



## PROJECT BRIEF

# Solar Mini Grids: Estimating Economic and Social Performance

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The experiment seeks to measure short- and medium-term impacts of having access to small amount of electricity, provided through a solar micro-grid

### The Research Question

In developing countries in Asia and Africa, nearly a billion people still live without electricity at home. In an effort to solve this problem, governments and the private sector continue to invest a significant amount of time and money with the object of expanding the grid, or developing decentralized renewable electricity solutions. Notwithstanding these efforts, many households continue to live without modern energy at home. To understand how best to reach the goals of universal electrification it is critical to fully understand the nature of household demand for energy, and decision-making in a marketplace with several electricity sources.

### The Approach

This study used a randomized control trial to identify the demand curve for off-grid solar power and understand the preferences of households over different electricity sources (grid, solar microgrids, diesel generation etc).

The experiment also seeks to measure short- and mid-term impacts of access to small amount of electricity, provided through a solar micro-grid. Evidence on the benefits of the first few units of electricity, as well as the nature of demand are critical to designing economically efficient policy instruments that seek to encourage household electrification. Researchers did a randomized experiment on pricing and availability of off-grid solar power to estimate demand for competing electricity sources.

The experiment was conducted in rural Bihar—an eastern state in India—from 2013 to 2017 with the help of the implementing partner Husk Power Systems (HPS), a Bihar-based private company that offers solar microgrids. The study covered roughly 3,000 households in 100 sample villages across three districts. These villages were not listed as ‘electrified’ by the government;

they had not been offered HPS micro-grids, and were located reasonably close to existing HPS operating sites so that micro-grid services could be feasibly expanded to these households. Total population of households in all 100 villages was 48,979.

### Findings

Experimental estimates suggest that demand for micro-grid solar power is highly price elastic. At a market price of INR 200 per month, the demand for HPS solar micro-grids was near zero. It was also near zero at INR 160 per month. Only about 8 percent households demanded off-grid solar at a market price of INR 100 per month. The result is in contrary to the conventional wisdom that there is substantial demand for solar power in remote areas of developing countries.

Moreover, there was little evidence that the electricity provided by solar microgrids had large impacts on health or education, although the estimates for education outcomes may not be precise. While the households still value off-grid solar for lighting and other energy services, they may perceive greater benefits from different electricity sources, leading to different willingness-to-pay, take-up, and use, according to the findings of the study.

### PARTNERS

