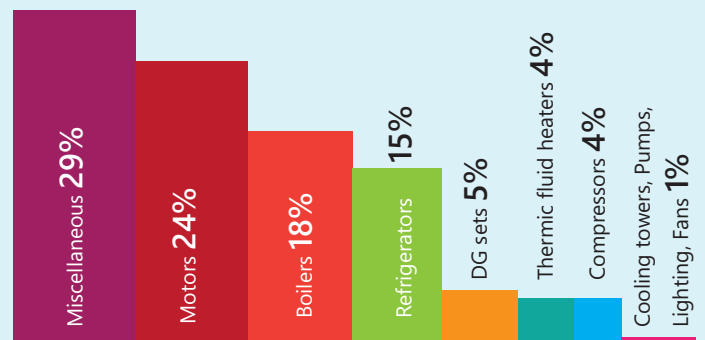
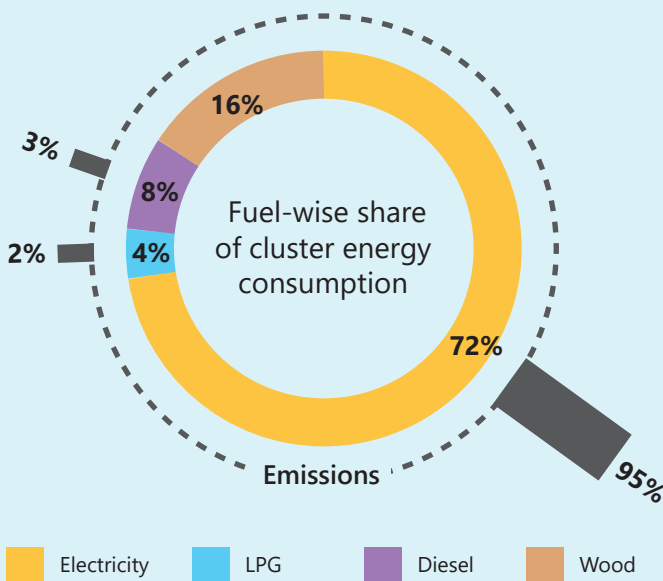
**Products:** Intermediates, tablets, injectables, eye drops, ointments, oral liquids, capsules, ORS sachets, medical gear and equipment, hand wash, petroleum jelly, and bulk drugs

MSME classification	Turnover (in INR crore)	Investment (in INR crore)
Micro	0–5	0–1
Small	5–50	1–10
Medium	50–250	10–50

## Unit process diagram



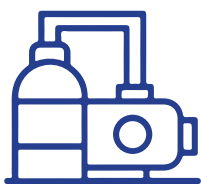
## Energy Consumption Profile



Equipment-wise share of cluster energy consumption

Note: Miscellaneous equipment consists of lighting, fans, additional process equipment, and so on

# Energy- and Emission-Intensive Equipment



## Boilers

Boilers are used for the generation of steam and hot water for process requirements. Steam is mainly used for drying in formulation and is used in coils to provide indirect heating in fluidised bed dryers and tray dryers. Boilers in Alathur are primarily diesel-powered, with wood also in use.



## Thermic fluid heaters

Like boilers, thermic fluid heaters meet the needs of several process-heating requirements in manufacturing units but without the use of steam. They are also used in mixing vessels to maintain temperatures.



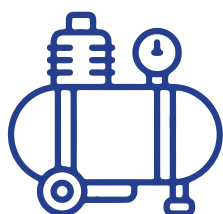
## Motors

Motors are major electricity-consuming equipment in the pharmaceutical sector, required to run several pieces of process equipment such as granulators, material handling systems, and milling machines.



## HVAC

Pharmaceutical processes require specific humidity levels and temperature ranges to ensure proper product quality. Heat ventilation and air conditioning (HVAC) systems are used in pharmaceutical units to regulate humidity levels, maintain desired temperature ranges, and filter out contaminants. The pharma units have installed packaged chillers, split ACs, air handling units, and cold storage rooms.



## Compressors

Compressed air is used for packaging filling, atomising the coating solution, and operating pneumatic systems. Compressed air is mainly used to operate the pneumatic system of the manufacturing/ process machinery such as fluidised bed dryers and formulation systems.

