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# SMART SOLAR IRRIGATION SAVES MONEY AND THE ENVIRONMENT IN SENEGAL

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Potou, Senegal

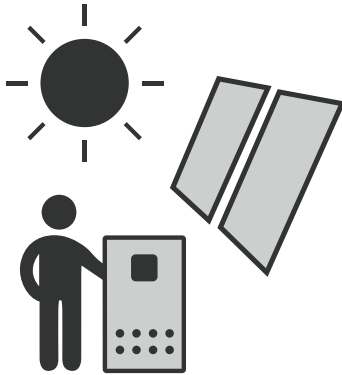


Irrigation of crops is critical to agricultural success, but in Senegal, this task is usually done by hand and can take all day. The current alternative, gasoline pumps, are not only expensive and carry recurring costs, but also contribute to environmental pollution.

The Sustainable Engineering Lab, as part of *Powering Agriculture: An Energy Grand Challenge for Development Initiative*, is piloting research in the Millennium Village of Potou, to reduce the price of energy for farmers by introducing solar PV as a reliable and cost-effective alternative.

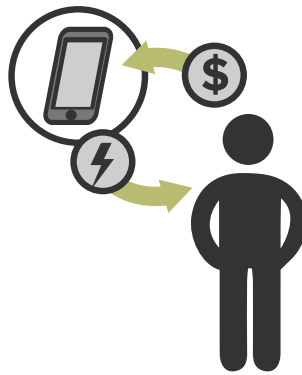
The Niayes zone of Senegal is responsible for more than half of the country's horticultural production. Finding a way to reduce production costs for farmers in this area can potentially lead to major economic gains.

## How it works



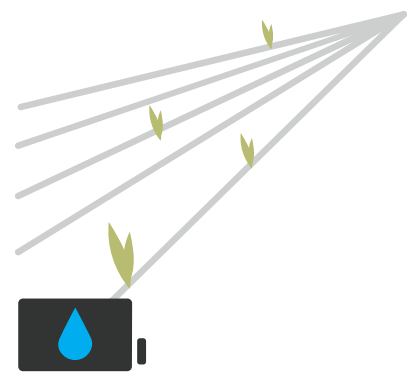
### Centralized solar & monitoring

Electricity is generated centrally by a single, solar PV array. A custom-made battery-less AC system controls and monitors pump function for 7+ farmers.



### Pre-paid credit

Electricity is sold by a micro-utility to farmers using a pre-paid credit system similar to cell phone scratch card systems, only paying for what they consume.



### Decentralized pumps

Farmers retain autonomy of their individual wells and pumps.

## Benefits

### Fuel and Time Savings

Farmers typically spend \$1/day on fuel for gasoline-powered irrigation pumps. These pumps are over-sized and consume more gas than necessary. Properly sized AC pumps require less energy to meet the same crop water requirements. Fuel and time are also saved on transportation, as the closest gas station is about a one-hour drive from the village.

### Environmental Savings

The gasoline-powered pumps produce approximately 2.4kg of CO<sub>2</sub> per liter of gasoline—0.24 tons of CO<sub>2</sub> in a typical 100-day season per farmer. Additionally, fuel spills are common. Switching to solar will eliminate both sources of pollution.

## Project Innovations

### Grid compatible AC pumps

Unlike DC, not only are AC pumps compatible with a future grid connection, but excess AC power could be a potential and profitable energy supply for domestic and commercial customers, who use AC versus DC appliances.

### Distribution of electricity to decentralized pumps

Centralized electricity production, with decentralized distribution allows farmers to retain autonomy of their own wells and pumps and creates a model for micro-utilities that can be scaled up beyond irrigation to meet other demand.

### Battery-less systems

The system is built without the need for a battery to keep capital and recurring costs low. To do this, SEL collaborated with an Indian manufacturer to engineer a low-cost alternative to standard inverters. The new inverter is designed to work in off-grid markets such as our pilot site, Potou, Senegal.

## Partners

