How is Karnataka faring with clean energy?

Although Karnataka is a leader in the transition to renewable energy in India, it has a long way to go to develop consistent power sources. In fact, according to a study by the Institute for Energy Economics and Financial Analysis (IEEFA), Karnataka has tapped only 11% of its RE potential.

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Hubballi: As he does every year, Govindaiah M R, a farmer from Bommanalli in Chamarajanagar district, had sown paddy on his 15 acres of land, trusting that the Suvarnavathi river, a tributary of the Cauvery, would provide irrigation.

The rains never did come and the region grew arid with each passing day. Govindaiah then turned to employing his irrigation pump set to draw water from his borewell. But those plans too came to a halt due to erratic power supply.

“Farmers of our village and surrounding ones staged a protest, pleading for 10 hours of three-phase power supply. But even officers seem helpless due to power shortage. They suggested we opt for solar-powered pump sets under various government schemes. But it is difficult for us to immediately shift over to solar pump sets as we cannot afford the initial investment,” says Govindaiah. He had thought that intermittent power supply was a thing of the past. After all, Karnataka has been an energy-surplus state for the past five years.

Yet, industrialists and farmers alike have been reeling as a result of the power shortage this year. Researcher Bhargavi Rao of Environmental Support Group cites the example of Tumakuru: “In spite of having one of the world’s largest solar power parks, several parts of the district do not receive electricity even during the day.”

Karnataka is among the country's top five states in power generation. The state meets 52% of its power needs from renewable sources like solar, wind, hybrid (solar-wind), biofuel and mini hydro projects.

Currently, the state gets 12% of its power requirement from its 24 hydropower stations, 2% from the Kaiga nuclear power plant, and 34% from the three thermal power plants.

Until 2018, Karnataka was leading in enhancing its RE infrastructure to bring down its dependency on thermal power plants.

As per the data of Karnataka Renewable Energy Development Ltd, the state commissioned projects that produced 434.13 MW in 2015-16 which increased to 1,990.25 MW in 2016-17 and to 5,120.38MW in 2017-18.

However, the investment and installed capacity began to decrease. In the last three years, the state added a total of just 1,158.6 MW of power.

In a rebuttal to former chief minister H D Kumaraswamy, the Energy Department blamed previous governments for their failure to add to the state’s installed capacity and to enter a new power purchase agreement with Electricity Supply Companies (Escoms) after 2018. “This is the root cause for the problem in meeting the current demand,” says the minister in the letter.

Major parts of India are currently in a similar power deficit, causing them to rely more heavily on coal. Increasingly, even renewable energy-forward states like Karnataka depend on coal when there are demand spikes in rainfall deficit months, when demand for electricity peaks.

Karnataka currently receives about 56,000 tonnes of coal per day from other states, including Odisha, Andhra Pradesh and Maharashtra. There has been a demand to increase this amount to meet the 40%-50% surge in demand for power in the state.

The sudden increase in demand has led to the use of substandard or wet coal. Karnataka's installed thermal power capacity is 5,020 MW. However, the units under operation account for only about 3,900 MW. “Of this, production is about 2,400 MW (less than half) because of the poor quality of coal,” says the reply.

Additionally, as temperatures skyrocket and instances of heatwaves and droughts rise, Karnataka's reliance on coal can lead to more climate-change-related disasters.

Currently, there is no technology that produces 100% green energy, says Karnataka Renewable Energy System Manufacturers' Association President Ramesh Shivanna. However, RE units produce net zero carbon emissions in comparison to coal-based thermal power plants, which emit harmful greenhouse gases.

"While the carbon footprint of solar power plants is 35% and that of wind energy is 15%, thermal power plants have a carbon footprint of more than 85%," says Ramesh.

Depending on coal also has adverse impacts on health due to air pollution. India's toxic air claimed an estimated 1.24 million lives in 2017, according to a study published by The Lancet Planetary Health.

Renewable energy

Although Karnataka is a leader in the transition to renewable energy in India, it has a long way to go to develop consistent power sources. In fact, according to a study by the Institute for Energy Economics and Financial Analysis (IEEFA), Karnataka has tapped only 11% of its RE potential.

There are several issues with renewable energy generation, particularly with regard to storage, limited generation capacities, and deficient port infrastructure.

According to a senior officer with the Karnataka Solar Power Development Corporation Ltd, despite renewable sources being our future, "these resources are highly nature-driven and cannot be generated or stored as per requirements."

In Karnataka, of the total installed capacity of 16,318 MW generated from RE, the state has the capacity to generate 8,267 MW from solar power, 5,273 MW from wind, 1,731 MW from co-gen (from multiple sources), 907.46 MW from small hydro and 139.03 MW from biomass.

However, due to cloudy weather during this monsoon, Karnataka generated a maximum of 4,238 MW solar energy (about half of its capacity) during the peak daytime, while wind energy generation fell drastically to 600 MW.

