



Transformation Of India Towards Net Zero Emission

¹Owais shafi, ²Sonal sood

¹Masters Student, ²Assistant Professor

¹Department of Electrical Engineering,

¹Rayat Bahra University, Kharar, Punjab, INDIA

Abstract

India has a 7,000 km long coastline and Himalayan glaciers in the north. Natural resources like coal and iron ore are found in the abundant forest regions. According to a recent estimate, the nation's actual GDP per person could decrease by 10% by 2100 if carbon emissions continue to climb this century. An examination of the ramifications of a NZE scenario for India is presented in the next section. A discussion of crucial tactics and fuels to decarbonize the Indian energy sector will follow. The 2019 Covid -19 pandemic, which was observed in the form of a slowdown in economic growth, a reduction in electricity and energy demand (including travel demand) and disruptions to the RE supply chains, was not taken into account in this study.

Keywords - NZE Scenario, Himalayan glaciers, energy sector, IPCC, IEA, European union

Introduction

According to <https://www.cs.mcgill.ca/>, India has a 7,000 km long coastline and Himalayan glaciers in the north. Natural resources like coal and iron ore are found in the state's abundant forest regions, making it inescapably vulnerable to climate change. According to a recent estimate, the nation's actual GDP per person could decrease by 10% by 2100 if carbon emissions continue to climb this century (Patel, S., et al 2021). According to the study, the three pillars of India's decarbonization strategy—transformative levels of electrification, increased energy efficiency, and a shift to decarbonized fuels—primarily green hydrogen, decarbonised electricity, and bioenergy—could realistically lead the country's energy sector toward a net zero emissions future. The report also shows that the absence of sufficient technology solutions makes it difficult for the heavy freight and industrial sectors to achieve complete decarbonization. In order to attain net-zero emissions, options for carbon sequestration, including both technical and natural solutions, would be needed to offset the system's residual emissions of around 1.3 gigatonnes. This study is anticipated to spur additional discussion and in-depth exploration of the energy sub-segments, which would be useful to planners and decision-makers in defining India's sustainable energy transition strategy.

To keep global warming to 1.5 °C, carbon dioxide (CO) emissions must be reduced by around 45 percent from 2010 levels by 2030 and reach net zero by about 2050. (IPCC, 2018). Despite commitments made by 44 nations and the European Union to achieve net-zero emissions (NZE) by the end of the first quarter of 2021, according to the IEA (2021) report.

Methods

model based on the dynamic least-cost optimisation principle supported by the rational expectation hypothesis. In order to conduct the analysis, a comprehensive picture of the Indian energy sector at the national level is created and spread out across the years 2000 to 2050. The model also incorporates several fuels and technology decarbonization strategies to determine the most technologically advanced.

Description and suppositions of the scenario

The NZE scenario, which was developed in this study, is an ambitious scenario designed to examine whether sufficient solutions are available to completely decarbonize the energy sector and to examine how far each sector might theoretically be able to move toward zero carbon emissions by the middle of the century. The Reference scenario is predicated on the premise that current policies and trends will persist through the end of 2019. Of overcome the different obstacles to developing a NZE system, additional hypotheses are made. We assume.

Results and discussion

An examination of the ramification of a NZE scenario for India is presented in this section.

The production of primary energy, overall emissions, and a decrease in energy intensity are among the broad energy and emissions-related outcomes we first describe.

The last discussion on energy use and emissions is then provided, noting the technological limitations in each industry.

A discussion of crucial tactics and fuels to decarbonize the Indian energy sector will next follow.

Limitation

The 2019 Covid-19 pandemic, which was observed in the form of a slowdown in economic growth, a reduction in electricity and energy demand (including travel demand), disruptions to the RE supply chains, and partial closure/shutdown of industrial establishments, was not taken into account in this study, which assumed steady economic growth for India over the modelling period.

Conclusion

Like every other nation, India must carefully consider and assess its options as it plans its energy transition over the next few decades. Like every other country, India recognises the need to pursue a sustainable development path and the need to contain global carbon budgets to levels that would contain temperature rise to well below 2 °C. This study aimed to investigate the feasible possibilities in the energy sector in order to not just identify the major fuels that needed additional scrutiny.