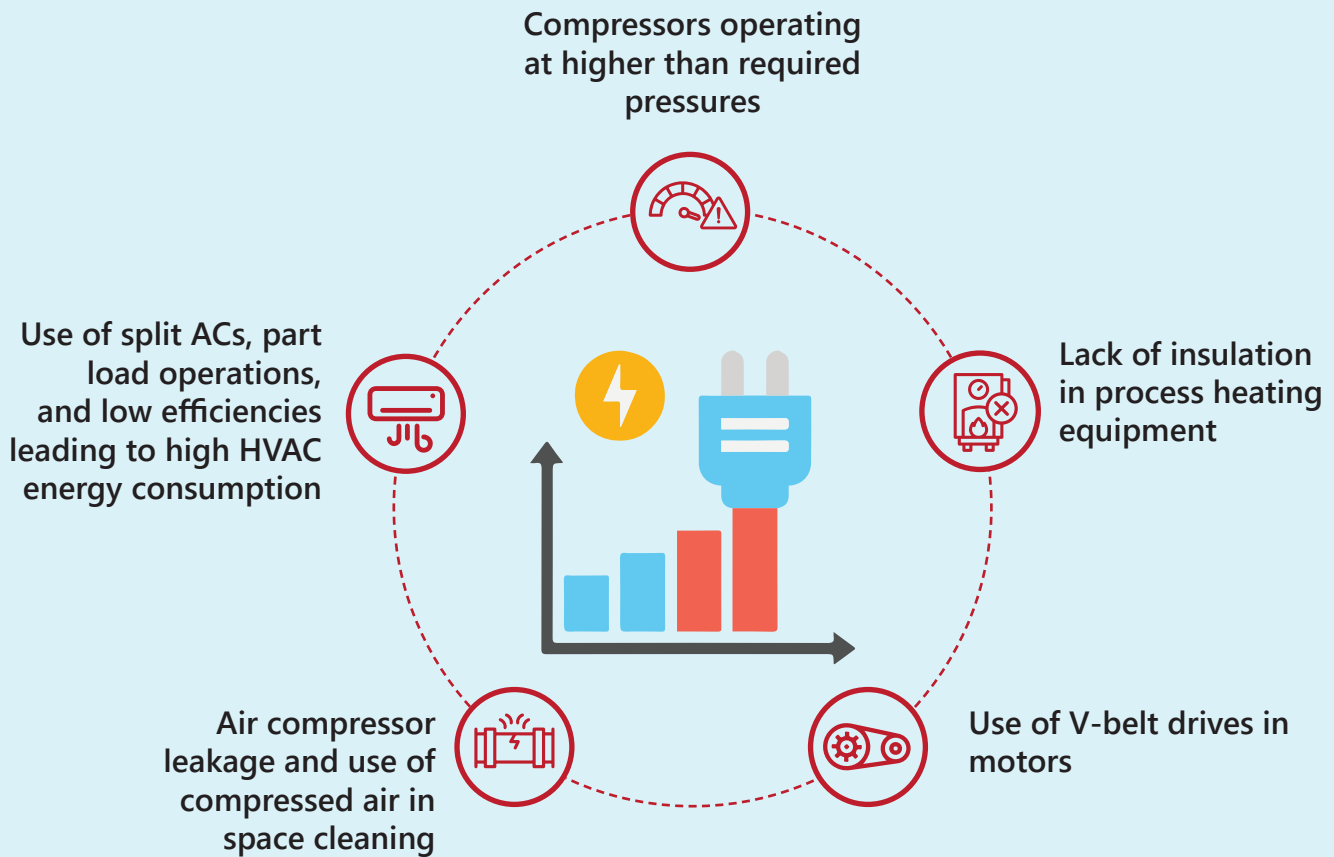


## Diesel generators

A diesel generator (DG) set is primarily used as backup power if there is a power outage. It is a large consumer of HSD in units, operating with typical efficiencies of 25%–45% depending on the age of the equipment.

Equipment	Recorded SEC in kW/CFM
Air compressor	0.11–0.28

## Reasons for High Specific Energy Consumption (SEC)



## Energy Efficiency (EE) Recommendations

- Improvements in boiler insulation (**short term**)
- Installation of BLDC fans (**medium term**)
- Replacement of V-belt drives with raw-edged cogged wedged belts (**medium term**)
- Use of centralised HVAC systems (**long term**)
- Switching to energy efficient IE3 motors (**long term**)
- Installation of energy management systems (**long term**)

