Opportunities & Challenges for Solar Grinder in Cambodia



SWITCH to Solar

switchasia GRANTS PROGRAMME

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In recent years, Cambodia's electricity sector has been through outstanding improvements fuelled by the government's success in rapidly expanding access to grid electricity up to 81% of households at the end of 2020. Nonetheless, in light of the relatively high electricity costs, remoteness of farmers and overall low mechanisation of the agriculture sector, solar technologies for productive use have the potential to improve agri-fishery MSMEs competitiveness on the market while reducing their operational costs. This summary provides a short overview of the opportunities and challenges for the adoption of solar grinders in Cambodia.

Starting by looking at the use of grinding technologies at large…

Grinders are technologies used for the mechanical production of farm-made animal feed. As such, it can be used mostly by stakeholders at the production level in the livestock value chain and has been studied for the selected value chains of pig and poultry. More specifically, within the poultry value chain, only broiler producers can be considered potential targets for grinder, as during the early stage of growth, chicks are fed with commercial feed only.

The consideration of the different needs and requirements of each selected stakeholder reveals both opportunities and challenges to the adoption of grinders, as detailed below.



Chicken production

Consume commercial feed only, so not relevant for self-feed production



Broiler production

- Smallholder farmers
- Semi-commercial farmers



Pig

- Smallholder farmers
- Semi-commercial farmers

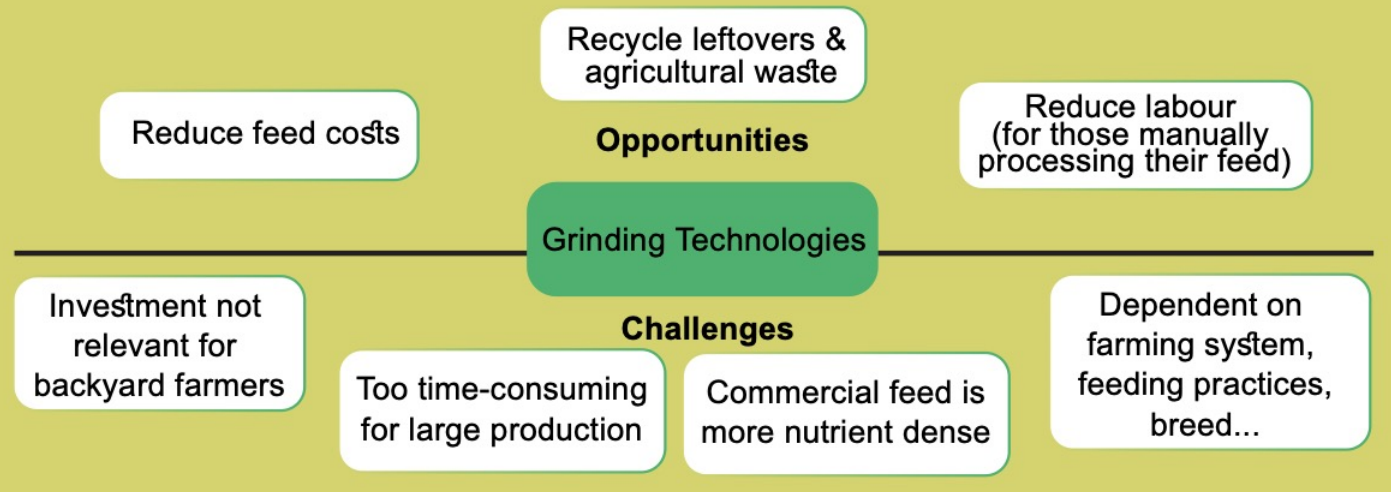
Opportunities that can positively influence the uptake of grinding technologies include:

- **Recycling kitchen and agricultural waste:** grinders allow using kitchen waste and agricultural by-products to produce animal feed, thus valorising what would have been thrown away otherwise
- **Reduce feed cost:** in relation to the above reason, and as it helps substituting commercial feed, which is very expensive in Cambodia, using grinders to produce farm-made feed can help farmers drastically reduce feed costs (one of the main expenses for a lot of farmers). It can also help improve the taste of the meat.
- **Reduce labor:** for those who relied on manual chopping to produce their own farm-made feed, switching to a grinder is both labour- and time-saving.

