PRESS RELEASE

With an initial investment of INR 90 crore, approximately 1,37,000 tCO_2, 3,85,000 GJ, and INR 37 crore savings in emissions, energy, and cost, respectively, can be achieved annually in 7 selected clusters

An in-depth techno-economic analysis for 7 MSME clusters highlights the need for a decarbonisation roadmap tailored for each location

For Immediate Release

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The Micro, Small and Medium Enterprises (MSMEs) contribute to 31% of India's gross domestic product, almost 50% of exports, and 57% of all employment in manufacturing sectors, making them crucial to the economy. However, they are highly energy- and emission-intensive. MSMEs are also vulnerable to the surge in energy prices and have rather high energy costs as a share of their total manufacturing costs. Thus, decarbonisation of MSMEs is necessary to reduce fossil fuel dependency in the industrial sector and to propel the clean energy transition. While several large-scale industries have implemented energy efficiency and conservation measures, MSME industries are lagging in this aspect.

The Center for Study of Science, Technology and Policy (CSTEP) has published a report titled 'Scope for Deep Decarbonisation in the MSME Manufacturing Sector'. The **2-year scoping study** evaluated the potential for decarbonisation in the MSME manufacturing sectors and for mitigating greenhouse gas (GHG) emissions. **Seven clusters, covering an aggregate of 66 MSME units**, from five energy- and emission-intensive sectors were included. A detailed techno-economic analysis was conducted to evaluate the feasibility of decarbonisation technologies (e.g. process electrification and fuel switching).

The study found that the implementation of a combination of the recommended Energy Efficiency (EE) measures, Renewable Energy (RE) solutions, and Advanced Technologies could result in **potential savings in emissions of 1,36,581 tCO_2, energy usage of 3,85,383 GJ, and energy costs of INR 37 crore**. Of note, except Asansol–Chirkunda clusters, all clusters experienced decreased energy costs.

For the aluminium die-casting cluster, the electric resistance furnace is an efficient and cost-effective option compared with piped natural gas (PNG)-fired furnaces, offering the benefit of reduced GHG emissions. Electric boilers are not financially viable for the pharmaceutical cluster owing to their higher capital costs and lower utilisation. Although the electric kiln offers a promising 29% reduction in emissions for the refractories sector, its financial feasibility is hindered by the substantial capital costs involved.

Although bio-compressed natural gas is at a nascent development stage, it is a viable alternative that can be used in PNG-fired furnaces in the aluminium die-casting cluster. Biodiesel blending with 80% diesel in diesel generator sets and diesel boilers can be another viable fuel option for the MSME sector. Despite the emission reduction potential of converting boilers to green hydrogen, the high fuel cost and cost of adopting hydrogen boilers hinder its widespread adoption.

EE measures for electric drives and heating ventilation and air conditioning (HVAC) equipment in the pharmaceutical sector, boilers and thermic fluid heaters in the textile sector, furnaces and die-casting machines in the aluminium die-casting sector, kilns in the refractory sector, and ovens in the bakery sector offer the **highest energy saving potential**.

The Delhi-NCR cluster showed a higher usage of natural gas-based melting and holding furnaces, whereas the Bengaluru cluster showed a higher usage of electricity-based furnaces. Thus, it is necessary to devise a specific **decarbonisation roadmap tailored for each location**, highlighting the diversity in results among locations of the same sector.

The main cluster-wise results of the analysis are given below:

- **Delhi-NCR cluster** (aluminium die-casting; 10 units): The implementation of decarbonisation measures requiring an initial investment of INR 9 crore reflected a 36% reduction in energy consumption, an annual emission savings of 3,123 tCO_2, and an energy cost savings of INR 11 crore/year.
- **Bengaluru cluster** (aluminium die-casting; 10 units): With an initial investment of INR 15 crore, decarbonisation measures could result in annual fuel cost savings of INR 6.5 crore, annual emission savings of 4,106 tCO_2, and energy consumption reduction of 26%.
- **Ludhiana cluster** (textiles; 12 units): An initial investment of INR 7.1 crore is needed to implement decarbonisation measures, which could reflect in annual emission savings of 91,876 tCO_2, energy savings of 6%, and annual fuel cost savings of INR 14 crore.
- **Tiruppur cluster** (textiles; 10 units): The recommended measures could result in energy savings of 13.5%, annual emission savings of 31,302 tCO_2, and annual fuel cost savings of INR 7.7 crore, with an initial investment of INR 1.31 crore.
- **Alathur cluster** (pharmaceuticals; 10 units): With an initial investment of INR 9 crore, decarbonisation measures could help achieve energy savings of 13%, annual emission savings of 2,308 tCO_2, and fuel cost savings of INR 3 crore/year.
- **Asansol–Chirkunda cluster** (refractories; 8 units): Implementation of decarbonisation measures could require an initial investment of INR 48 crore, majorly because of process electrification. Fuel costs could rise by INR 5.3 crore/year with the application of advanced technologies, whereas fuel cost savings of INR 3.25 crore/year could be achieved without implementing these technologies. Nevertheless, decarbonisation measures could help achieve annual emission savings of 3,583 tCO_2 and energy consumption reduction of 57%.
- **Coimbatore cluster** (bakeries; 6 units): With an initial investment of INR 1.36 crore, the recommended measures could aid in annual emission savings of 283 tCO_2, energy savings of 5.5%, and energy cost savings of INR 0.74 crore.

Some of the main challenges to decarbonising the manufacturing sector include **access to adequate financing** opportunities, **limited compliance requirements** for smaller industries from the government or clients, a **lack of awareness** within the MSME environment, constraints on the **adoption of rooftop photovoltaic (RTPV) or RE open access**, apprehension towards the **adoption of advanced technologies**, and a **lack of skilled workforce** or reskilling exercises to operate upgraded/new equipment.

The study informs specific policy recommendations to support the decarbonisation of this sector. This includes tailoring state-wise MSME policies to include emission reduction targets and a roadmap, development of a reliable ecosystem for the production and supply of biofuels, promoting the use of renewables such as RTPV and open-access systems, and providing regulatory incentives from governments and clients to nudge MSMEs towards fuel switching.

The findings of this study have been documented as seven cluster-wise reports for cluster-specific details on the recommended measures and technoeconomic assessments; one policy brief to highlight policy recommendations; and a full-length report with comprehensive documentation of the research data, study gaps, methodology, and major takeaways.

*The full report and cluster-wise reports can be accessed **here**. To read the policy brief, please click **here**.*

For more details and interviews, please write to us at cpe@cstep.in

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