Decarbonisation measure

Short term: <1 year

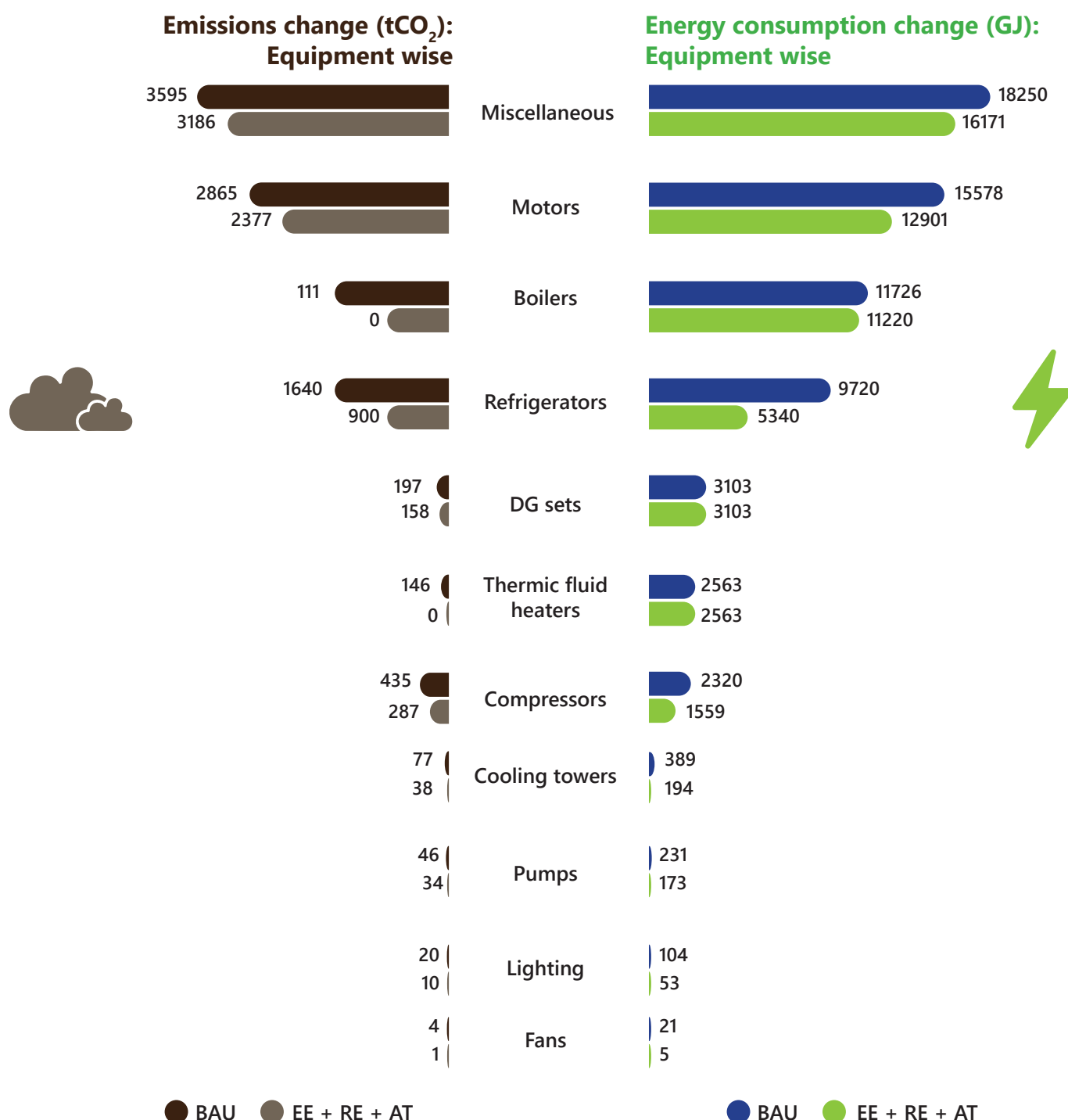
Medium term: 1-2 years

Long term: >2 years

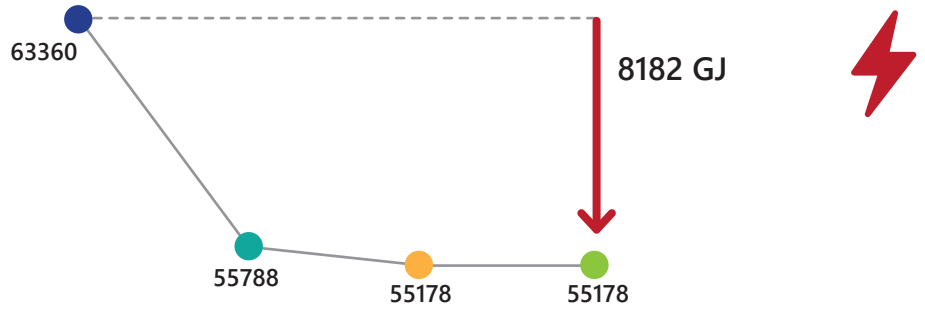
## Techno-economic Analysis

A techno-economic analysis is carried out for a sample size of 9 units where energy, emission, and energy cost are modelled across four scenarios. The analysis shows the difference in each scenario and the impact of decarbonisation measures at various levels. The scenarios are as follows:

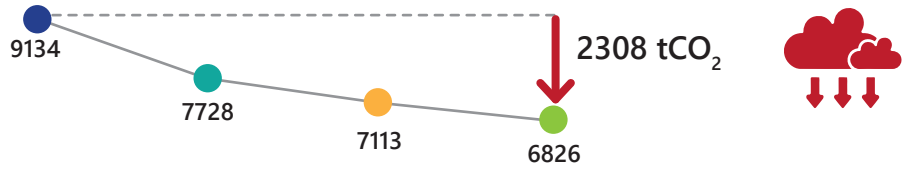
- **Business as Usual (BAU):** Without any interventions
- **Energy Efficiency (EE):** EE measures on existing equipment
- **Energy Efficiency with Renewables (EE + RE):** EE measures and renewables for electricity generation
