



Piloting Innovation: Lessons Learned from Introducing Solar-Powered Irrigation Systems in Nigeria



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Nigeria's farmers are the backbone of agriculture in the country, constitutes over 70% of the country's workforce. Despite their critical role in food production, challenges such as erratic rainfall, prolonged dry seasons, and high fuel costs continue to limit productivity, ironically pushing many into a cycle of food and nutrition insecurity. Against this backdrop, HortiNigeria piloted solar-powered irrigation systems across Kaduna, Kano, Ogun, and Oyo states, confident that this innovation could provide a transformative solution. This article reflects on the lessons learned from the pilot.



Lesson 1: Sustainable Solutions Ignite Farmers' Interest

Solar-powered irrigation pumps, unlike their fuel counterparts, harness Nigeria's abundant sunlight to power water systems. These pumps are environmentally friendly and cost-effective in the long run term. Throughout the pilot, farmers across the intervention states repeatedly expressed their enthusiasm to transition to solar-powered irrigation despite the high upfront cost which ranges between N800,000 – N3,000,000 depending on the scale and specification. According to HortiNigeria Youth Agribusiness Development Coordinator Benedict Ukpukpen, "Many farmers say they wish they'd known about the technology sooner. They

would have transitioned a long time ago.” Clearly, much interest exists despite the initial expense.

Lesson 2: Demonstration Drives Adoption of Practices and Technology

Through HortiNigeria’s demonstration plots, over 2,000 farmers in Ogun and Oyo states were exposed to the pilot solar-powered irrigation systems by the end of 2024. Training covered efficient water management using drip systems, how to use the installed system, and other relevant topics.

Firsthand exposure proved vital: Boluwatife Maybee, a farmer in Ogun State, remarked, “We learned how to plan irrigation better to match the crop’s needs. I don’t waste water anymore as the crops get the exact amount of water they need.”

Kamilat Balogun, a farmer in Oyo State, similarly observed, “One of the first demonstrations set up in Oyo State through the program helped me see the difference with my own eyes. That’s what convinced me to purchase my own system.”

Lesson 3: Solar Technology Delivers Quick Returns

According to Damilola Awe, CEO of DDEE Farms in Oyo State, adoption of solar-powered irrigation system technology has resulted in a weekly savings on fuel costs of N30,000, or around N360,000 over the three- to four-month tomato production cycle. Although solar-powered pumps require a one-time investment, they save money since recurring costs are negligible. Farmers who switched to solar-powered irrigation, such as Feed the West CEO

Taofiq Ahmed, reported a 70% reduction in operational expenses within one planting cycle.

“After using the solar pump for just one season, my cost of production dropped, and my harvest increased by 100%. It’s one of the best decisions I have made,” Ahmed declared.

Lesson 4: Inclusion Requires Deliberate Action

As part of its commitment to inclusive agricultural development, HortiNigeria distributed solar-powered irrigation systems to ten women-led producer organisations in Kano and Kaduna. These groups, comprising over 200 smallholder women farmers, were selected following their participation in Her HortiVantage—a flagship HortiNigeria empowerment initiative designed to strengthen the entrepreneurial and technical capacity of women in horticulture.

This strategic intervention promoted sustainable farming through clean energy solutions but also reinforced the program’s dedication to impactful inclusion within Nigeria’s horticulture value chains.

“I feel proud being one of the recipients of the solar irrigation systems,” said Kubura Hassan, a farmer from Kano State. “Before HortiNigeria, I had never heard of solar irrigation. But through the training, I learned it’s not just about getting water easily; it also means a cleaner, healthier environment for my family and community.”

Case Study: Feed the West, Ibadan, Oyo State

Feed the West, an agribusiness known for its year-round greenhouse farming, had been looking to expand its open-field production. Fuel costs made this a risky move, but after attending HortiNigeria's solar-powered irrigation demonstrations, CEO Taofiq Ahmed took the leap.

"The demonstration made all the difference. I saw the system in action, asked questions, and realized it could work without daily fuel purchases or complex repairs," Ahmed explained.

Despite receiving no financial assistance, Feed the West independently invested in a solar-powered pump. Within months, operational costs significantly dropped and yields rose with consistent irrigation.

Ahmed continued, "Once installed, the system ran itself. No more recurring costs. I could irrigate more land without worrying about expenses." Now, Feed the West grows tomatoes, cucumbers, and peppers across more hectares, supplying urban markets directly.

"We didn't get financial support. But the clarity from seeing it firsthand, and the fact that it solves both cost and climate issues, made [the solar-powered irrigation system] a smart business move," Ahmed concluded.



Next Steps to Enable Adoption of Solar-Powered Irrigation Systems

In order to expand the adoption of solar-powered irrigation systems in Nigeria, insurance programs and financing options, such as pay-as-you-grow and micro-leasing, should be bundled and made more accessible to farmers. Forging new partnerships by collaborating with rural electrification agencies and state

governments to scale innovation would also support more widespread adoption of these systems. Finally, training on solar-powered irrigation systems should be embedded into good agricultural practice curricula, with promotional support from agro-dealer networks.

Conclusion: Moving Forward

Solar-powered irrigation is not just a technological advancement – it is a catalyst for resilience, economic empowerment, and sustainable food systems. The pilot program revealed that, with the right mix of demonstration, training, and targeted support, solar-powered irrigation can uplift entire communities. To sustain momentum, coordinated investments and inclusive strategies are essential.