On the opposite, challenges that need to be considered encompass:

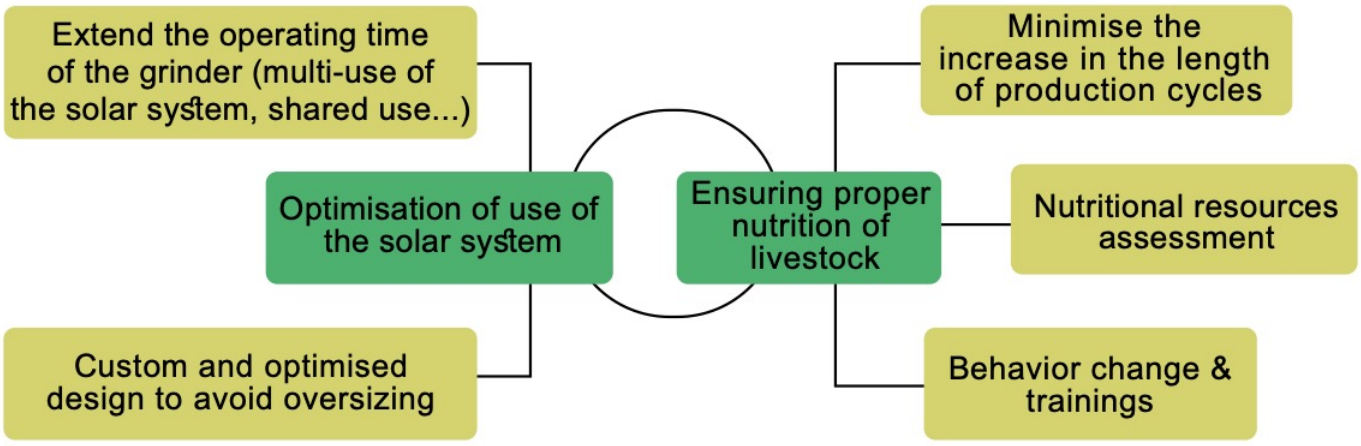
- **Farm-made feed cannot replace commercial feed:** commercial feed is more nutrient-dense, improves animal growth and is better suited for earlier stages of development. If a share of the feed can be farm-made, it is not suitable to switch 100% to farm-made feed.
- **Factor-dependence:** whether the production of farm-made feed can be suitable for the farmer depends on a lot of factors, including the farming system in place, the size of the production, the feeding practices, the breed of the animal and the stage of development.

It is also worth noting that using grinding technologies for the self-production of animal feed is not suited for all farm sizes. On the one hand, the investment is not relevant for backyard farmers as their feed needs and investment capacity are low. On the other hand, for commercial farmers, the self-production of animal feed would represent a too significant workload. As such, investing in grinding technologies makes sense mostly for semi-commercial farmers as they have intermediary production sizes and the self-production of animal feed could help them reduce feed costs.



Technical considerations

Solar Grinders is a relatively **mature** technology already distributed in Cambodia and **simple to install** – mostly plug and play. It is interesting to note that solar grinders are not usually offered on their own - they are often combined with other appliances, such as a cool-box for chicken vaccines or an egg-incubator.



Nonetheless, current feeding practices, through the use of commercial feed or farm-made feed, associated to the own limitations of solar grinders reveal 2 main technical constraints to the adoption of the technology:
the **need to ensure proper nutrition of the livestock** and the **criticality of optimising the use of the solar system.**

Capacity	By hand	Electric	Solar
40 kh/h grinding 100kh/h cutting	$0	$150-$200	$1,200