Storage

This fall in production puts into perspective how weather influences RE power generation. Additionally, Bhargavi explains, "Renewable sources will be considered alternative sources of energy till we have technologies to store the energy for future use."

Storing solar power, which is currently used on a live generation basis, in batteries to be used after sun hours is being discussed as one of the means to make solar power reliable.

There is a reluctance to invest in these technologies as they are expensive, according to renewable energy officials at Escoms. At present, a battery can cost Rs 8 crore to store one MW of power. The battery can provide four hours of power backup.

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Disposal

A major challenge with regard to solar power cells and battery storage is disposal. Harikrishna says that India has, so far, not come up with a policy for solar panel disposal. As the shelf life of these panels is just 25 years, and soon, the country will have a heap of panels to address, he adds.

Adding to this, Shantanu Srivastava of IEEFA says the lifespan of lithium/ion batteries is around eight to fifteen years. Disposing of these batteries continues to be a challenge in the path towards the achievement of a climate-neutral circular economy.

Biodiversity

Looking beyond the issue of storage, experts say that a hurried transition to renewable energy can also impact biodiversity.

According to a study conducted by The Nature Conservancy (TNC-India) and Microsoft, 85% of renewable energy, especially solar power plants, sit on agricultural and ecologically sensitive lands.

Shivaprakash K N, senior scientist at TNC-India and co-author of the study, says: "Instead of installing solar and wind power plants on agricultural land, which affects the fertility of the soil, the government can make use of low-impact land parcels (degraded land and wastelands)."

Installing these resources on agricultural land impacts the livelihoods of people in the region as well. Rao cites the example of Pavagada Solar Park, spread across 1,300 acres and generating nearly 2,000 MW on a sunny day.

"Farmers there have lost their livelihood for a meagre income of Rs 20,000 per acre per year that could have otherwise yielded them one crop a year," Bhargavi says.

The study shows that Karnataka alone can generate 218 GW of solar power and 788 GW of wind energy by using wastelands.

Investment and tech

Shivaprakash says that India would need 280 GW of solar and 140 GW of wind energy by 2030 to reach its renewable energy target of 450 GW. To achieve this target and account for the costs of battery storage, the country needs an investment of $267 billion between 2022 and 2029 and an additional $175 billion towards transmission and distribution to the grid.

Harikrishna K V, a research scientist with the Center for Study of Science, Technology and Policy (C-STEP) says, "Given the high cost involved in power generation from RE and limited technological advancement, traditional power generation units are not going to phase out any time soon."

Fortunately, the installation costs of RE and related storage infrastructure have been reducing over time. In a study, the Berlin-based Mercator Research Institute on Global Commons and Climate Change found that in the last decade, the cost of solar power has dropped by 87% and the cost of battery storage by 85% around the world.

Further, according to a 2019 study published in Nature Commune, an annual cost decline of 6% in both solar PV and battery storage could enable the phase-out of coal power from 2040 in India.

Potential solutions

Experts say that until renewable energy production costs are reduced, there is a need to look at generating energy by adopting a hybrid model where power is generated using multiple technologies in tandem.

Farmers solely reliant on solar-powered pump sets make a serious case for a hybrid model. Take, for instance, Panduranga Jadhav from Belagavi taluk, who has been watering his nine acres using a solar-powered pump set for the last two-and-a-half years. He says he cannot completely rely on solar energy as there is little consistency.

The farmer had spent Rs 2.2 lakh to install 10 solar panels on one gunta of his farm so that his motor could supply water. But the pump set did not work satisfactorily this year due to prolonged cloudy weather.

Another solution is pumped storage, where the water released from hydropower plants is pumped back to higher levels using renewable sources of energy to be reused for the generation of power. While the majority of experts believe that this is a "workable solution", they also acknowledge that this is only possible when there is sufficient water in reservoirs.

Environmental researcher and writer Nagesh Hegde says, at the government level, there is a need to conduct an energy demand survey in every village. Based on the projected requirement of power in each village, the government should set up mini solar power plants with storage facilities.

Energy Department Additional Chief Secretary Gaurav Gupta emphasises that Karnataka has been an energy surplus state for the last five years. "We faced a power shortage only during those three months due to poor monsoon and excess demand from farmers for pump sets." He says the state government is looking at all the possibilities of tapping energy to meet the growing demands.

"For us, both renewable and fossil fuel-based power generation is equally important. However, given that renewable sources of energy are eco-friendly, we are investing in battery and pumped storage technology to enhance the capabilities of solar, hydro and wind energy. As per a rough estimate, the energy demand could double by 2030 and for this, we need a healthy source of resources," he says.

There is a need for such interim hybrid solutions until a complete transition to renewable energy is possible, explains Subramanyam Pulipaka of the National Solar Energy Federation of India. "By effective planning and better utilisation of available land through the hybrid way of generation we can make renewable energy more reliable," he says.

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