Husk Power Systems

COMPANY BACKGROUND

Founded in 2007, Husk Power Systems (HPS) is a decentralized power generation and distribution company serving rural India. It has developed an innovative biomass gasification technology capable of generating power as efficiently as conventional biomass gasifiers, but on a micro scale—enabling the company to serve rural villages at prices they can afford. HPS covers 250 villages and employs 350 people.

HPS is promoted by first-generation entrepreneurs Gyanesh Pandey, Ratnesh Yadav, Manoj Sinha, and Charles Ransler, who won several business plan competitions in the United States and decided to implement their idea in the state of Bihar. Besides IFC, Draper Fisher Jurvetson, Cisco, Oasis Fund, Acumen Fund, and LGT Philanthropy Foundation also have equity stakes in the company.

HUSK POWER’S INCLUSIVE BUSINESS MODEL

HPS provides electricity in remote, rural villages in India through small-scale systems that generate and distribute power cheaply enough for base of the pyramid consumers to afford. Its target markets are previously unelectrified villages in India’s low-income states, including Bihar, Uttar Pradesh, Orissa, and Jharkhand. Most of HPS’ target customers earn around $2 a day.

Each HPS system consists of a 30–50 kilowatt (kW) power plant that runs entirely on rice husks, generating electricity through biomass gasification, and a simple distribution micro-grid connecting subscribers directly to the plant using insulated wires strung from bamboo poles. Systems are sited only in locations where rice husks are plentiful. HPS plants offer competitive prices for husks year-round, approximately $0.02–0.03 per kilogram, and farmers have an incentive to supply them in order to ensure that electricity remains available in their villages. The typical plant can serve two to four villages—approximately 500 households—with a radius of 1.5 kilometers, depending on size and population.

Including both generation and distribution, HPS systems can provide electricity at a levelized cost of approximately $0.20 per kilowatt hour at current system utilization levels (likely to drop to $0.15–0.16 as utilization increases). Household subscribers pay a base rate of $2.20 per month, which includes 40W of electricity for 6–8 hours every evening, enough to power two 15W compact fluorescent lamp (CFL) bulbs and recharge a cell phone. Business subscribers tend to use more electricity, between 60–75W, paying an average of $4–4.50 per month. Subscribers can pay more, at $1.10 for each additional 15W connection, if they have appliances requiring greater wattage. HPS’ service compares favorably to the cost of alternatives such as candles, kerosene lamps, and LED lanterns, which serve only lighting needs.

Local employees collect payments once a month, in advance. In two villages, smart meters installed on subscribers’ premises help the company make sure that subscribers are using only the wattage that they have, keeping non-payment under 5%—compared to a national average of approximately 30%. Smart meters will be part of each new HPS system built, and will be added gradually to those already in operation. In addition, circuit breakers are designed to cut off the flow of electricity if it exceeds the designated level, and resume when it returns to normal.

HPS uses two primary revenue models.

- Build, own, operate, maintain: In the first model, HPS builds, owns, operates, and maintains the power generation and distribution system, with revenues coming from subscriber fees. Each plant requires four staff—an operator, husk loader, collector, and electrician—though the company plans to reduce this to two or three staff via process and technology improvements that would enable HPS to increase salaries and save on costs. It typically takes two to three months for a plant to reach operational profitability, and three to four years to recoup capital expenditures, depending on whether (and how much) subsidy is received. Additional revenue streams come from the sales of rice husk ash (to be mixed in cement or used to produce incense sticks) and, starting in 2012, carbon offsets. Each of these revenue streams could add up to 50–60% to the total margins of each plant.
- Build and maintain: In the second model, HPS builds and sells the system to an independent owner-operator. The owner-operator is responsible for all costs and entitled to all revenues. Staff training is included in the purchase price, and maintenance and repair are provided on a fee-for-service basis. For a share of the revenues, HPS will also facilitate marketing of rice husk ash and obtaining carbon credits. HPS also facilitates access to Indian government subsidies available for rural electrification, which can cover up to 50% of the total project cost.

