



How India's 'smart villages' are centralising solar power

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Image © AFP: For the roughly 200 million Indians living off-grid, access to power is a privilege, not a right

The Indian government has committed 980bn rupees (\$14.5bn; £10.9bn) to a flagship smart cities' programme, but the social entrepreneur behind the country's first smart village thinks they've missed some low-hanging fruit.

City-dwellers tend to take electricity for granted, says Ashok Das, but for the roughly 200 million Indians living off-grid, access to power is a privilege, not a right.

Mr Das says that makes them a fertile ground for experimenting with smarter ways of using energy that could help the rural poor leapfrog traditional power networks to a greener, community-led approach.

"Changing consumer behaviour in a big city is a major problem," he says. "It will take decades to build smart cities, but I can get thousands of smart villages done in that time."

After a decade in the US semiconductor industry, Mr Das returned to India in 2005 where he transitioned into a green tech consultant.

But despite the huge sums directed into renewables, he saw very little focus on energy access for rural communities who could benefit most.

Gift of light

Visiting a family in a non-electrified village near his hometown in the northern state of Bihar in 2010 hardened his resolve to do something.

"I remember asking my niece, 'what can I bring you?' and she said, 'Uncle, I have everything, just bring me light,'" he says.

India's green energy sector has a tendency to "sell and run" - high-end equipment is installed, but a lack of maintenance support for remote villages means systems often fall into disrepair, he adds.



Image © AFPI: India's green energy sector has a tendency to "sell and run"



Image © ASHOK DAS: It will take decades to build smart cities, but thousands of smart villages can get done in that time

So Mr Das decided to create a smart grid technology that allows a village's entire electrical infrastructure to be monitored remotely.

In January, Chhotkei in Orissa became India's first smart village powered by the Smart NanoGrid technology developed by his company SunMoksha.

Power is provided by a 30KW solar plant and meters and sensors collect data on energy usage and system health.

Remote access

This information is fed into SunMoksha's cloud-based monitoring system, which can be accessed by the company's staff anywhere.

This makes it possible to remotely manage supply and demand and schedule power-hungry activities like irrigation pumping for agriculture and new microenterprises that have sprung up, like a food packaging business and a store that sells cold drinks.

Wi-Fi hotspots let villagers access local intranet via a language-independent mobile app to view their consumption, pay bills and register complaints.

If users exceed their allowance, they can be shut off to avoid overloading the grid and faults can be spotted remotely before villagers trained in basic repairs are sent to fix them.

Set-up costs for the project were met by the Finnish power company Wartsila's corporate social responsibility programme, but on-going expenses are covered by usage-based subscriptions paid to a village committee that maintains the grid.



Image © ASHOK DAS: Villagers trained in basic repairs can help maintain the grid

SunMoksha's local partner is the Odisha (Orissa) Renewable Energy Development Agency (OREDA).

Last year, Prime Minister Narendra Modi pledged to electrify every Indian village in 1,000 days, and in Orissa, OREDA is responsible for installing renewable power solutions in remote villages.

But deputy director Ashok Choudhury says most projects are simple solar home lighting systems.

"When you ask villagers what's their priority for getting electricity they always prioritise livelihood. Number two is entertainment and number three is illumination," he says.

"We always do the third priority first, so we don't make much headway because our programme can't support livelihoods."

Even with larger installations, the difficulty of monitoring and maintaining systems means they often break down.

But for a 15 to 20% mark-up on the cost of a solar plant and microgrid, Mr Choudhury says the Smart NanoGrid makes projects sustainable.

"You get a lot more control," he says. "It brings a real solution to a village; otherwise we install a system and don't know what happens to it when we leave."



Image © ASHOK DAS: Most projects at this village are still only simple solar home lighting systems

Mr Choudhury is keen to incorporate the technology in all the agency's future microgrid developments.

Following a demonstration day at the village in April, secretary in the ministry of new and renewable energy (MNRE) Upendra Tripathy agreed to support 10 pilot projects by providing 30% of the funds.

"I've seen plenty of microgrids, but the combination of technology in this village is a first," he says. "It's the integration and the remote monitoring. That's where they've done wonders."

Last month, SunMoksha won in the 'Smart Village' category at the 2016 Smart Cities India Awards and it is now in the process of submitting proposals for the first MNRE pilot - a smart village cluster in Orissa.

The railway board also wants them to look at using train stations as local power hubs for nearby houses and businesses, and several mining firms want to use the technology to provide power for settlements relocated due to mining activities.

Power management is the main focus, but the system is sensor-agnostic and Mr Das says it could also make villages truly smart by monitoring things like water consumption or environmental factors for agriculture.

The pilot village is so remote it currently relies on a satellite data connection, which is too expensive for general internet use.

But the communications network the system puts in place provides a backbone for future e-governance, telemedicine and tele-education applications, he says.

"The smart grid acts as a catalyst in the village and then all these other things become possible," says Mr Das. "The potential is huge."