New delhi increased renewable energy penetration

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India faces three principal challenges: (1) how to expand reliable energy access and use while maintaining affordability for consumers and financial stability for the DISCOMs; (2)how, at the same time, to integrate increasing shares of renewable energy in a secure and reliable manner; and (3) how to reduce emissions to achieve ambitious social and climate objectives while meeting economic goals.

Power system transformation in India will be supported by the transformation of electricity demand from passive consumption to more proactive participation by demand sectors. Agricultural users already play an important role in balancing power supply and demand through involuntary irrigation load shifting, and the IEA analysis foresees more active participation from the agricultural sector, buildings (including cooling) and industry by 2030.

The current regulatory and market frameworks present significant gaps and barriers for power system flexibility resources, including demand response, batteries, pumped-storage hydro and power plant flexibility. Comprehensively reviewing and removing the wholesale and retail market barriers to new technologies and creating an equal playing field for all resources is an important ongoing task not only in India, but worldwide.

India"s wholesale power trade achieved important milestones in 2020, with improved trading across Indian states and the introduction of real-time markets and green markets. Since 2020 the real-time market has filled an important gap by providing corrections on an hour ahead timeframe for variable and uncertain generation such as solar and wind. The newly established green market enables clients such as the DISCOMs to fulfil the states" renewable purchase obligations through market purchases.

While renewables have must-run status in India, renewable generators can be curtailed due to system security considerations. For example, states such as Tamil Nadu and Karnataka have seen solar and wind curtailment in recent years.

Increasing power system flexibility enables the integration of higher shares of solar and wind generation. As a result, for a given amount of solar and wind capacity, a larger share of renewables can be utilised. This is illustrated in the two models presented in this report. Lower curtailment also brings about the benefits of reduced system operating costs and lower CO2 emissions.

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