India's sunshine village

The village of Modhera, with its 8,000 inhabitants, is situated on the bank of the Pushpavati river in the Mehsana district of Gujarat. It is a little over a two-hour drive north of Ahmedabad. Till recently, it was famous for its iconic Sun Temple, built by the Chalukyas and dedicated to the solar deity Surya. It is now famous for being India's first fully solarised village.

It is no coincidence that this village housing the Sun God achieved this status. The Gujarat Power Corporation, under its Surya Gram Project installed solar rooftop systems free of cost for the entire village. It set up a 6 MW ground-mounted solar power plant along with a 15 MWh battery energy storage system or the BESS at Sujanpura village, about a km from Modhera. Solar panels of 1 kWh have been installed on the roofs of the 1,400 households in Modhera. Such systems have also been installed on public and institutional buildings in the village like the bus stand, police station, primary health centre, and *panchayat* office. There is also now an electric vehicle-charging station and, of course, the Sun Temple gets illuminated at dusk.

INFRATALK

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The entire daytime power demand of Modhera is met through the solar project, and at night the supply is met through the BESS. On any average day, about 30,000 units of solar power is generated, of which 5,500 units are consumed during the day and 6,000 units stored in the BESS. The excess power is fed into the state grid on a daily basis. Residents confirm that their electricity bills have come down drastically. A typical household that used to pay a monthly electricity bill of ₹3,000, now needs to pay only ₹1,000. Householders are also using more electrical gadgets making daily life more comfortable. Thus, Modhera has not only become a "net zero" community, but has also become a supplier of green energy to the grid.

Whilst the Modhera example demonstrates the art of the possible, it has to be remembered that these installations have been free of cost — borne by the Central and Gujarat governments at a reported project outlay of around ₹81 crore. This is clearly not possible, or desirable, across all of India's 6 lakh plus villages.

In fact, the national implementation of residential rooftop solar has been patchy and disappointing, though solar energy growth has been rapid since the inception of the National Solar Mission in January 2010. The objective then was to achieve 20 GW of grid-connected solar power project capacity by 2021-22. In 2015, this target was revised to 100 GW, of which 40 GW was to be achieved through grid-connected rooftop photovoltaic (RTPV) and the balance 60 GW from utility-scale projects. Disappointingly, a meagre 11.8 GW capacity of RTPV has been achieved as of end-FY22. Of this 11.8 GW, only about 17 per cent of installations (2 GW) are at residential premises; and 2 GW, or 61 per cent, came from a single state — Gujarat!

The biggest advantage of RTPV is that no additional capex for land is incurred. Consumers can utilise their own premises to generate electricity and become "prosumers" — producers and consumers. But residential consumers tend to shy away from RTPV investments for a variety of reasons. These include an inability to afford upfront installation costs, hassles in arranging finance, free and/or highly subsidised retail tariff for lower consumption domestic usage and principal-agent challenges in rented homes.

In parallel, rooftop "project developers" find it expensive to aggregate demand from small residential consumers. Long gestation periods in closing the sales cycle, the irritations inherent in processing approvals from discoms for multiple locations are some of the debilitating reasons for demotivating installation agents.

Pushbacks from discoms have largely come in the form of lobbying for changes to rules and regulations, primarily those with respect to sale of excess energy back to the grid for fear of losing cash-paying customers. For example, the majority of states have now restricted the capacity size of RTPV for which net metering is allowed. In most states, this capacity restriction is up to systems below 500 kW. Such limitations on net metering lowers the financial viability for commercial and institutional consumers who have access to larger roof areas that can fit in bigger projects. Discom disinterest is a bit surprising as sourcing from RTPV requires lower investments in securing transmission interconnections. Having a good proportion of RTPV increases the local distribution grid's efficiency and reliability.

The Ministry of New and Renewable Energy has made repeated attempts to get RTPV moving for the residential sector. A fiscal-cum-incentive package was fashioned for this purpose. Central financial assistance is provided to residential consumers under a graded scheme based on project size. This includes an advance capital grant of up to 40 per cent of project cost for systems up to 3 kW, and 20 per cent of project cost for systems between 3 and 10 kW. In addition, discoms are provided with performance-based incentives. This incentive is primarily meant to reimburse additional expenditure incurred by discoms in providing supporting infrastructure, capacity building of discom staff, additional manpower and creating consumer awareness.

Modhera has clearly demonstrated the scale of transformation possible in the lives of ordinary Indians in villages. Globally, RTPV has been recognised as a tool to alleviate poverty. It monetises the free sunlight falling on abodes, and serves as a kind of "green direct benefit transfer."

Ideally, this movement should spread far and wide across India's countryside. A fresh scheme needs to be formulated that should draw upon all the learnings to date. This practical, monetisable and poverty alleviating opportunity should be pursued with vigour, just as electricity and water connections have been.

Then, every village in India could become a Sun village.

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