

IETP: Reshaping India's Energy Sector for a Better Future

Center for Study of Science, Technology and Policy

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In India, one of the world's fastest growing economies, most industries still run on fossil fuels. However, the importance of renewable resources for sustainable development is now well-acknowledged, calling for a prompt policy push to make India's energy sector renewable energy (RE)-driven.

To achieve both developmental aspirations and climate goals, India needs to look at long-term solutions that can help in the deep decarbonising of her energy sector. Numerous opportunities exist for India to make the transition from fossil fuel-based technology to energy-efficient technology.

To study these opportunities, the Swiss Development Agency and Shakti Sustainable Energy Foundation set up the India Energy Transformation Platform (IETP) in 2020, with CSTEP as its Secretariat. The Platform identifies innovative, game-changing ideas, and analyses their strategic applications in policy, aiming to inform India's long-term energy policy — beyond 2030.



During its first year, IETP identified four critical areas of intervention:

- Decentralised Energy Systems
- Urban-space Cooling
- Industrial-process Heating
- Technologies for Renewable Energy Systems

Decentralised Energy Systems

Distributed energy systems have the potential to support 15% of the country's energy demand by 2050. IETP identified opportunities to enhance the role of distributed energy

technologies (generation, storage, and smart-control systems) in meeting the increasing energy demands and reducing the GHG emissions in India over the next 30 years. The Platform recommends five distributed energy systems to help India decarbonise. When shortlisting these five technologies, it leveraged on the existing technologies that were relevant in the Indian context and could be prioritised in low-carbon planning. These include solar rooftop for residential, commercial, and industrial buildings; solar pumps for agriculture; distributed hydrogen for freight vehicles; high-energy-density Li-ion batteries for electric vehicles; and airborne wind-energy systems for captive power.

Geeta Gouri, former member of India Development Foundation, and a mentor on the Platform, expressed that the most exciting thing about decentralised energy is rooftop solar because it allows every locality or household to become an electricity-generation centre. Electricity will need to be traded, for which, “We now need to move towards creating power markets,” she said, adding, “this is a technological revolution. We are making a paradigm shift from the centralised concept of an electricity board to a system where every household can set up its own power unit.”

Urban-space Cooling

The demand for space cooling is predicted to increase sharply in the next decade or two. The government’s ‘India Cool Air Plan’

estimates that 80–90% of this demand will be contributed by room air conditioners in the residential sector.

IETP's study observed that although numerous proven technologies for energy-efficient building envelopes exist, their market share is small. It recommends that energy-efficient building envelopes be included in housing and cooling-related policies and emphasises a market transformation programme for developing supply chains, raising consumer awareness, reducing performance uncertainties and high costs, etc.

According to Dr Satish Kumar, President and Executive Director, Alliance for Energy Efficient Economy (AEEE), India needs to cool a population of 1.3 billion people living in a tropical climate. This is a huge challenge and a tremendous opportunity, he said (see video below). He highlighted that the IETP study takes a scientific approach, leveraging what is already changing/improving in the country due to the 'India Cooling Air Plan'. "The researchers took a twin approach — a strategy to reduce the energy demand, along with the use of a design-based intervention (and not merely an active air-conditioning or cooling-technology-based approach to provide thermal comfort). This is quite novel," he said.

Energy-efficient Industrial Processes

IETP studied transformative solutions for reducing emissions from the steam generated in industrial processes, and expects that the identified solutions can reduce emissions in this sector by 75–

80% by 2050. The estimated GHG emissions in the industrial sector with process-steam demand is expected to rise from the present 99 Mn tCO₂/y to 569 Mn tCO₂/y in 2050.

The recommendations focus on enhancing the energy efficiency of boilers, shifting to biomass as a fuel for industrial boilers, exploring and investing in futuristic technologies, and devising a carbon market for the industrial sector.

“Energy efficiency is a no-regret strategy for decarbonising the industrial sector. We should be investing in it just for productivity reasons, regardless of environmental benefits”, said Chinmaya Acharya, then Interim CEO of Shakti Sustainable Energy Foundation, in this [video](#). “IETP also looked at the supply side because we will always have energy requirements. It is advantageous for us to green our fuel choices and that is why we looked at some alternative technology options in the industrial-process-heat-related application, like biomass and hydrogen.”

Technologies for Renewable Energy

India’s energy sector is undergoing a major transition, thanks to renewable energy. The share of RE in the total power-generation capacity is likely to increase to 80% by 2050. IETP’s study identified technologies that are key to developing an integrated RE-dominant energy system — in line with our current ambitious RE plans — and looked at how policies can enable the development, commercialisation and scaling up of these

technologies. Two key areas of intervention identified by IETP are storage technologies and sector coupling, where electrification is not limited to the power sector alone, but involves other sectors such as transport, building heating, etc. This can help India achieve power-system flexibility, and reduce emissions.

“It makes a lot of sense for India to deploy more and more renewables, because although the initial investment is high (declining now) on the operation side, the Sun is not going to send you a bill,” said Mr Winfried Damm, Head of the Indo-German Energy Programme, GIZ, in this [video](#). The challenge ahead for India is in balancing the rapid increase in electricity demand with a higher deployment of renewable energy.

In each of the IETP intervention areas, the research teams have considered game-changing technologies, as well as policy-level changes, to develop a long-term roadmap for the deep decarbonisation of India’s energy sector. Through these efforts, we hope to support India to stay ahead of the curve in the global transition to clean energy.

You may access the full report and policy recommendations from the study at www.ietp.in.

About India Energy Transformation Platform

The India Energy Transformation Platform is an informal, independent, multi-stakeholder group of experts aiming to

develop an informed narrative on India's strategies for meeting its Nationally Determined Contributions (NDCs) through non-linear, transformative solutions. This unique initiative hopes to ensure that India stays ahead of the curve and cements its leadership in the global transition to clean energy — even beyond 2030.

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