The build and maintain model will be HPS’ primary focus scaling up. The company is establishing processes, technologies, and training infrastructure to facilitate its growth as a solutions provider. For instance, HPS has set up a training institute called Husk Power University to help fulfill human resource needs. HPU uses both classroom-based and experiential learning to train power plant entrepreneurs and technicians.
DRIVERS FOR HUSK POWER’S INCLUSIVE BUSINESS MODEL

- Demand for affordable, reliable electricity in rural India
- Ready supply of husks left over from rice processing, as well as other biomass, with few competing uses
- Government support for off-grid energy solutions

More than 400 million Indians lack access to electricity. Approximately 125,000 rural villages are “off the grid,” with 25,000 of these considered unviable to connect via conventional means. The problem is particularly acute in the state of Bihar, India’s third largest state (with 83 million residents) and also its poorest (with average per capita income of $260 per year, less than a dollar a day). Bihar is very rural, with 85% of its citizens living in villages. Only 28% have access to electricity. Those without are forced to rely on kerosene, wood, and dung for their household energy needs and diesel for their agricultural and commercial energy needs. These alternatives are costly and cause health hazards like indoor air pollution. They are also damaging to the environment.

HPS founders saw a market opportunity in the demand for more reliable, affordable sources of energy. People were already paying high prices for kerosene and battery-powered lighting, and energy needs for non-lighting purposes—like mobile phone recharging—were going unmet. While Bihar is a low-income state, it also has a young population and a pro-reform government, and has experienced rapid economic growth in the last half decade—at an average of 11.5% a year between 2005 and 2010. It is also an important rice-producing state, generating approximately four billion pounds of husks a year that—with few competing uses—can be used to generate electricity through biomass gasification.

Indian government policy has provided an additional driver for HPS. Recognizing that electricity is fundamental for economic growth and poverty alleviation, the government is encouraging the development of off-grid power solutions through subsidies and other forms of support available through the Ministry of New and Renewable Energy.

RESULTS OF HUSK POWER’S INCLUSIVE BUSINESS MODEL

- 72 power plants installed, serving more than 30,000 households in 250 villages in Bihar
- Total customer savings of $1.25 million thus far, compared to available alternatives ($17 per household per year)
- 358 jobs created

To date, HPS has installed 72 power plants serving more than 30,000 households—150,000 people—in 250 villages in the state of Bihar. HPS services enable parents to work and children to study beyond daylight hours; reduce the amount of time women must spend collecting firewood; and cut down on indoor air pollution from burning fuel. HPS services also save customers money. Estimating average annual energy expenditure per household at $38 for villagers using kerosene lanterns, HPS customers paying approximately $21 save $17 per year. In total, since its inception, HPS has saved customers $1.25 million.

HPS has also created economic opportunities for power plant owners, operating partners, and staff, including operators, husk loaders, collectors, electricians, and mechanics. HPS employs 350 people directly, and two independent plant owner-operators have created eight additional jobs between them. Close to 300 of these employees are from the villages HPS serves.

While the company is still young, it has experienced fast growth, from three to 72 plants in three years. HPS expects to have built more than 100 plants by the end of 2011. Plant level margins are between 20 and 30%, and the company is on track to break even within six to nine months of reaching the 100–110 plant mark. HPS won an Ashden Award for Sustainable Energy in 2011 and a BD Biosciences Economic Development Award in 2010, among others.

IFC’S ROLE AND VALUE-ADD

In 2010, IFC invested $350,000 in convertible quasi-equity in HPS. At the time, HPS had just completed a $1.75 million round of equity financing, attracting mostly “impact investors” interested in social as well as financial returns, like Acumen Fund and the Oasis Fund. HPS had initially received grant funding and technical assistance from the Shell Foundation, which continues to be a strategic partner assisting the company with research and development, management information systems, and training infrastructure.

The off-grid power sector is still evolving and is considered too risky for commercial financing. IFC’s investment in HPS is intended to help bridge this gap. IFC is helping HPS, an early-stage venture, to firmly establish its business model; develop a financial structure conducive to scale; and comply with social and environmental standards. Together with the Shell Foundation, IFC Advisory Services is helping the company to build up the Husk Power University—for example, by developing a soft skills training module. In addition to building the company’s capacity, IFC’s participation is also expected to have an important signaling effect to larger, more commercial investors.

IFC’s Investment:
$350,000 in convertible quasi-equity