





Around 65% of the total coal power generation capacity as of March 2020 was installed in the previous ten-year period.



Coal Power's Trilemma

Variable Cost, Efficiency, and
Financial Solvency

Karthik Ganesan and Danwant Narayanaswamy

Report
July 2021
ceew.in



Copyright © 2021 Council on Energy, Environment and Water (CEEW).

Open access. Some rights reserved. This work is licensed under the Creative Commons Attribution-Noncommercial 4.0. International (CC BY-NC 4.0) license. To view the full license, visit: www.creativecommons.org/licenses/by-nc/4.0/legalcode

Disclaimer:

The views expressed in this study are those of the authors and do not necessarily reflect the views and policies of the Council on Energy, Environment and Water.

Suggested citation:

Ganesan, Karthik, and Danwant Narayanaswamy. 2021. *Coal Power's Trilemma: Variable Cost, Efficiency, and Financial Solvency*. New Delhi: Council on Energy, Environment and Water.

Cover image:

iStock.

Peer reviewers:

S. R. Narasimhan, Director – System Operations, POSOCO; Dr Johannes Urpelainen, Founding Director, Initiative for Sustainable Energy Policy; Dr Kaveri Iychettira, Assistant Professor, Indian Institute of Technology, Delhi; Dr Rahul Tongia, Senior Fellow, Centre for Social and Economic Progress; Ashok Sreenivas, Senior Fellow, Prayas (Energy Group); Maria Chirayil, Research Associate, Prayas (Energy Group); and Shalu Agrawal, Senior Programme Lead, CEEW.

Publication team:

Alina Sen (CEEW), Venkatesh Krishnamoorthy, Aspire Design, and Friends Digital.

Organisation:

The **Council on Energy, Environment and Water (CEEW)** is one of Asia's leading not-for-profit policy research institutions. The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse, and misuse of resources. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with wider public. In 2021, CEEW once again featured extensively across ten categories in the 2020 *Global Go To Think Tank Index Report*. The Council has also been consistently ranked among the world's top climate change think tanks. CEEW is certified as a Great Place To Work®. Follow us on Twitter @CEEWIndia for the latest updates.

Council on Energy, Environment and Water

Sanskrit Bhawan A-10, Qutab Institutional Area,
Aruna Asaf Ali Marg New Delhi – 110067, India

About CEEW

About CEEW The Council on Energy, Environment and Water (CEEW) is one of Asia's leading not-for-profit policy research institutions. **The Council uses data, integrated analysis, and strategic outreach to explain — and change — the use, reuse, and misuse of resources.** The Council addresses pressing global challenges through an integrated and internationally focused approach. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with the wider public.

The Council's illustrious Board comprises Mr Jamshyd Godrej (Chairperson), Mr Tarun Das, Dr Anil Kakodkar, Mr S. Ramadorai, Mr Montek Singh Ahluwalia, Dr Naushad Forbes, Ambassador Nengcha Lhouvum Mukhopadhaya, and Dr Janmejaya Sinha. The 120-plus executive team is led by Dr Arunabha Ghosh. CEEW is certified as a **Great Place To Work®**.

In 2021, CEEW once again featured extensively across ten categories in the 2020 Global Go To Think Tank Index Report, including being ranked as **South Asia's top think tank (15th globally) in our category for the eighth year in a row**. CEEW has also been ranked as South Asia's top energy and resource policy think tank for the third year running. It has consistently featured among the world's best managed and independent think tanks, and twice among the world's 20 best climate think tanks.

In ten years of operations, The Council has engaged in 278 research projects, published 212 peer-reviewed books, policy reports and papers, created 100+ new databases or improved access to data, advised governments around the world nearly 700 times, promoted bilateral and multilateral initiatives on 80+ occasions, and organised 350+ seminars and conferences. In July 2019, Minister Dharmendra Pradhan and Dr Fatih Birol (IEA) launched the CEEW Centre for Energy Finance. In August 2020, Powering Livelihoods — a CEEW and Villgro initiative for rural start-ups — was launched by Minister Mr Piyush Goyal, Dr Rajiv Kumar (NITI Aayog), and H. E. Ms Damilola Ogunbiyi (SEforAll).

The Council's major contributions include: The 584-page *National Water Resources Framework Study* for India's 12th Five Year Plan; the first independent evaluation of the National Solar Mission; India's first report on global governance, submitted to the National Security Adviser; irrigation reform for Bihar; the birth of the Clean Energy Access Network; work for the PMO on accelerated targets for renewables, power sector reforms, environmental clearances, Swachh Bharat; pathbreaking work for the Paris Agreement, the HFC deal, the aviation emissions agreement, and international climate technology cooperation; the concept and strategy for the International Solar Alliance (ISA); the Common Risk Mitigation Mechanism (CRMM); critical minerals for Make in India; modelling uncertainties across 200+ scenarios for India's low-carbon pathways; India's largest multidimensional energy access survey (ACCESS); climate geoengineering governance; circular economy of water and waste; and the flagship event, Energy Horizons. It recently published *Jobs, Growth and Sustainability: A New Social Contract for India's Recovery*.

The Council's current initiatives include: A go-to-market programme for decentralised renewable energy-powered livelihood appliances; examining country-wide residential energy consumption patterns; raising consumer engagement on power issues; piloting business models for solar rooftop adoption; developing a renewable energy project performance dashboard; green hydrogen for industry decarbonisation; state-level modelling for energy and climate policy; reallocating water for faster economic growth; creating a democratic demand for clean air; raising consumer awareness on sustainable cooling; and supporting India's electric vehicle and battery ambitions. It also analyses the energy transition in emerging economies, including Indonesia, South Africa, Sri Lanka and Vietnam.

The Council has a footprint in 22 Indian states, working extensively with state governments and grassroots NGOs. It is supporting power sector reforms in Uttar Pradesh and Tamil Nadu, scaling up solar-powered irrigation in Chhattisgarh, supporting climate action plans in Gujarat and Madhya Pradesh, evaluating community-based natural farming in Andhra Pradesh, examining crop residue burning in Punjab, promoting and deploying solar rooftops in Delhi, Bihar and Meghalaya.

Acknowledgments

We are grateful to our reviewers who provided critical comments: Mr S. R. Narasimhan, Director—System Operations, POSOCO; Dr Johannes Urpelainen, Founding Director, Initiative for Sustainable Energy Policy; Dr Kaveri Iychettira, Assistant Professor, Indian Institute of Technology, Delhi; Dr Rahul Tongia, Senior Fellow, Centre for Social and Economic Progress; Ashok Sreenivas, Senior Fellow, Prayas (Energy Group); and Maria Chirayil, Research Associate, Prayas (Energy Group); Shalu Agrawal, Senior Programme Lead, CEEW. Their inputs went a long way in refining the analysis and communicating the main findings of the study.

We also thank our colleagues at CEEW—Kurinji Selvaraj, Programme Associate, for helping in spatial analysis, Dhruv Warrior, Research Analyst, and Sangeeth Raja, former intern at CEEW, for helping us in the data collection process. We would like to express a special thank you to Gautam Pradhan from Earthmetry Decision Systems LLP for providing on-demand data support throughout the study. Finally, we thank the Outreach team at CEEW for quality control and for the publishing and outreach of this report.