- **Advanced Technologies (EE + RE + AT):** EE + RE measures and advanced decarbonisation technologies (clean fuels, process electrification)



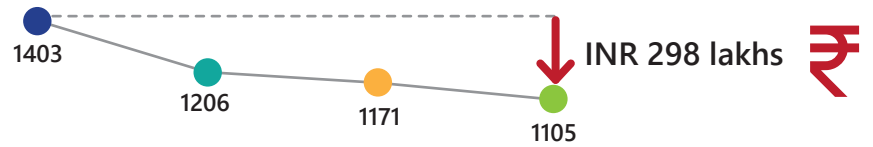
Scenario-wise reduction in cluster energy consumption (GJ)



Scenario-wise reduction in cluster GHG emissions (tCO<sub>2</sub>)



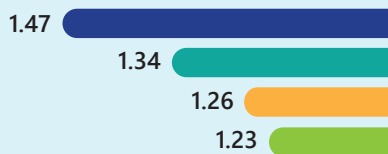
Scenario-wise reduction in energy cost within cluster (INR in lakhs)



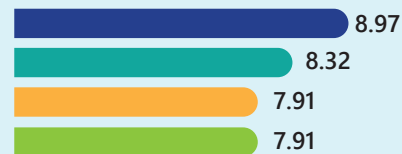
● BAU ● EE ● EE + RE ● EE + RE + AT

For a typical unit in the cluster, the change in energy and emission intensity of production is given:

Scenario-wise reduction in emission intensity (tCO<sub>2</sub>/tonne)



Scenario-wise reduction in Specific energy consumption (GJ/tonne)



