Wind Solar Hybrid (WSH) Project: A round-the-clock clean energy solutions for commercial and industrial power consumers

Quick Facts

- Location - Jagaluru, Karnataka
- Electricity Generation - 57 million units per annum
- Type Of System - Open Access, Grid-connected Wind and Solar Farm
- Carbon Dioxide Abated - 46,740 tons annually
- Date Of Commissioning - March 2021

Overview

CleanMax has begun to offer a Wind Solar Hybrid (WSH) solution for commercial and industrial consumers with high power requirement. By integrating wind and solar power generation, a WSH project leverages the complementary nature of solar and wind energy power generation in India. Wind energy generation peaks in the rainy season when there is a significant dip in solar power generation. Similarly, a solar plant generates power only during the day, when wind speeds are lower, while wind power generation peaks up in the evenings and early mornings when solar power generation is zero. This complementary nature of wind and solar power generation allows a wind solar hybrid plant to generate a more consistent power output as compared to standalone wind plants or standalone solar power plants. Since power generation is more evenly spread out across the day, transmission infrastructure is efficiently used, and uneven loading of grid is avoided.

CleanMax has implemented this WSH solution for one of the largest Data Center company under a “build-own-operate” or “energy sale” model. The client will source approximately 90% of its power requirement from a 13.5 MW WSH power project with ~52% solar hybridization (wind capacity 13.5 MW and solar capacity 10.5 MWp). The wind solar hybrid plant is expected to generate approximately 57 million units of electricity every year, abating nearly 46,740 tons of CO2 annually. The wind capacity has been installed and commissioned whereas the solar capacity is being added and expected to be commissioned in the next couple of months. The 13.5 MW WSH plant is part of a larger WSH project being developed by CleanMax which will have a cumulative generating capacity of 150 MW after completion of all phases.

In addition to the environmental benefits, the project also brought social and economic benefits for the neighboring communities including temporary employment opportunities during construction of the project as well as permanent employment opportunities in the operations and maintenance of the project. Approximately, 600-700 people have received employment from the project.

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Highlights

The wind Solar Hybrid systems combine power from solar panels and wind turbines which are co-located, to produce uninterrupted electric power. Solar and wind power plants share common infrastructure – in particular, the transmission line and pooling substation of the project are common to wind and solar power supply. This reduces the fixed costs of the project, improving its cost-competitiveness. Power generation is also less susceptible to curtailment than a standalone wind or solar project, because of its consistent generation pattern.

The utilization or Plant Load Factor (PLF) of an individual wind farm in India today is approximately 35%, while that of an individual solar farm is approximately 17%. In other words, much of the power transmission infrastructure is only being used a fraction of the time. But when these two projects are co-located and hybridized, the effective Plant Load Factor goes up to 52% which means better efficiency for the developer, and more efficient utilization for the grid operator as well.

With this Wind Solar Hybrid Solution, CleanMax is able to combine wind energy and solar energy to provide a pattern of power supply which matches the requirements of CleanMax's clients, enabling those clients to achieve a very high proportion of their power requirement from renewable energy.

Challenges

Site selection for a Wind Solar Hybrid project is challenging due to the need of identifying land parcels where wind speeds are high, large contiguous land parcels are available for installation of the solar capacity and government grid substation is available nearby for shorter transmission network; further micro siting of wind turbines is required to determine the exact location of wind turbines complying several requirements regarding existing wind resource, distance from other wind turbines, approach roads, etc.

The remoteness of the location and the enormous size of wind turbines posed a challenge in handling the logistics of the Project.

Given the scale of the project and the labour force, safety and synchronisation across teams becomes extremely important, both during and post installation of the project, to ensure a safe, timely and

Solution

Site selection

For both wind plant and solar power plant projects, CleanMax conducted a detailed analysis to predict the wind or solar power generation across various sites considering distance from nearest evacuation substation, availability of congruous land for solar and wind installation and availability of historical wind data. CleanMax was able to zero down on such a location at a distance of less than 1 km from a major grid substation (thus restricting transmission losses to less than 1%). India's Ministry of New and Renewable Energy has certified the area as one of the best sites in India for Wind Solar Hybrid projects.

Further for micro siting of wind turbines, CleanMax analyzed over 100 locations to finalize the exact locations for the wind turbines. Due to a detailed micro siting exercise, CleanMax was able to (i) reduce the length of the road network inside the wind park by 25% from the initial budgeted estimate and (ii) achieve 4% higher energy output compared to initial assessment.

New roads were built

The enormity of the Wind Solar Hybrid project is reflected in the 132 meter hub height of wind turbines, equivalent to a 35-storey building. The crane used to erect the wind turbines of this height requires 40 trucks to assemble and dismantle. To ensure the seamless movement of vehicles for logistics supply of these huge machines, 16 kms of kattcha road was upgraded and 9 kms of new roads were built.

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Comprehensive Environment, Health & Safety (EHS) policy implemented

At CleanMax, safety is always given the highest priority, and we implemented a comprehensive Environment, Health & Safety (EHS) policy throughout our operations for all employees and contractors. We strictly adhered to safety guidelines, including use of safety harness, lifelines, personal protective equipment (PPEs), and all relevant regulations for safety and labour laws. For this project, we also installed bird guards on transmission poles of our wind sites to prevent bird fatality as per the International Finance Corporation (A World Bank company) Environmental & Social Impact Assessment guidelines.

About CleanMax

CleanMax is the sustainability partner for India's leading corporates. Headquartered in Mumbai, we are the largest provider of solar power to commercial and industrial customers.
The company develops projects on turnkey basis, providing cheaper-than-grid solar power without any upfront investment from its customers. With a highly skilled in-house team, CleanMax operates across India, Middle East and South East Asia.
Our track record with India's top companies has made CleanMax a preferred partner across sectors such as Automotive, Pharmaceuticals, Food & Beverages, Information Technology, Education and many other industries. We also partner with some of India's leading government institutions and top universities.