

Scaling-up solar PV in water supply services in Rajkot, India

Key findings

- There is significant potential to reduce greenhouse gas emissions in the energy-intensive water-supply sector in India.
- In Rajkot, solar photovoltaic (PV) panels have been installed in the Aji water treatment plant, reducing carbon dioxide emissions by 184 tonnes per year and providing nearly one-fifth of the plant's power needs.
- Highlighting the economic and mitigation benefits of renewable energy has contributed to scale up. Real-time monitoring of the solar PV system through online software allowed the project to quantify monetary savings and make the 'business case'. Showcasing successful emissions reductions caught the attention of the municipal corporation and encouraged them to replicate.
- Co-financing the installation led to greater accountability and ownership by the municipality and ensured proper operation and maintenance, and therefore enhanced potential for sustainability.

Introduction

Rapid urbanisation is placing immense pressure on urban systems, making them more vulnerable to climate change. Cities represent almost two-thirds of global energy demand, accounting for almost 70 percent of energy-related greenhouse gas emissions that contribute to climate change.¹

In the process of meeting the needs of citizens, Indian cities are becoming major greenhouse gas emitters. Rajkot, an industrial city in the state of Gujarat in western India, has many energy-intensive water treatment plants. Water supply, accounting for 61% of the total municipal electricity consumption in 2015-2016, is the most energy intensive municipal service in the city.²

Approach

To reduce dependence on conventional energy sources and promote renewable energy, the Rajkot Municipal Corporation installed solar photovoltaic (PV) panels at the Aji water treatment plant. The municipal corporation received support from the Swiss Agency for Development and Cooperation's Capacity Building for Low Carbon and Climate Resilient City Development (CapaCITIES) project.

The 145 kilowatt-peak (kWp - the peak power of a solar PV system or panel) and grid-connected installation comprises of 452 PV panels of 315 kWp capacity, which can generate 580 units of electricity per day. The solar PV installation, worth INR 8.5 million (\$111,725 as at 23 April 2020), was co-financed by the CapaCITIES project and the Rajkot municipality. While the municipality financed 75 kWp of solar PV worth INR 4.5 million (\$59,148), CapaCITIES paid for 70 kWp, worth INR 4 million (around \$52,576).

Online software monitors the power generation, the avoided greenhouse gas emissions and the monetary savings from the solar installation. A contractor has been appointed to maintain the solar PV system for ten years.

Results

The installation can generate 211,700 units of electricity per year, accounting for nearly one-fifth of the Aji plant's power consumption. The solar installation has the potential to reduce the plant's carbon



A contractor explains how the solar PV system functions.

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dioxide emissions by 174 tonnes per year, without the reliance on conventional energy sources. Between July 2018 and August 2019, the installation generated 224,150 kWp of electricity and mitigated 184 tonnes of carbon dioxide emissions.

Success factors

Success factors for this solar installation include:

- Water supply services in Rajkot are **highly energy-intensive**, and therefore provide a good opportunity to reduce greenhouse gas emissions.
- The success of the solar installation at the Aji plant **caught the attention of the Rajkot Municipal Corporation to scale-up** this solution elsewhere. This was supported by **real-time monitoring of the PV system**, which helped to **highlight the potential economic and mitigation benefits**.
- The project's **co-financing approach has helped to generate greater accountability and ownership** of the project by the municipal corporation and **ensured proper operation and maintenance**, thereby leading to greater sustainability of the project outcomes.
- The contractor responsible for maintaining and operating the plant has also been **given a bank guarantee** by the Rajkot Municipal Corporation, ensuring **seamless operations for the next ten years**.

Way forward

Rajkot has 47 water treatment plants that consume 45 million kilowatt hours of electricity. Following the success of the solar installation at the Aji plant, the Rajkot Municipal Corporation has proposed a 250 kWp solar PV system at Rajyadhar wastewater treatment plant. Additionally, the municipality has commissioned a study to assess the feasibility of using solar PV systems in other water treatment plants in Rajkot. At the time of writing, the municipality was also developing a project to implement solar PV systems in two water treatment plants and two sewage treatment plants.

Endnotes

1. International Energy Agency (IEA). (2016). Energy Technology Perspectives 2016: Towards Sustainable Urban Energy Systems. Paris: OECD/IEA. Retrieved from: <https://www.iea.org/reports/energy-technology-perspectives-2016>
2. Solutions Exchange for Urban Transformation of India (SMARTNET). (2017). 'Renewable energy deployment at Aji water treatment plant in Rajkot'. Retrieved from: <https://smartnet.niua.org/csc/assets/pdf/water/CS3.pdf>

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A 145 kWp grid-connected solar PV system at the Aji water treatment plant.