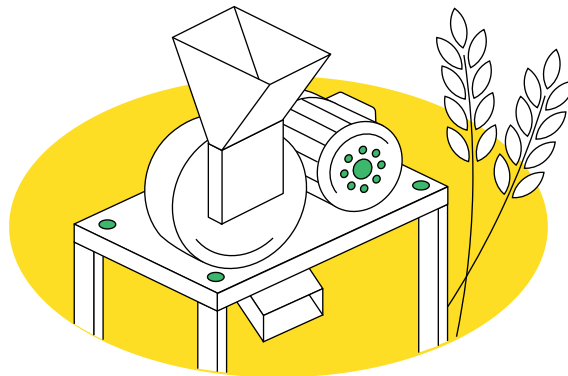


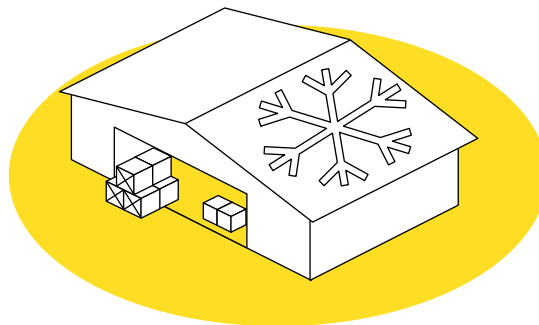
EXAMPLES OF PRODUCTIVE USE

These agricultural processing activities are enabled at 200 kWh per person per year.

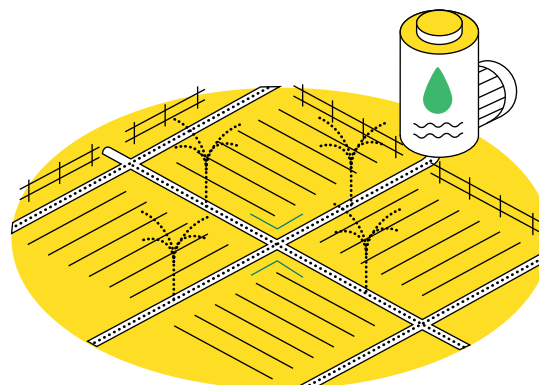
AGRICULTURAL PROCESSING
REPRESENTS AN ENORMOUS
ECONOMIC OPPORTUNITY.



Grain Milling



Cold Storage



Irrigation

GRAIN MILLING

Staple crops like wheat, maize, barley, or teff are often milled with inefficient diesel systems. Electric milling can save farmers money, reduce air pollution, and end dependency on fragile diesel supply chains.

The potential market is huge. In Ethiopia alone, 30 million growers farm nearly 10 million hectares to produce 25 million tons of cereal across the country. Grain millers are found in rural villages throughout sub-Saharan Africa.

Replacing diesel grain mills for electric equivalents has a short payback, and can improve the quality of the finished product. Efficient appliances are becoming available for minigrids or off-grid supply where peak power is constrained.



DAVID BABARINDE WITH HIS RETROFITTED GRAIN FLOUR MILL, WHICH NOW RUNS ON 24/7 ELECTRICITY FROM A MINIGRID IN GBAMU GBAMU COMMUNITY, OGUN STATE, NIGERIA. PHOTO BY ANDREW ALLEE

FURTHER READING

- [ENERGY4IMPACT](#)
Solar Milling: Exploring Market Requirements to Close the Commercial Viability Gap (2020)
- [LIGHTING GLOBAL](#)
Productive Use Leveraging Solar Energy - PULSE (2019)
- [FACTOR\[E\]](#)
Laboratory Characterization of Income Generating Appliances (2019)
- [USAID NIGERIA SECTOR POWER PROGRAM](#)
Agricultural Productive Use Stimulation in Nigeria: Value Chain & Mini-Grid Feasibility Study (2020)
- [CROSSBOUNDARY](#)
Mini-grid Innovation Lab

COLD STORAGE

Cold storage keeps high-value foods such as fish, dairy, fruits, and vegetables fresh, enabling sales to urban areas for increased revenue. Without reliable cooling, spoilage rates for milk in Kenya and vegetables in Nigeria can be higher than 50%, representing huge losses for farmers.