References

- - ZuoJ. *et al.*
Achieving carbon neutrality in commercial building developments–Perceptions of the construction industry
Habitat Int.
(2012)
 - ZhaoX. *et al.*
Challenges toward carbon neutrality in China: Strategies and countermeasures
Resour. Conserv. Recy.
(2022)
 - ShuklaP.R. *et al.*
Low carbon and clean energy scenarios for India: Analysis of targets approach
Energy Economics
(2012)
 - ShahbazM. *et al.*
UK’s net-zero carbon emissions target: Investigating the potential role of economic growth, financial development, and R & D expenditures based on historical data (1870–2017)
Technol. Forecast. Soc. Change
(2020)
 - SalviaM. *et al.*
Will climate mitigation ambitions lead to carbon neutrality? An analysis of the local-level plans of 327 cities in the EU

Renew. Sustain. Energy Rev.
(2021)

- ParikhK.S. *et al.*

Can India grow and live within a 1.5 degree CO2 emissions budget?

Energy Policy
(2018)

- MillotA. *et al.*

Guiding the future energy transition to net-zero emissions: Lessons from exploring the differences between France and Sweden

Energy Policy
(2020)

- MayberryD. *et al.*

Pathways to carbon-neutrality for the Australian red meat sector

Agric. Syst.
(2019)

- JainM. *et al.*

Analyzing sectoral niche formation: The case of net-zero energy buildings in India

Environ. Innov. Soc. Trans.
(2017)

- JainA. *et al.*

Resource potential and variability assessment of solar and wind energy in India

Energy
(2020)

- GuptaD. *et al.*

Achieving sustainable development in India along low carbon pathways: Macroeconomic assessment. World Development

(2019)

- GuptaD. *et al.*

Sustainable development and carbon neutrality: Integrated assessment of transport transitions in India

Transp. Res. D
(2020)

- GadreR. *et al.*

Assessing the evolution of India's power sector to 2050 under different CO2 emissions rights allocation scheme

Energy Sustain. Development
(2019)

- DharS. *et al.*

Low carbon scenarios for transport in India: Co-benefits analysis

Energy Policy
(2015)

- DahalK. *et al.*

The role of renewable energy policies for carbon neutrality in Helsinki metropolitan area

Sustainable Cities Soc.
(2018)

- ByravanS. *et al.*

Quality of life for all: A sustainable development framework for India's climate policy reduces greenhouse gas emissions

Energy Sustain. Development
(2017)

- BuC. *et al.*

Achieving net-zero emissions in China's passenger transport sector through regionally tailored mitigation strategies

Appl. Energy
(2021)

- AnandarajahG. *et al.*

India's CO2 emission pathways to 2050: what role can renewables play?

Appl. Energy
(2014)

- ChaturvediVaibhav

Peaking and Net-Zero for India's Energy Sector CO2 Emissions: An Analytical Exposition

(2021)

- ChaturvediV. *et al.*

Implications for shared socio-economic pathways for India's long-term electricity generation and associated water demands

Council Energy Environment Water
(2017)

- DasS.

Achieving carbon neutrality in the global aluminum industry

JOM

(2012)

- FaubertP. *et al.*

Achieving carbon neutrality for a future large greenhouse gas emitter in quebec, Canada: A case study

Atmosphere
(2020)

- FuhrmanJ. *et al.*

China's 2060 carbon neutrality goal will require up to 2.5 GtCO2/year of negative emissions technology deployment

(2020)

- **Guidelines for implementation of pradhan mantri kisan urja suraksha evam utthan mahabhiyan (PM KUSUM) scheme**

(2019)

- **Government of India's UJALA & street lighting national programme complete five successful years of illuminating India, press information bureau**

(2020)

- **Implementation of energy efficiency measures in India saves substantial amount of CO2 emissions in the country: Perform achieve and trade (PAT) scheme, targeting carbon emission reduction in 13 energy intensive sector, leads to energy savings of 17 MTOE and results into mitigation of about 87 million tonnes of CO2, per year, press information bureau**

(2021)