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Empowering Smallholder Farmers In India With Irrigation And Climate-Smart Advisory as-a-Service

Oorja provides a package of services tailored to smallholder farmers powered by decentralised solar and using a unique pay-per-use business model. The company offers users affordable and reliable solar-powered irrigation, and climate-smart farm advisory services. Using an innovative pay-per-use model removes the barrier of upfront cost of technology acquisition, making solar technology accessible to low-income customers.

Region

Northern India

Sector

Agriculture

Retrofit or new

New

Total installed capacity

708 kWp*

Technology

Solar PV and Submersible or Surface Pump

Total investment

USD 435,000

*All figures presented in this case study are from March 2025.



Background

Smallholder farmers in India face declining agricultural productivity, contributing to low and irregular income. Only 65% of farms have reliable electricity connections - forcing them to rely on fossil fuels for energy-intensive activities like irrigation and milling. Solar pumps offer a cheaper life cycle cost but remain inaccessible due to high initial expenses. Additionally, excessive chemical fertilizer use and conventional methods degrade soil health, lowering productivity and trapping them in poverty.

Oorja is a purpose-driven social enterprise working at the intersection of sustainable agriculture and renewable energy. Oorja finances, deploys, owns, operates and maintains decentralised solar infrastructure at the farm level and sells irrigation, milling and climate-smart advisory services to small and marginal farmers.

The company has pioneered the Irrigation-as-a-Service (IaaS) business model to overcome the upfront cost barrier for the adoption of solar technology in agriculture. Currently, Oorja operates in six districts of Uttar Pradesh state of northern India.

The Need

Oorja's primary customers are smallholder farmers with an average monthly household income of \$60-100 and less than 2 acres of land. They rely on agriculture for subsistence (ca. 50% of their income) and have a highly seasonal income. Around 80% of our customers come from historically discriminated groups. Due to financial barriers and lack of social capital, they cannot afford the upfront capital investment of solar-powered appliances.

Growing a variety of crops, such as rice, wheat and corn, Oorja's customers need access to year-round availability of water for irrigation, and guidance on modern scientific agronomic practices to address issues like low crop productivity, crop failure, unpredictable weather etc.

Through climate-smart advisory, Oorja provides training on crop diversification, precise irrigation, preparation and application of inputs, and sustainable farming techniques. They are trained in scientific cultivation techniques, enabling them to operate with a lower environmental footprint.

"Our solutions are used by over 15,000 people in Bharhaich, Uttar Pradesh. With our services, the lives of smallholder farmers have undergone a significant transformation over the years. By 2030, we plan to deploy 10,000 projects impacting over 1 million people globally. These projects would help avoid over 500,000 tons of CO2 emissions over their lifetimes."

Dr Clementine Chambon, CTO & Co-founder, Oorja Development Solutions



The Solution

When it comes to solar technology in the agricultural space, the dominant approach globally has been to promote direct sales or leasing, effectively reaching only middle-income and wealthy farmers who are financially and socially well off. Oorja's innovative Pay-Per-Use business model makes solar technology accessible to the poorest farmers.

In addition, Oorja's innovation relies on robust domestically available technology and is easily replicable in different geographies. Under this model, Oorja takes care of the maintenance of its solar assets and equipment, removing the cost of repairs and maintenance for end users.

Selected sites serve 20-50 farmers. Oorja then installs pumps powered by solar PV, and measures water output using a flowmeter. Pump selection is dependent on the water source and Oorja procures high-quality systems from Shakti Pumps.

Oorja's Engineering team optimises the pump sizing and head, motor selection and water output according to the requirement. The implementation of each project goes through multiple stages, from demand assessment to testing and commissioning.

So far, 147 units in Bahraich district are deployed in Uttar Pradesh, serving 2,146 direct users, and benefiting around 15,800 people. As the installations generated nearly 2,000 MWh of clean energy, they reduced diesel use by 96%, saving more than USD 62,000 in fuel cost so far.

About the PaaS Contract

After an initial membership fee, Oorja's Irrigation-as-a-Service is charged based on water usage measured per cubic meter. This pay-per-use model is designed to be flexible and affordable, allowing smallholders to pay only for what they need and use. Oorja guarantees a 95% service uptime, ensuring reliable irrigation. The project is funded through a mix of equity and grants. Equity investments support infrastructure development, while grants help cover setup and operational costs, making the service more affordable for rural communities and ensuring long-term sustainability. Climate-smart farm advisory services and soil testing services are available as part of the membership offer.



PaaS benefits:

- Direct cost savings of up to 60%
- Year-round access to irrigation and greater crop productivity
- Expert training and agronomic advisory
- Lower overall operational costs and increase in farm income
- Reduction in consumption of chemical inputs, and decreased carbon footprint



“Farming in the summer used to be challenging due to frequent issues with diesel pumps, like fuel shortages and delays. But since Oorja installed its solar pump, things have become much easier. We’ve stopped relying on diesel, and it’s improved the environment significantly—no more smog, smoke, or pollution concerns.”

Maya Ram. Oorja customer, Bahraich (Uttar Pradesh)



Schneider Electric Energy Access Asia, Acumen Fund, elea, Artha Impact, Echoing Green, and Swiss Re Foundation among others.

Oorja plans to scale up its pay-per-use farming services in India, Southeast Asia and Africa. In India, Oorja will expand their customer base in new districts of Uttar Pradesh and expand operations in at least two new states (Bihar, Jharkhand, Chhattisgarh and/or Odisha) in India by the end of 2026. The organisation is also committed to digitalisation efforts.

Further benefits

Smallholder farmers typically grow two different crops. Access to reliable irrigation can enable a third crop to be grown, increasing revenues and enhancing food security in the region. In addition, the installation of solar irrigation systems in the area has created 88 local green jobs (as of April 2025) for operators and salespersons.

Next Steps

Apart from the direct sale of services, Oorja has partnered with South Pole and the D-REC Initiative (decentralised renewable energy certificates) to sell energy certificates from Oorja’s high-impact solar projects. This represents an additional revenue stream for the company, while also acting as a pre-financing tool for new solar projects. The company has raised USD 3 million in equity investments and grants from reputed investors and donors including

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