In sub-Saharan Africa, the serviceable cold storage market is estimated to be 225,000 farmers, at a value of US\$191 million. With some structural support, the market can grow by 17.4% annually to reach 1.6 million farmers in 2030. The full market potential exceeds US\$6.2 billion and 6.5 million farmers.

Cold storage powered by minigrids or off-grid supply is protected from the impacts of an unstable grid system, and often better suited to the rural conditions in sub-Saharan Africa. There is already a strong business case in areas with relatively high production levels (for example, over 15 litres of milk per day). To benefit more small farmers and reduce the cost of cold storage, new business models and appliances are put into use to aggregate smallholders and increase system utilization.



ROMOKE TAIWO, A FISH FARMER WITH HER ELECTRIC FREEZER IN GBAMU GBAMU COMMUNITY, OGUN STATE, NIGERIA. PHOTO BY KENDALL ERNST

FURTHER READING

- [VERASOL](#)
Quality Standards, Testing, and a Database of Certified, Efficient Off-grid Appliances, Including Refrigerators (2020)
- [LIGHTING GLOBAL](#)
Productive Use Leveraging Solar Energy - PULSE (2019)
- [LIGHTING GLOBAL](#)
Off-Grid Solar Market Trends Report (2020)
- [GLOBAL LEAP AWARDS](#)
Global LEAP Off-grid Cold Chain Challenge Awards (2019)

IRRIGATION

Irrigation can provide significant yield increases and higher incomes for farmers. Take the example of cabbages and tomatoes in Zimbabwe: irrigation could increase the yield by 150% and 220% respectively. However, approximately 95% of farmed land in sub-Saharan Africa and 60% of land in South Asia relies solely on unpredictable seasonal rainfall to meet water needs. Efficient and cost-effective water supply solutions are needed to enable economic growth and resilience for more than 500 million smallholder farmers, as climate change starts to impact rainfall patterns in many places.

Irrigation represents one of the largest shares of the agricultural productive use potential. In sub-Saharan Africa, the total addressable market is worth US\$3.5 billion and could serve 5.4 million farmers. Today the total serviceable market is worth US\$456 million and reaches 701,000 farmers. This is expected to grow by 12.3% annually, driven by the combined effects of rising income levels, growing rural population, electrification rates, and an estimated reduction in end prices.

The business case for farmers to invest in off-grid water pumps is often compelling, even at small scale. In Kenya, solar pump expenditures can break even against diesel alternatives within the first year, despite their higher upfront costs (up to 60% higher). The market for solar-powered water pumps is booming and ready to scale further, with an increased variety of product options.



A SOLAR-POWERED PUMP ENABLES USERS TO DRAW WATER WITHOUT HAVING TO MANUALLY PUMP THE HANDLE IN GAYARI, ARARIA DISTRICT, BIHAR, INDIA.
PHOTO COURTESY ROCKEFELLER FOUNDATION

FURTHER READING

- [VERASOL](#)
Quality Standards, Testing, and a Database of Certified, Efficient Off-grid Appliances, Including Water Pumps (2020)
- [LIGHTING GLOBAL](#)
Productive Use Leveraging Solar Energy - PULSE (2019)
- [GIZ](#)
Toolbox on Solar Powered Irrigation Systems (2020)
- [GLOBAL LEAP AWARDS](#)
Global LEAP Awards Buyers' Guide for Solar Pumps (2019)



ELECTRIFYING ECONOMIES

The Electrifying Economies project

demonstrates the role distributed energy will play in ending energy poverty and catalyzing a green and equitable recovery from the Covid-19 crisis. It draws on the latest data and research from around the world to show how distributed renewables can provide sustainable, affordable, and reliable power for all. The project provides information to support policy makers and investors in taking action today, to realize this potential.



#ElectrifyingEconomies
ElectrifyingEconomies.org