OPINION: Lessons on energy transition from India's first climate atlas

The absence of climate vulnerability-indexed standards coupled with the omnipresent pressure to offer reducing tariffs in successive bids creates a situation not too desirable.

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New Delhi: As in the case of other countries, India's transition to net-zero emissions economy is heavily dependent upon renewable energy. Indeed, the bedrock of India's climate change mitigation strategy is built around a quantum increase in the uptake of renewable energy resources like solar, wind, hydro, and biofuels. Being driven by natural forces, it is unrealistic to think that they would remain untouched by the rapid changes facing the climate itself. In a sense, it is rather ironic that the efficacy and reliability of devices being deployed to fight climate change hinges on that very change. The pertinent question, therefore, is how resilient renewable energy plants are to climate hazards like extreme wind, heavy rainfall and flooding, dust storms, and cyclones? The first `Climate Hazards and Vulnerability Atlas of India' brought out by the Indian Meteorological Department could not have come at more opportune time when the country has embarked on preparing the roadmap to achieve the twin goals of 500 GW of RE electricity by 2030 and net-zero emissions by 2070. Earlier too the National Cyclone Risk Mitigation Project (NCRMP) concluded that "India is highly vulnerable to natural hazards especially earthquakes, floods, drought, cyclones and landslides. Andhra Pradesh, Odisha, Tamil Nadu, West Bengal, Pondicherry, and Gujarat are more vulnerable to cyclone disasters". Most of these very regions also happen to be rich in renewable energy resources, especially solar and wind. The climate-associated risks in the case of renewable energy may be categorized as (a) climate change affecting the resources like solar, wind, hydro, and biomass both qualitatively and quantitively and (b) climate hazards impacting RE systems' installations, operations, and reliability in general. The Climate Hazards and Vulnerability Atlas provides critical information about district-wise climate hazards as well as climate vulnerability. On one hand the performance indices of different RE systems must start factoring in climate change-induced resource variabilities over their lifetime. On the other hand, potential climate hazards must inform key decisions right from plant designs to installations to the standard operating

practices of RE plants. Even a cursory glance through this atlas must prompt a question: are the existing standards adequate to address challenges arising out of extreme weather events?

Presently, RE systems, particularly solar PV systems, follow standard system design and quality standards across the country. However, considering that potential climate hazards may differ significantly in different geographical locations, it becomes obvious that `one size fits all' approach may not be the best approach. As per the Atlas, coastal districts like neighbouring districts of Odisha, and Ramanathapuram, Pudukkottai and Thanjavur in Tamil Nadu are more vulnerable to severe cyclones than Prakasam, Guntur and Krishna districts of Andhra Pradesh, and Kachchh and Bhavnagar in Gujarat – which themselves are cyclone vulnerable but comparatively to a lesser degree. Likewise, several districts of Jharkhand, West Bengal, Telangana and Tamil Nadu are vulnerable to extreme rainfall. Naturally the RE systems for such regions must incorporate features to address such vulnerabilities that may not be needed elsewhere. For instance, let us take solar power plants, whether ground mounted or rooftop ones. As far as mounting structures of solar power plants are concerned, minimal standards in terms of material and coating are prescribed. The missing elements, however, are standards and best practices for design of mounting structures as well as for field installations that also take into account potential risks arising out of climate hazards. These aspects are critical for the long-term reliability of any solar power plant, more so of those set up in trying field conditions. Global experience of analysing damaged and surviving solar power plants on the face of hurricanes in Puerto Rico, the US Virgin Islands, and Barbuda very clearly establishes the criticality of design of racks or mounting structures. Some similarities of failed systems in the wake of hurricanes Irma and Maria included under-sized mounting structures, under-sized bolts, and improper fastening. Let us not forget that solar and wind power plants are assumed to provide us electricity for 20-25 years. A 2016 study, `Cell, Interrupted: Balancing Risk and Reward in Solar', by renewable insurance provider GCube says that "Average solar claims severity in the last five years has increased by 87%, predominantly as a result of the greater impact of weather-related losses."

The absence of climate vulnerability-indexed standards on the one hand and the omnipresent pressure to offer reducing tariffs in each successive bids on the other hand creates a situation not too conducive for bringing about changes that are badly needed if we want our RE assets to function the way envisaged in a multitude of decarbonization scenarios. The way forward, therefore, is two-fold. First, to lay-down standards and processes for RE systems in the country to enable them to cope up with extreme weather events. Second, there has to be a judicious quality criteria for design, engineering, and field-installation while determining tariffs rather than cost becoming the only end goal. That would mean to, first of all, put in place mandatory standards and best practices, backed by independent field inspections. Then comes training and capacity building of professionals across the value-chain, inculcating in them the criticality of ensuring quality standards, even more so in workmanship in the field. Normally forecasts

are made on the basis of past events but in fast changing climatic conditions that alone may not suffice. Perhaps, the time has come for renewable energy sector to incorporate climate science and modelling in its decision support system so that it can continue to deliver the promised benefits along the transformational journey.

[This piece was authored by Amit Kumar, Former Senior Director, Social Transformation & Knowledge Management, The Energy & Resources Institute (TERI)]

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