

‘Enerovation:’ How innovations can transform electricity sector

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India is amongst the key signatories of the Paris Agreement, which contains a commitment towards a significant expansion of renewable energy. The government has also made a commitment to make power accessible to all our citizens (‘Power for all’). Thanks to disruptions in renewable energy, storage and business model innovations, it is possible to achieve these apparently conflicting targets. Today, these innovations are helping countries like India to strike the right balance between policy challenge of environment protection and economic development.

These challenges also resonate with the classic Energy Trilemma: how to provide affordable, reliable and sustainable energy to all?

The world is also witnessing the emergence of a fourth powerful dimension – the consumer-centricity at the very core of the ‘Energy Trilemma’, entailing complex interwoven links between: public and private sectors, government and regulators, environmental concerns and consumer behaviors.

Innovation and convergence in the energy sector is transforming these energy trilemma challenges into opportunities and through this article, I would like to share some of these emerging trends

Technological innovations

Clean energy plants such as wind, solar, biomass, and geothermal are operational for decades. However, over the last few years, wind and solar have become the face of the energy transition.

Modularity and scalability of wind and solar technologies have attracted the attention of many to use them as a solution for the energy trilemma; to fund research and deployment of related policies. Technologies such as bifacial PV, advanced tracking systems, robotic cleaning mechanism for solar panels, increase in turbine capacities and advances in wind are some of the technological innovations that are enhancing efficiency and lowering the cost of electricity.

In fact, solar - thanks to its compactness, ease of operations and wider application, is now racing ahead of wind in terms of investment and R&D interest. The flow of funds, talent and policy support have resulted in technological improvements and creation of a network of eco-systems.

The lithium ion batteries are also attracting huge investments along with major market players creating fierce competition. This is leading to the decrease in battery pack prices estimated to reach \$ 96/KWh by 2025, a 26 per cent decrease from their current prices. Most think-tanks are predicting that electricity from solar or wind along with battery storage, will achieve grid parity between 2022 and 2025 in most markets. Perhaps this is the time when we witness an exponential growth of renewable energy and significant disruption in the electricity markets.

This race of technologies will continue playing games and it may be wrong to assume that solar is the only hero for our future energy landscape. The amount of money, resources and manpower at stake in conventional power generation, makes one wonder – could carbon capture and storage or nuclear be the dark horse? What role can municipal waste play in power generation?

Technologies leading to business model innovation

Another silent disruption on the horizon of the electricity sector is the convergence of emerging and existing technologies enabling the creation of new business models in the electricity sector.

Since it is difficult to predict generation of wind and solar energy accurately, large scale deployments of such technologies create challenges for grid management.

The big data and artificial intelligence driven energy forecasting and grid management is a classic example of how deployment of new technology is enabling new business of large scale renewable energy.

Similarly, smart grid technologies are enabling consumers to generate power using rooftop solar plants and sell surplus power to utilities. This transformation of consumer into ‘prosumer’ – producers becoming consumers – is now placing consumers at the center of the electricity market.

Large scale adoption of Electric Vehicles (EVs) and its impact on consumers’ electricity purchase behavior is another disruption on the horizon. Consumers’ ability to purchase, store, and sell power will surely have a material impact on “time of the day” tariff of electricity.

These innovative business models are offering the consumer a unique opportunity to not only participate in the resulting disruption, but further compelling industry players to rethink their strategy – demanding that the consumer be put first, right at the core of the ‘Energy Trilemma’.

Developments in India

Over the last few years, India has clearly demonstrated its willingness to adopt and promote emerging technologies.

India’s role in the Paris Agreement and International Solar Alliance demonstrates its willingness to establish itself as a truly global leader by adopting and promoting cleaner technologies. The government has done a remarkable job by electrifying villages. We look forward towards seeing similar successes in its ‘Power for all’ initiative.

Despite the massive work of providing last mile connectivity to our fellow citizens, we have also made notable progress on adopting some of these technology and business model innovations.

The government’s push to migrate from Feed-In-Tariff (FIT) to competitive bidding model for wind and solar projects has resulted in building utility scale renewable energy projects with affordable tariffs. This is one of the major success stories and many countries are now adopting it.

We also have policies related to net metering of rooftop solar plants in most of our states and this acting as a catalyst to promote Pay As Use (PAU) model for rooftop solar plants, especially for industrial and commercial consumers. In this model, the supplier installs a solar plant on the rooftop of the consumer and bills the consumer based on its consumption of electricity from the rooftop solar plant. Tariff offered under such business models are far below utility tariffs in most of the states, hence saving significant cost for the consumer without making any capital investment.

We are also seeing increased deployment of smart meters under the government’s smart city projects. We hope to see further reforms in regulations that enable the consumer to choose their electricity supplier.

These second-generation reforms will truly give power in the hands of consumers and provide much needed ground to roll-out innovative technologies and business models.

However, the dilemma here is that on one hand the benefits of a demanding consumer has broadened the scope of mass renewable energy adoption; on the other it will create negative impacts on the ecosystem of conventional power generation.

How do we ensure reliability of electricity supply? How do we avoid stranded assets? How can we reskill the people? – are probably the key questions that all stakeholder will need to debate, as we embark on this energy transition.

With both the government and the industry ready to work together in this energy transition, India looks steadily heading towards a future powered by clean and green energy.

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