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(David Ferris)

How Solar Can Save India's Farmers

Water pumps powered by the sun could solve a host of problems for rural farmers and the nation's power grid

By David Ferris
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Ravi Kant, a rice and wheat farmer in his 30s, lives in Bihar, just south of Nepal and one of the poorest states in India. Kant used to perform an intricate ritual when rains alone couldn't provide enough water for his crops: He would rent a diesel pump from town, shoulder it on a bamboo sling and carry it to a corner of his property where he could drench one of his flat fields with water from an underground aquifer. Then he would move it to another quadrant, and another. "The discharge [of water] from the diesel pump was never strong," Kant recalled. "Add to that the time and hassle to rent a van, go to the town and buy diesel."

But life recently became much easier for Kant: His fertile acreage near the banks of the iconic river now has its own 7.5-horsepower water pump powered by six six-foot-square solar panels. Watering his fields is as simple as walking a plastic hose past the huts where the women dry cow patties for stove fuel. When the sun shines, the farmer can summon water from the ground whenever he wants, and even on cloudy winter days he can irrigate for at least two hours.

A consensus is building that India needs millions more farmers who, like Kant, run their irrigation on sunshine. The country is home to 25 million agricultural water pumps, more than anywhere on earth. Whether they draw their power from the country's rickety power grid or from diesel-fueled generators, the pumps cause a host of

problems. They are sucking aquifers dry, draining the government treasury and farmer's pockets, and adding to the country's burgeoning carbon emissions levels.

A growing number of government officials, aid workers and entrepreneurs believe that if any sector is ripe for solar power in India, it is the legions of agricultural irrigation pumps, because the benefits could add up so quickly.

"In my view, India should stop doing all other solar and just focus on giving farmers a solution for their needs," said Pashupathy Gopalan, a managing director of SunEdison, an American firm that is one of India's largest developers of big solar farms and rooftop solar panels. "The farmers will be happy, and once the farmers are happy, the politicians will be happy because the farmer tells his family how to vote."

To know how a solar pumpset, as it's called, can make such a difference, it's worth taking a moment to understand the strange burden that watering crops places on the Indian economy. About 18 million of the country's 25 million pumpsets are tied to the national electric grid. India's planning commission estimates that farming accounts for about 15 percent of gross domestic product but the sector consumes some 25 percent of the nation's electricity, mostly from powering irrigation pumps. Utilities provide this power at a huge loss; electricity for farmers is usually free, or nearly so, costing only a couple of pennies per kilowatt.

It's been this way for decades, the legacy of a country that is quickly urbanizing but whose self-image -- and nearly 70 percent of its population -- is still rooted in the countryside. The policy comes at a high cost, both in energy and money. The power lines experience transmission losses of 30 to 40 percent on their long route to customers who pay almost nothing. "Every watt sold to a rural customer is a loss to the bottom line," explained Srinivasan Padmanaban, a senior energy advisor to the U.S. Agency for International Development (USAID) in New Delhi.

This burden is taking its toll on the rest of India. Most state electricity boards, the rough equivalent of U.S. utilities, are operating in the red, and the nation's power system frequently falters under the demand pressures of the fast-growing country. In July 2012, more than half of India's population, 670 million people, experienced the world's largest blackout ever. Smaller, rolling blackouts are common, even in some of India's largest cities, spurred on by an outdated power grid, electricity theft, chronic shortages of fuel and the rising cost of imported coal and petroleum. Easing energy demand is a top priority.

And if the flickering power grid is a headache for utility officers and city dwellers, it is an obstacle of another kind for the farmer, sometimes a deadly one. Farmers get electricity, but often for only a few hours a day—or, rather, the night, when no other customers need it. This means that many farmers stumble out of bed and irrigate their fields in the dark. India is home to many venomous snakes like cobras and vipers, and it is fairly common, Gopalan said, for a farmer to meet his end with a snakebite.

These exhausted farmers who depend on short bursts of free electricity are not the best stewards of the nation's diminishing supply of groundwater. The system incentivizes the farmer to use as much water as he can when he can get it. Thus, many farmers gravitate toward crops that require flooding, like rice and wheat. But these commodities offer farmers the lowest of profit margins. Global consulting firm KPMG estimates that solar pumps, which give a farmer the leisure to pump water only when he needs it—and can see it—could increase agricultural income by 10 to 15 percent by letting farmers switch to more profitable crops such as tomatoes and potatoes.

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Entrepreneur	Let's assume the product/service you just learned about existed today. Is it safe to assume you would be interested in purchasing?
Interviewee	Yes.
Entrepreneur	So, if it existed right here, right now, you would part with money and buy it.
Interviewee	I think so, yes.
Entrepreneur	It's actually very close to being ready. Would you be willing to write a check right now for \$3 -- the first month -- and it won't be cash until the product launches.
Interviewee	Now that's different. I'm not saying I'd do that.
Entrepreneur	Why? The check won't be cashed ever if the product does not launch.
Interviewee	Actually, I was just trying to be friendly. I like you and your idea, but I think I can provide that service for my family on my own with free things already available on the web.
Entrepreneur	So, really, this is not that great of an idea because you have other ways to get this done.

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Real-Time Marketing Isn't What You Think It Is
Evergage

Rank	Name	City	Annual Revenue (\$ Million)	Square Feet
1	Marquee	Las Vegas, NV	80-90	62,000
1	XS Nightclub	Las Vegas, NV	80-90	40,000
3	TAO Nightclub	Las Vegas, NV	60-70	44,000
4	LIV	Miami Beach, FL	45-60	18,000
4	Surrender Nightclub	Las Vegas, NV	45-60	60,000
6	Pure Nightclub	Las Vegas, NV	35-45	40,000
7	LAVO Nightclub	New York, NY	25-35	6,000
7	Tryst Nightclub	Las Vegas, NV	25-35	12,000
7	LAVO	Las Vegas, NV	25-35	20,000
7	Mango's Tropical Cafe	Miami Beach, FL	25-35	20,000
7	Greystone Manor	West Hollywood, CA	25-35	10,000
7	Hyde Bellagio	Las Vegas, NV	25-35	10,000
7	HAZE Nightclub	Las Vegas, NV	25-35	25,500
14	1 OAK Las Vegas	Las Vegas, NV	15-25	16,000

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