POWER FOR ALL FACT SHEET

Decentralized renewables can enhance agro-productivity in Tanzania

POWER FOR ALL

3.75kW

OIL EXTRACTOR PROFITS FOR RURAL AGRO-PROCESSORS

USD 30

DAILY PROFIT POTENTIAL FROM SOLAR-POWERED OIL EXTRACTOR

USD1000

IDEAL PRICE POINT FOR SOLAR-POWERED MILLS TO COMPETE WITH DIESEL MILLS IN TZ

Tanzania makes for a strong case in expanding the integration of decentralized renewable energy technologies (DRE) within agro-processing activities[1]. This Fact Sheet highlights the current state of DRE powered agro-processing activities in Tanzania, drawing on analysis by: Access to Energy Institute (A2EI)[2], The National Renewable Energy Laboratory and Energy for Impact (NREL & E4I)[3], the Energy Change Lab (the Lab)[4], and African Development Bank Group (AfDB).[5]

Recent studies identify agricultural value-chains in Tanzania where solar-powered agro-processing appliances are commercially viable.[6]

» A2EI assessed ten agricultural processes. For each, a business model was developed and unit economics and other financial metrics were evaluated to identify opportunities where solar energy can be used profitably in agriculture-related businesses.[7] (TZ1, p.12,14,15)
» A USD 2000, 3.75kW solar-powered oil extractor on a USD 0.60/kWh retail tariff that presses 80kg of seeds per hour and operates 7 hours a day for 50% of the year, generates daily profits of USD 30.19. (TZ1, p.6,27)
» A USD 600, 3.75kW solar-powered peanut sheller on a USD 0.60/kWhretail tariff that can produce 110kg of shelled peanuts per hour, generates daily gross profits of USD 49.86. (TZ1, p.10,70)
» A USD 1000, 4.4kW system that runs a 2.2kW solar-powered flour mill and 2.2kW solar-powered hulling machine on a USD 0.60/kWh retail tariff and processes 90kg per hour of flour, generates a daily gross profit of USD 3.74. (TZ1, p.9,65)

However, limitations have been observed in effectively integrating DRE systems for solar-powered agro-processing.

» Single-phase solar-powered mini-grids are not compatible with power-intensive agro-processing activities such as milling and grinding. These mini-grids can run motors of up to 3.7kW (5hp), whereas solar-powered mills run on 10kW motors, making them more compatible with three-phase mini-grids.[8](TZ2, p.23,30; TZ3 p.30)
» High retail tariff structures associated with solar-powered mini-grids in Tanzania can limit an agro-processing entrepreneurs' ability to invest in their businesses and adhere to appliance payments. (TZ3, p.16,28)
» Solar mills, driven by rooftop solar PV systems, have prohibitively high capital costs (USD 2500) compared with diesel mills (USD 1000) and many rural entrepreneurs lack collateral for loans and credit histories to access financing.[9](TZ3, p.18)

To promote DRE powered agro-processing in rural communities, productive use of energy (PUE) stakeholders can coordinate to improve local community skills gaps, after-sales servicing, and appliance distribution supply chains.

» Developing locally appropriate training materials - videos tutorials in Kiswahili and hands-on appliance demonstrations - has provided much needed technical training in how to properly operate agro-processing appliances. (TZ3, p.8,15)
» User-friendly business development training manuals have been created for rural entrepreneurs to train in: business management, financial planning, and health and safety standards. (TZ3, p.14)
» Identifying a local technical vocational training partner and local skilled technicians, especially in remote rural communities, has been essential in having local personnel who are trained in repairing solar-powered appliances. (TZ3, p.22)

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By the Numbers:

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» Brokering partnerships and agreements between key players in the local distribution networks has ensured extension of appliance distribution to rural communities. In Tanzania, the Lab was able to broker a supply chain agreement with a local distributor to distribute appliances from Dar es Salaam to Chang'ombe and Dongo, over 365km away, (TZ, p.24)

» Providing trial periods and warranty coverage for agro-processing appliances would allow rural entrepreneurs to test out appliances and provide assurance on their investment. (TZ3, p.22)

With support from government and partners, DRE is well-positioned to provide an enabling environment to advance agro-processing.

» Appliance developers and financial institutions can work together to provide rural entrepreneurs access to SME guarantee schemes that would bridge the appliance financing gap; these schemes can ensure payments that align with seasonal rural incomes in case of defaults. (TZ1, p.29)

» Increasing entrepreneurs' ability to pay for electricity can be achieved through grants that can be used to buy down a portion of the capital cost of mini-grid services and offering credit, or pay-as-you-go solutions that mirror current retail spending on energy services. (TZ4, p.66)

» DRE projects have a high capital cost and financing conditions available domestically are not well suited to the development of DRE projects. Therefore, long-term financing through commercial banks can be offered, as well as transaction advisory services to assist developers in finding equity investment partners. (TZ4, p.66)

» To minimize grid encroachment that can reduce the expansion of DRE projects in rural communities, the Tanzanian government has developed The Rural Electrification Investment Prospectus to identify rural areas best suited for mini-grid and off-grid electricity supply. (TZ4, p.64)

Share the Message

» DRE agro-processing offers a strong commercial opportunity for rural entrepreneurs, however, appliance financing, business and technical skills gap and high retail tariffs remain a barrier in maximizing the opportunity.

» Key productive use of energy (PUE) stakeholders can position themselves in engaging with local communities to offer training and financing assistance thus bridging the barriers to solar- powered agro-processing.

» Government and partners can play a role in encouraging DRE projects by offering a conducive investment environment; they can provide long-term financing and transaction advisory services to DRE developers.

Sources:

1. IRENA defines agro-processing activities as, "Processing, which, when applicable, involves transforming the raw product into one that is adjusted to the needs of the consumer. Examples include drying, milling, grinding, pressing, shredding, pasteurizing dairy, juicing and de-husking." IRENA, Decentralised Solutions in the Agri-Food Chain", 2016, http://www.irena.org/publications/REagrifood/.

2. Access to Energy Institute (A2EI), "Evaluation of Solar Powered Agricultural Technologies for Productive-Use: A Modeling Approach," 2020. **(Herein TZ1)**

3. The National Renewable Energy Laboratory and Energy for Impact (NREL & E4I), "Productive Use of Energy in African Micro-Grids: Technical and Business Considerations," Usaid, Nrel, no. August (2018), https://www.nrel.gov/docs/fy18osti/71663.pdf. **(Herein TZ2)**

4. The Energy Change Lab (the Lab), "Remote but Productive: Practical Lessons on Productive Uses of Energy in Tanzania," 2019. **(Herein TZ3)**

5. African Development Bank Group (AfDB), "Renewable Energy in Africa: Tanzania country profile," 2015. **(Herein TZ4)**

6. A2EI modeled solar-powered agro-processing businesses by selecting, "a USD8.00 benchmark as it is a typical daily gross profit margin reported by diesel mill operators." A2EI, "Evaluation of Solar Powered Agricultural Technologies for Productive-Use: A Modeling Approach," 2020

7. Ibid

8. World Resources Institute (WRI), "Accelerating Mini- Grid Deployment in sub-Saharan Africa," 2017

9. EFFICIENCY FOR ACCESS COALITION, "Solar Milling: Exploring Market Requirements To Close the Commercial Viability Gap January 2020 Efficiency for Access Coalition," no. January (2020): 1–33