

Electricity Market Reforms Towards Clean Energy Transition and Their Impact in India

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Abstract : India's ambitious target to achieve a 50 percent share of energy from non-fossil fuels and the 500-gigawatt (GW) renewable energy capacity before the deadline of 2030, coupled with the global pursuit of sustainable development, will compel the nation to embark on a rapid clean energy transition. As a result, electricity market reforms will emerge as critical policy instruments to facilitate this transition and achieve ambitious environmental targets. This paper will present a comprehensive analysis of the various electricity market reforms to be introduced in the Indian Electricity sector to facilitate the integration of clean energy sources and will assess their impact on the overall energy landscape. The first section of this paper will delve into the policy mechanisms to be introduced by the Government of India and the Central Electricity Regulatory Commission to promote clean energy deployment. These mechanisms include extensive provisions for the integration of renewables in the Indian Electricity Grid Code, 2023. The section will also cover the projection of RE Generation as highlighted in the National Electricity Plan, 2023. It will discuss the introduction of Green Energy Market segments, the waiver of Inter-State Transmission System (ISTS) charges for inter-state sale of solar and wind power, the notification of Promoting Renewable Energy through Green Energy Open Access Rules, and the bundling of conventional generating stations with renewable energy sources. The second section will evaluate the tangible impact of these electricity market reforms. By drawing on empirical studies and real-world case examples, the paper will assess the penetration rate of renewable energy sources in India's electricity markets, the decline of conventional fuel-based generation, and the consequent reduction in carbon emissions. Furthermore, it will explore the influence of these reforms on electricity prices, the impact on various market segments due to the introduction of green contracts, and grid stability. The paper will also discuss the operational challenges to be faced due to the surge of RE Generation sources as a result of the implementation of the above-mentioned electricity market reforms, including grid integration issues, intermittency concerns with renewable energy sources, and the need for increasing grid resilience for future high RE in generation mix scenarios. In conclusion, this paper will emphasize that electricity market reforms will be pivotal in accelerating the global transition towards clean energy systems. It will underscore the importance of a holistic approach that combines effective policy design, robust regulatory frameworks, and active participation from market actors. Through a comprehensive examination of the impact of these reforms, the paper will shed light on the significance of India's sustained commitment to a cleaner, more sustainable energy future.

Keywords : renewables, Indian electricity grid code, national electricity plan, green energy market

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