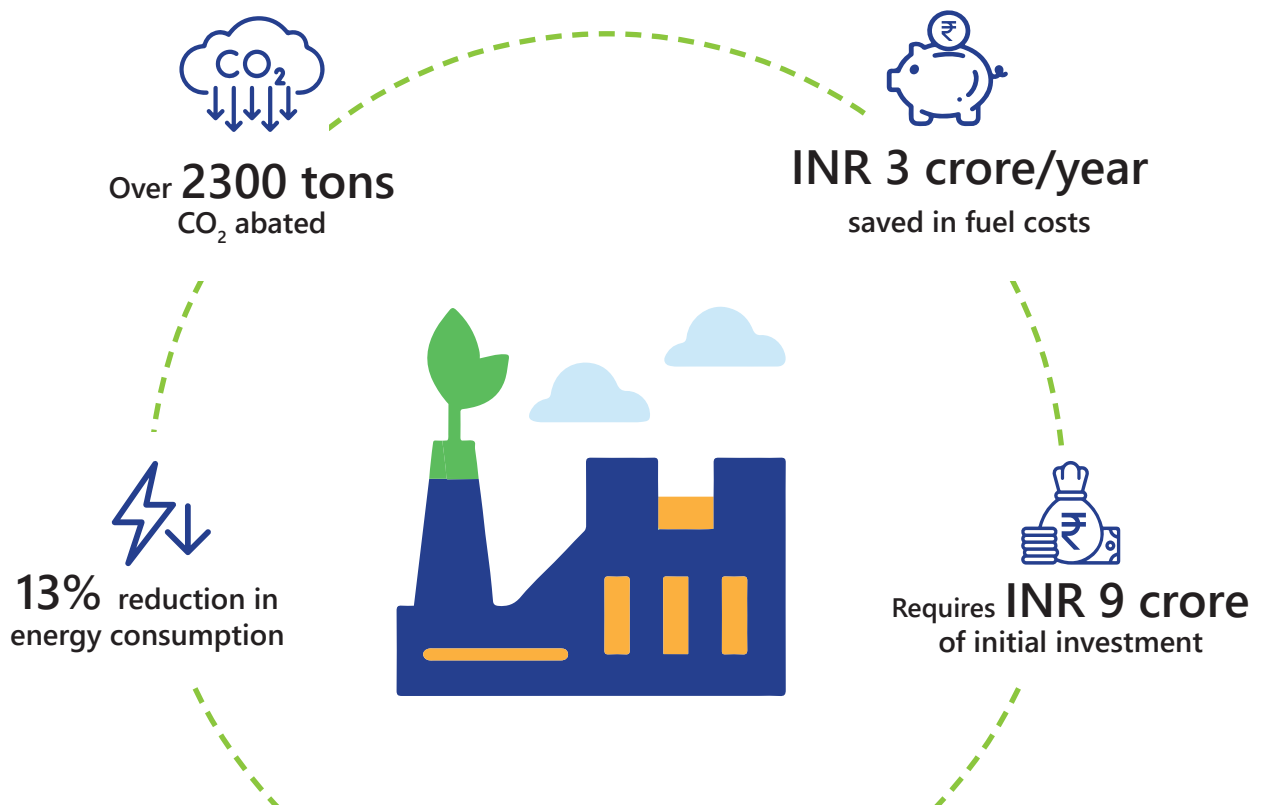
● BAU ● EE ● EE + RE ● EE + RE + AT

## Advanced technology measures considered for cluster and impact

Equipment	Decarbonisation measure	Energy reduction	Emissions reduction	Investment cost	Payback period
Electric	Installing rooftop solar	-	High	High	<5 years
Electric	Using open access green energy from grid	-	High	Low	Immediate
DG set	Biodiesel blending (20%) in DG set	-	Medium	Low	Immediate
DG set	Use of 100% biodiesel generator	-	High	Medium	<3 years
DG set	Conversion of DG set to battery	Medium	None	High	Not feasible
Boiler	Diesel boiler to electric	Low	None	High	Not feasible
Boiler	Diesel boiler to biogas	Low	High	High	Not feasible
Boiler	Diesel boiler to green hydrogen	Low	High	High	Not feasible
Boiler	Diesel boiler to biomass briquettes	None	High	Low	*4 years

Note: High payback for diesel boiler conversion because of the low utilisation rate

### Potential impact of decarbonisation measures





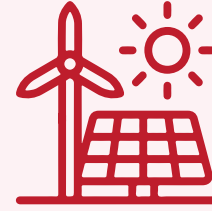
## Way Ahead



### Energy efficiency

High scope for energy, emissions reduction in HVAC systems, cooling towers, compressors, and motors. Policies targeting the equipment can maximise impact:

- Equipment likely to be eligible under PEACE implementation scheme. Facilitating more energy audits (energy audit cost subsidies and capacity building of state auditors) can have positive ramifications on the scheme
- Create additional line of credit for identified equipment
- Equipment benchmarks for energy consumption
- State government support through the upcoming RAMP scheme



### Potential for using RE in units and increasing usage

- Rooftop solar installation and use of RE-specific financing schemes (e.g., MNRE)
- Utilising RE open access and aggregating demand from multiple MSME units
- Reducing networking charges for RTPV
- Allowing RTPV installation above the sanctioned load in the gross metering regime
- DISCOMs to provide power evacuation infrastructure



### Demand aggregation

Given similar processes and proximity of units, the possibility to utilise MSME Cluster Development Programme and Integrated Processing Development Scheme funds for common:

- Centralised steam distribution, compressed air systems, and HVAC
- Centralised RE systems



### MSMEs carbon trading

Use of the upcoming carbon market as a potential source to reduce the payback period of decarbonisation measures:

- Regulations and framework on market design
- Sensitisation and awareness-building in the MSME community



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