

CLEANTECH: Innovations for a Sustainable Future



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Innovations for a
Sustainable Future**

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India is on track to becoming to one of the world's largest producers of green energy and has to take an innovative and cleaner path of development for all.

India ratified the Paris climate agreement on the 147th birth anniversary of the father of the nation, Mahatma Gandhi. This presents an unforeseen opportunity to us as a nation at a scale never witnessed before. The agreement has set tangible targets as India has committed to 40% of the country's expected electricity generation capacity from renewable sources by 2030 with a 35% reduction in carbon intensity by 2030 from 2005 levels. Innovation will be the bridge to make this vision a reality and to convert the multiple challenges into opportunities as emerging economies like India with a different pattern of growth and challenges take centre-stage in the development of renewable energy market in the next ten years. From microgrid technology, solar lanterns, the world's longest canal top solar project, integrated home solar solutions, wind turbines, apps for distributed generation data, and car batteries to light up homes – India has been home to a host of innovations from start-ups to century old players in the renewable space.

We are at the cusp of the energy and the fourth industrial revolution. The energy revolution is transforming the energy landscape as we have never witnessed before. In 2015 China overtook Germany to become the biggest producer of solar energy, led by leadership in solar panel manufacturing and conducive policies to replace fossil fuel. India has set a target of 20-fold increase in solar power by 2022 with a total renewable energy generation target of 175 GW in the same timeframe. As per a report by consultancy KPMG, the share of solar in India's energy mix is expected to rise to 12.5% by 2025, from less than 1% today. There are projections that solar in India will be cheaper than coal by 2020. This has significantly been led by almost 80 percent drop in the price of solar technology since 2010 as per International Renewable Energy Development Agency. This in turn has made it much more viable in emerging economies and reduced the difficult trade-off between clean energy and growth. India is on track to becoming to one of the

world's largest producers of green energy and has to take an innovative and cleaner path of development for all.

The advent of renewable energy has transformed our way of using and generating or using and storing electricity. The advent of the prosumer (who can generate, consume and sell electricity) in the field of energy is set to play a significant role in the resultant innovation and democratization of the energy market in ways like online trading did to the global oil markets decades ago. As solar and wind farms cannot be located in cities or sunshine and wind velocity is not consistent, efficient transmission and balancing or storage has assumed critical significance.

The following would be instrumental in shaping innovation and bringing growth and green together:-

- **Flexibility and the need to address different scope:** ABB as a company with decades of manufacturing in the country has energized a 6,000MW project to provide power to 90 million Indians with the world's first multi terminal UHVDC power transmission corridor. HVDC technology is increasingly being adopted as the technology of choice to transmit renewable energy across long distances. The project also involved the delivery of high voltage power equipment designed and manufactured in the country. India is a country of diverse requirements, which provide a bigger play to innovators. From a few thousand megawatts to a few kilowatts, supporting the government's program of green energy in educational institutions, ABB's solar inverters have brought power to almost 200 schools in the state of West Bengal.
- **Addressing local issues:** In India land comes at a premium and is a scarce and precious resource. In a bid to optimize usage of space, ABB has been part of projects like the world's longest canal top project in the Narmada canal. The project entails usage of the water body surface for the panels which help reduce evaporation from the lakes as well as the water can be used to cool down panels. In Kerala, ABB has set up a first of its kind 500 kW floating solar grid-interactive photovoltaic (PV) project on the Banasurasagar Dam. The project aims to feed power to the grid. In such solar projects, the generation of hydroelectric power can be reduced during the daytime to balance total power output and the water for the purpose can be used during peak hours. ABB's solar pump drive innovation was a result of wanting to improve the life of Indian farmers with a mechanism that made their solar pumps more effective. These solar pumps have also been innovatively deployed by forest officials to pump water in order to create watering holes for animals.

Increased automation and digitalization: The complexity of renewable energy and the demands of balancing and storage require a greater expertise in digitalization and automation and unlike Germany, India which is led by utility scale projects in solar, this is critical. A recent PwC study also quoted that in the next 5 years, the level of digitalization for Indian industrial companies is expected to rise to 65%. ABB set up the first of its kind state of the art unified automation platform to power the world's largest single location solar plant of 648 MW in Tamil Nadu to handle more than 600 inverters with varying loads, electrical systems, the solar inverters and state-of-the art software for plant performance monitoring, maximizing operational efficiency and ensuring grid

compliance. The advent of the fourth industrial revolution and the internet of things, services and people, it has become necessary to close the loop with data based services for the remote monitoring of such renewable energy plants again necessitating such systems.

- **Industry - Academia partnership:** Collaboration by industry and academia to develop technology in areas of green and clean energy will pave the way to solve a lot of the emerging market issues in clean energy. ABB has a collaboration with IIT Madras on developing microgrid technology as well as battery engineering. Microgrid technology applied to the rural areas would be key to providing reliable, cost-effective and clean power to offgrid and urban areas through an optimal mix of energy resources. An unconventional application could also be deployment at the numerous railways stations to locally generate power with or without grid connection.
- **Picking the low hanging fruits:** Sometimes small changes can have a huge impact. Our internal studies have shown that across multiple sectors India uses 15% to 30% more energy to produce one unit of anything as compared to global benchmarks. In the EU, for instance, rules requiring a higher efficiency class of motors came into effect in January 2015. In India, where the standards are guided by the EU rules but not mandatory, market-driven demand for high-efficiency motors is growing very rapidly at a compound annual growth rate of 25%. Depending on the rate of adoption, this could result in savings ranging from 30% to 60% with a payback period of less than a year. Considering that more than 10 GW of low voltage motors are produced in India annually, MEPS (Minimum Energy Performance Standards) on the European lines could save approximately 2000 GWh of energy on a per annum basis.

In conclusion, clean energy in India has redefined innovation with a variety of applications. One such redefinition was ABB's technology alliance with Solar Impulse, the world's first aircraft to circumnavigate the world only on solar energy this year. It changed the paradigm of what could be achieved by innovation in renewable energy. However effective and holistic decoupling of growth from carbon emissions will be possible when sustainability is not merely compliance but a source of opportunity to improve the quality of lives of millions across the world.

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