

Bridging the Climate Crisis: The Role of Green Finance in Advancing Energy Efficiency Startups in India

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The threat of climate change is evolving from a scientific concept to an urgent existential crisis. Climate changes are primarily driven by variations in Earth's orbital patterns, which alter the amount of solar energy reaching the planet. Increasing temperatures, unpredictable monsoons, glacial melt, and severe weather phenomena have made South Asia, especially India, exceedingly susceptible. Greenhouse gas (GHG) emission is a global problem, the major sources of GHG emissions from burning fossil fuels, iron-steel production, deforestation, cement production, food production, and various other sources (Planton et al., 2008).

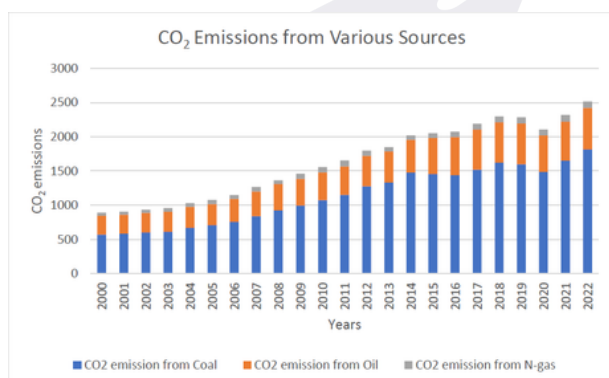


Figure 1. CO2 emissions from India from the year 2000 to 2022, Source: IEA

As in the figure 1 year-wise graph of CO2 emissions shows that coal is the primary source of emission over the period from 2000 to 2022. According to the World Energy Outlook (2023), a reduction in CO2 emissions can be achieved through fostering technological innovations and promoting energy efficiency in significant CO2-emitting areas. India's pledge under the Paris Agreement to cut its CO2 emission intensity by 45% by 2030 and move towards a net-zero economy by 2070 necessitates a fundamental overhaul of the country's energy production, consumption, and financing systems.

One of the earliest domestic responses to industrial emissions was the Perform Achieve and Trade (PAT) scheme, launched in 2012 under the National Mission on Enhanced Energy Efficiency (NMEEE). It created market-based incentives for large industries to improve energy intensity. While the PAT mechanism targeted heavy emitters, a new wave of entrepreneur-led innovations is now pushing energy efficiency into the mainstream.

Jaffe & Stavins (1994) analysed the energy efficiency gap and found that this gap is due to market failure, lack of information, and principal-agent problems. The theory allows for measuring the gap with different levels of energy efficiency potential. India has taken initiatives for resilient economic growth through the International Solar Alliance, One Sun, One World, One Grid project, and the National Biofuel Policy to support clean tech startups.

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Optimising energy use in homes, businesses, and industries, energy efficiency entrepreneurs contribute significantly to the reduction of emissions and frequently provide low-cost, high-impact solutions. Through advancements in smart grids, storage, and energy analytics, clean energy efficiency firms improve the performance of renewable systems, facilitating a more dependable and scalable shift to green energy. They work together to promote sustainable economic growth and accelerate decarbonisation.

Centralised solutions are giving way to distributed, digital, and data-driven energy efficiency approaches with the rise of energy-tech businesses. These businesses work in fields such as: Efficiency with fossil fuels: boiler retrofits, thermal plant predictive maintenance, and industrial IoT. Clean energy optimization: smart grids, EV charging, solar microgrids, energy storage tech.

"The next 1,000 unicorns will be startups that help the world decarbonize." - Larry Fink

The number of energy efficiency startups has seen a high surge in India over the last ten years, with 35 energy efficiency startups in 2019, which is approximately 128 for the energy generation and consumption space as of early 2024. Meeting of climate change awareness policy, energy efficiency startups, and sustainable finance is essential for the sustainable growth of the economy. Startups are uniquely placed to innovate, and it is essential for a resilient future. Green finance mechanisms amplify their reach, while policy frameworks ensure accountability. However, technology is insufficient without financial support; green finance amplifies sustainable economic growth.

In the race against climate catastrophe, energy efficiency is the lowest-hanging fruit. Startups have infused this space with innovation, scalability, and ambition. With targeted support from green finance instruments, they can create deep, cross-sectoral impacts from carbon mitigation to job creation. Climate change is not a distant crisis; it is a present challenge, and entrepreneurial energy is a key part of the solution.

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