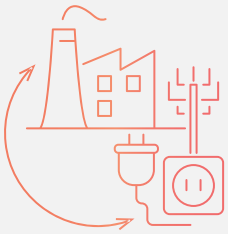

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SET aims to facilitate higher clean energy deployment in the State by working with stakeholders in order to find sustainable and equitable solutions. SET is a collaborative initiative by Auroville Consulting (AVC), Citizen Consumer and civic Action Group (CAG), the World Resources Institute India (WRI).

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Briefing Note Electrification of Processes in Top-performing Industrial Sectors of Tamil Nadu

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Purpose

This document presents the potential for the electrification of some of the processes in the top-performing (in terms of contribution to the state's GDP) industrial sectors of Tamil Nadu.

Key messages

- Most of the heat required for Tamil Nadu's top-performing industries is in the temperature range of 60 °C to 400 °C.
- Different industrial sectors are at different stages of electrification in Tamil Nadu. Accelerating electrification or partial electrification of processes in these sectors can be financially attractive and helpful in decarbonising the sector substantially.
- For exports to be carbon and emissions regulations proof, it is important to decarbonise the production. Electrification can be a key strategy in reducing emissions and sourcing electricity from renewables would allow some industries to approach zero-carbon.

Background

India's industrial sectors account for a considerable percentage of the country's energy needs, for which the primary sources of energy are petroleum, coal, natural gas, and lignite. A significant amount of primary energy is imported. In the year 2019, India imported 406 million tonnes of oil equivalent (MTOE) of fossil fuels, which is 55% of the total primary energy need of the country (Energy Balance 2019). Despite the huge imports, there is a challenge in matching the energy supply to demand because of the availability, quality, and regulation-related issues. Adding to the above, the following challenges also put pressure on the industrial sector's energy security:

1. Geopolitical tensions affect the import of fossil fuels in terms of quantity and pricing.
2. Logistic and supply chain issues due to the decentralised nature of fuel oil supply in India.

Whilst thermal energy requirement across various industries in India is posing a challenge to attain energy security and meeting decarbonisation targets. It is important to note that in the last ten years the cost of solar has reduced by 82% and that of wind by 39% (PV Magazine 2020). This is where electrification offers itself as a solution to accelerate the decarbonisation of the industry sector while contributing to the state's energy security.

Considerations

Tamil Nadu is one of the most industrialised states in India. Advancing electrification for the thermal energy need of industries in Tamil Nadu may be promoted for the following reasons:

1. Renewable energy (wind and solar) is the least expensive source of energy today and its cost is expected to further decrease in the next decade. Tamil Nadu, endowed with some of the best solar and wind energy sites in India, has a good potential to harness renewable energy.
2. Cost of electrical equipment such as boilers and heat pumps is coming down (Plugging in 2020).
3. Electrification in combination with renewable energy supports the decarbonisation of industries.
4. Electrification helps in reducing the dependency on the import of fossil fuels.
5. Electrification improves the energy efficiency of industrial processes.
6. Electrification and decarbonisation can give a head-start to the following:

   i) protection from future regulations such as the imposition of carbon taxing/carbon rating on the traded goods.

   ii) earning an advantage on the carbon trading mechanisms to be introduced in the future.

Tamil Nadu accounted for 9.47% of India's GDP in FY 2020-21(Industries Department 2022). Below is a list of the top 10 (based on their contributions to the GDP) industrial sectors of Tamil Nadu along with a break-up of the various processes requiring heat energy.

Table 1 Heat requirement for various processes in top-performing (Based on their contribution to the GDP) industrial sectors in Tamil Nadu

Sectors / Processes	Cleaning	Drying	Evaporation	Distillation	Pasteurisation	Sterilisation	Cooking	Process Heating	Boiler Feed Water Heating	Cooling
Automobiles and Auto Components	x						x	x	x	x
Wearing Apparel										
Leather and Related Products		x	x				x	x	x	x
Textiles	x	x						x	x	x
Machinery	x									x
Electronics										x
Fabricated Metal Products										
Rubber and Plastics	x	x	x	x				x	x	x
Food Processing	x	x	x	x	x	x	x	x	x	x
Chemicals	x	x	x	x		x		x	x	x

Recommendations and Conclusions

Tamil Nadu aspires to be a leading export state in India at a time when more countries are proposing Carbon Border Adjustment Mechanism (CBAM). This will put restrictions at the borders on goods produced with carbon and Greenhouse gas emissions (GHG) (CBAM 2021). For the exported goods from Tamil Nadu to be regulations proof (Economic Laws and Practice 2022), it is important to decarbonise the production. Eventually, the electricity could be sourced from a renewable source to make the goods carbon-free. The following steps are recommended to achieve electrification:

1. Bring policies, regulations, and incentives to enable the electrification of the industrial heat.
2. Create a designated agency that advances the electrification of the industrial process. The scope of work of this agency may include the following:

   i) Map the process-wise and temperature-wise heat requirement and its current source across the industrial sectors of Tamil Nadu.

   ii) Map the sector-wise GHG and CO2 emissions as a first step towards setting emission targets.

   iii) Identify opportunities to electrify the heat which is currently sourced from fossil fuels.

   iv) Perform a financial, social, and environmental cost-benefit analysis of the currently available technology options.

   v) Deploy pilot projects to demonstrate the viability and benefits of electrifying industrial processes.

   vi) Foster collaboration between key stakeholders such as the State Government, academia, public, technology providers and industries, etc., to accelerate technology adaptation.

   vii) Partner with financing institutions and provide access to low-cost financing.

   viii) Create a technical assistance program to advise industries and MSMEs on the electrification of their heat demand.

References

1. CBAM (2021). Carbon Border Adjustment Mechanism. Available at: https://ec.europa.eu/taxation_customs/green-taxation-0/carbon-border-adjustment-mechanism_en (Accessed on: 20 May 2022)
2. Economic Laws and Practice (2022). The EU Carbon Border Adjustment Mechanism – Implications for India. Available at: https://www.mondaq.com/india/international-trade-investment/1166146/the-eu-carbon-border-adjustment-mechanism-implications-for-india (Accessed on: 16 May 2022).
3. Energy Balance (2019). India Energy Dashboards of NITI Aayog. Available at: https://niti.gov.in/edm/#balance (Accessed on: 20 May 2022
4. Industries Department (2022). Demand No. 27. Major Industries- Tamil Nadu. Available at: https://cms.tn.gov.in/sites/default/files/documents/ind_major_e_pn_2022_23.pdf (Accessed on: 16 May 2022)
5. Plugging in (2020). What electrification can do for industries. Available at: https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/plugging-in-what-electrification-can-do-for-industry. (Accessed on: 16 May 2022)
6. PV-Magazine (2020). Solar Costs have fallen. Available at: https://www.pv-magazine.com/2020/06/03/solar-costs-have-fallen-82-since-2010/ (Accessed on: 16 May 2022).
7. SHIP (2020). Solar Heat for Industry - India. Available at: https://www.solar-payback.com/wp-content/uploads/2020/06/SHIP-india-26-06-20.pdf (Accessed on: 16 May 2022).