Sidebar: Fast Facts

▶ **20+ solar pumps**
deployed across
4 states

▶ **2,000+ farmers**
exposed to solar-powered
irrigation systems

▶ **120,000 Naira**
average monthly savings
per farmer

▶ **200 kg reduction**
in carbon dioxide per
hectare each year

▶ Irrigation system life span
of **1020 years** with
basic maintenance

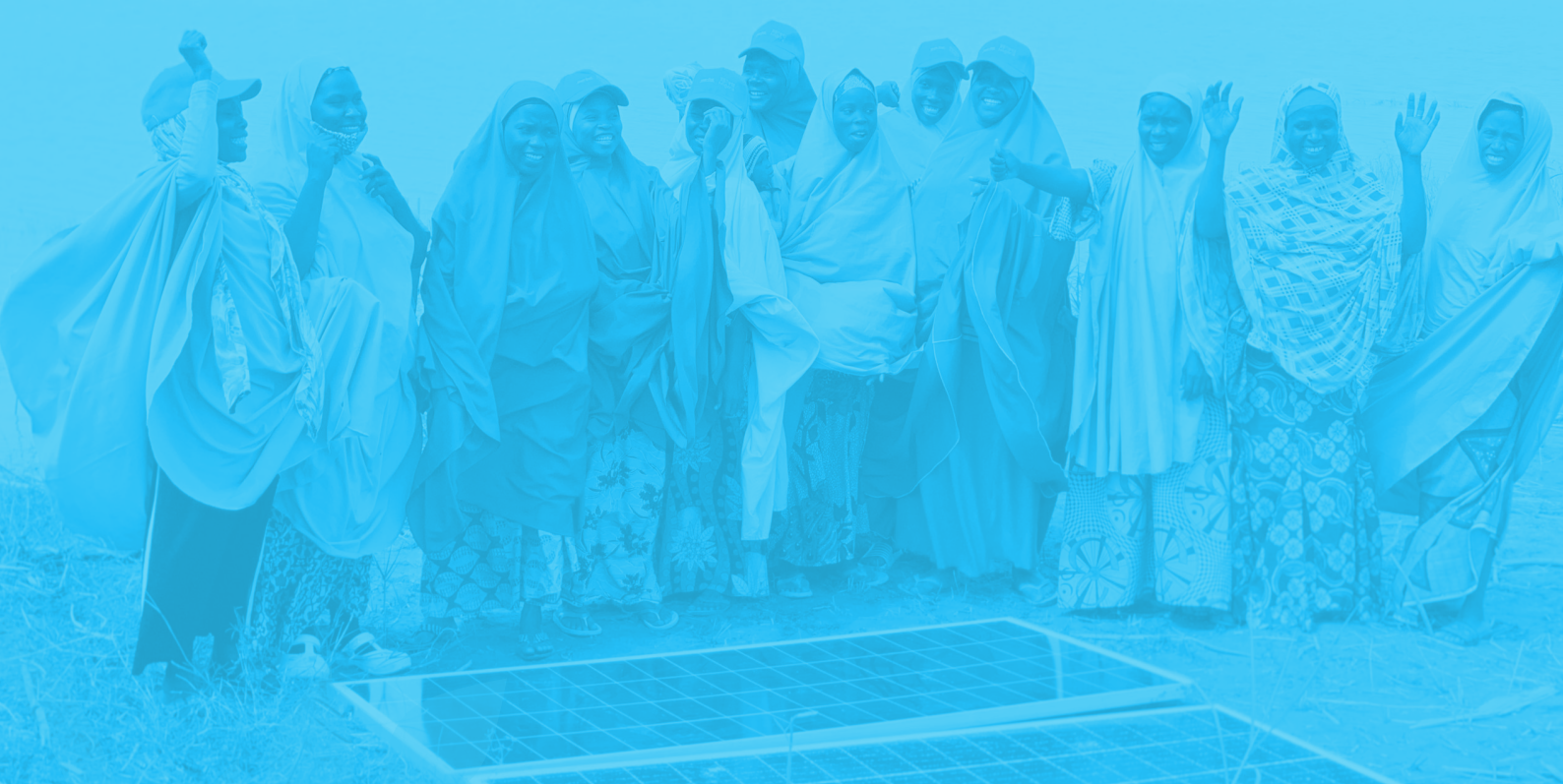
▶ **150+ women
farmers** reached directly
through group-based
solar irrigation systems in
Kaduna and Kano states

▶ **70% reduction** in farm
operation cost reported
by farmers

Did you Know: Simple Innovations Advance Global Goals

Beyond individual gains for farmers, solar-powered irrigation systems support environmental goals, especially by reducing carbon dioxide emissions. Switching from diesel- to solar-powered irrigation means cleaner air and a healthier environment because these systems help farmers avoid releasing harmful gases that come from burning fuel, such as carbon dioxide, smoke particles, and other pollutants. Solar-powered irrigation systems can reduce emissions by nearly 200 kg of carbon dioxide per hectare each year, making a real difference in addressing climate change.¹

1 Guno, C.S. (2024). Diesel to solar irrigation system: Economic, environmental, and social acceptability analyses by small-scale farmers of Calapan, Oriental Mindoro. *Journal of Human Ecology and Sustainability*, 2(1), 3. <https://doi.org/10.56237/jhes23015>



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