



Photo Credit: Agsol

MILLING

Solar Appliance Snapshot

JULY 2021
 EFFICIENCY FOR ACCESS COALITION

Despite low adoption rates, solar mills have significant market potential. Milling represents the largest single use of stationary energy in off-grid areas. New solar mill prototypes and business models are finally showing promise for commercial viability.

MARKET INSIGHTS

Large-scale diesel mills dominate the off-grid market, with standard solar-powered mills run on the grid slowly replacing them. Large-scale milling is limited only to a few value chains that can supply the quantity of grain required for commercial viability; small-scale milling remains nascent. The value proposition for solar milling is highest in remote areas where the distance to travel to existing mills is a greater challenge; however, the trade-off is that population density is lower in these areas. There may also be competition from cheaper, incumbent small-scale diesel equipment. Additionally, milling on mini-grids shows great promise and could be a game-changer, but they struggle with demand creation.

CONSUMER IMPACTS

In off-grid areas, milling has the potential to enhance farming efficiency, promote food security and empower women. This is important for securing livelihoods in rural areas with few economic activities apart from farming. Grain production and processing are some of the most important productive uses of energy (PUE) for off-grid smallholder farmers in rural Africa.

Because solar mills do not produce greenhouse gas emissions, they incur safety, health and environmental benefits through reduced use of diesel fuel. Due to their user-friendly design and reduction in workload, solar mills allow women to spend time on education or income-generating activities.



\$417M

Projected growth of serviceable market by 2030 if product costs are reduced and the proportion of people who can afford agro-processing units increases.¹



257k

Potential number of agro-processing units sold in 2030 in Sub-Saharan Africa.²



50%

Throughput increase after mini-grid operator PowerGen and mill manufacturer Agsol customised off-the-shelf mills through the installation of larger pulleys.



25%

Projected increase in percentage of people who can afford an agro-processing unit by 2030.

1. This is not for mills alone, but for all agro-processing of <1Kw.

2. Ibid.

CURRENT SUCCESSSES

Notwithstanding social and environmental gains, solar mill proto-types outperform diesel incumbents in energy efficiency, lower operation cost and more beneficial unit economics.

Several new companies have entered the solar milling market due to solar mills' market potential. Companies such as Agsol and Nadji.Bi Senegal are making strides in research and development (R&D) and business model evolutions to better target their consumers. Agsol developed a solar micro-mill that optimises solar mill throughput with lower power input. Nadji.Bi Senegal is digitising solar milling to improve the overall economic viability and inclusion of women.

REMAINING CHALLENGES

Incumbent milling technologies have been in place for a long time and require efforts to displace. Solar-powered agro-processing units currently do not match the entry price and throughputs of diesel-powered units. Low awareness of electric and solar milling, in addition to high capital costs, are also limiting this switch over.

It is difficult to match technologies with a use case. The majority of use cases and associated value chains have not been mapped in depth. Unviable catchment areas, both in terms of quantity of cereals and customers, is another remaining challenge. Finally, the market faces uncertainty around the typical business models suggested for PUE technologies (e.g., business-to-business) and need more innovation.

RECOMMENDATIONS AND PATHWAYS TO SCALE

Even with current innovations, solar mills have not yet demonstrated commercial viability. However, there are viable paths to close this commercial gap.



Continue R&D for technological innovation

Donor-supported programmes are needed to scale the market for solar mills. Sustained support is required to develop commercially ready products and find viable business models.



Enable long term financing

Risk capital should be made available to entrepreneurs, suppliers and manufacturers to enable them to develop and commercialise more efficient solar mills and specific market-led designs and business models.



Deploy rapid product assessment

A rapid product testing protocol that can accommodate local context would eliminate the costly hurdle of equipment breakdowns.



Discover and test innovative business models

More investment is needed in technical assistance to tailor technologies and business models, and to support technology upgrading and skills transfer.



Increase market intelligence

More data is needed on which markets and value chains are viable as a way to baseline incumbent technologies and characterise demand for household, community and productive use mills.



Redirect subsidies and policy incentives

Subsidies and other policy incentives should be redirected from diesel milling machines. Setting a price on carbon would enable solar mills to benefit fiscally from emissions saved.