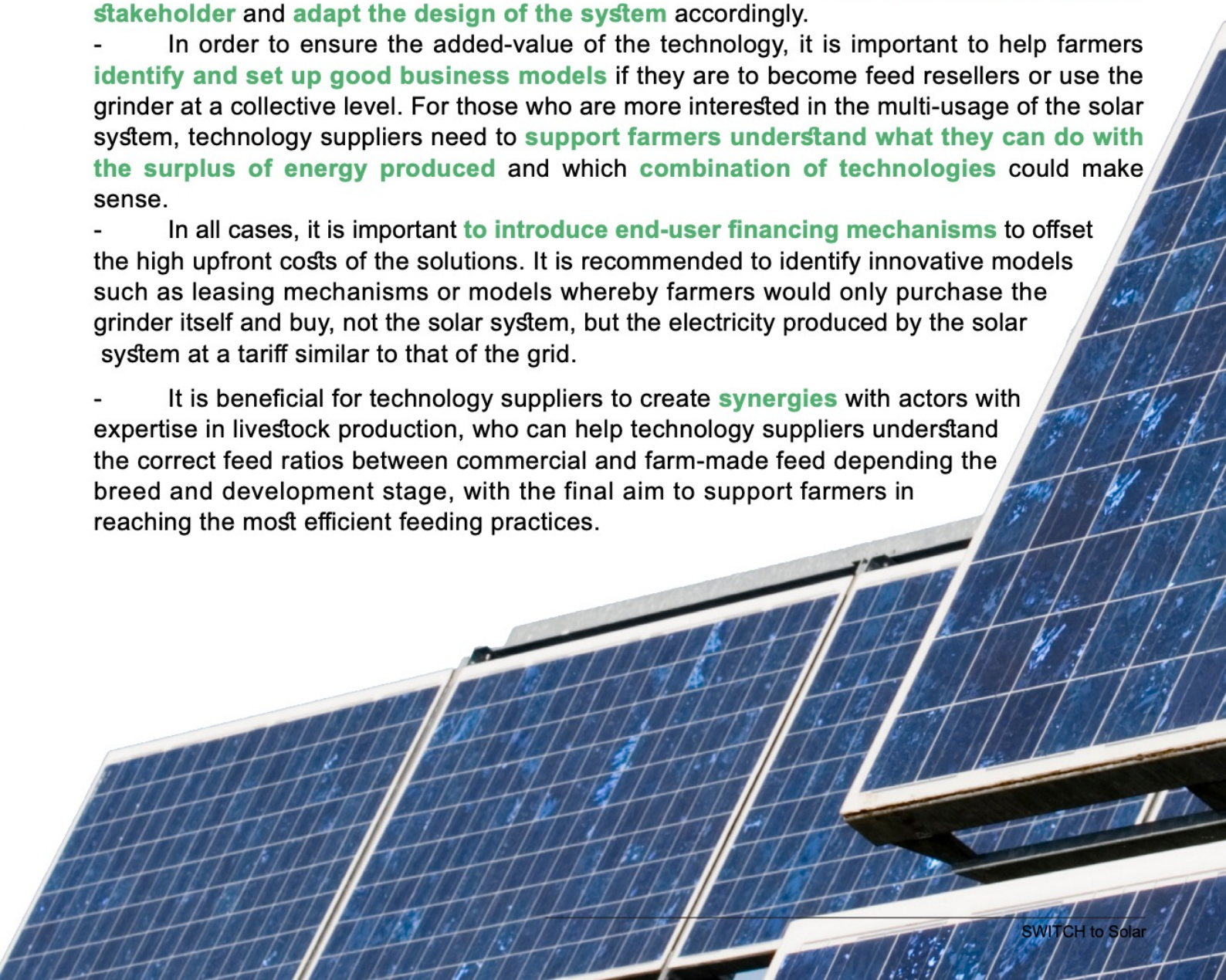
Another major constraint to the adoption of solar grinders is their **upfront costs:** purchasing cost is 8 times higher than the one of a grid-powered equivalent. The key challenge of solar grinders is that they require powerful motors, and thus a large and costly PV system, but are only used few hours a day, if not few hours a week.

As such, cost benefit analyses show **no clear return on investment for a solar grinder** for either smallholder and semi-commercial farmers and reveal that it is difficult for a solar grinder to be economically more advantageous than a grid-powered grinder. The only cases when a solar grinder could be interesting is in **area with little to no access to the national grid**, through the **multi-usage of the solar system** to power other appliances or if farmers are **selling the feed** produced to other farmers. Even more so than for other technologies, end-user financing mechanisms will be critical to facilitate the uptake of solar grinders by all stakeholders.

Recommendations – How to be successful in distributing Solar Grinders?

The use of solar grinders has revealed great opportunities in helping farmers alleviate the financial load that animal feed can represent. Yet, there are challenges to overcome to be able to develop such a solar powered solution at scale. Here are a few recommendations to increase the adoption of solar grinders in Cambodia:

- The number of parameters affecting the added-value of solar grinders is quite considerable and heavily depends on end-users' operations. It is important to **evaluate the needs of each stakeholder** and **adapt the design of the system** accordingly.
- In order to ensure the added-value of the technology, it is important to help farmers **identify and set up good business models** if they are to become feed resellers or use the grinder at a collective level. For those who are more interested in the multi-usage of the solar system, technology suppliers need to **support farmers understand what they can do with the surplus of energy produced** and which **combination of technologies** could make sense.
- In all cases, it is important **to introduce end-user financing mechanisms** to offset the high upfront costs of the solutions. It is recommended to identify innovative models such as leasing mechanisms or models whereby farmers would only purchase the grinder itself and buy, not the solar system, but the electricity produced by the solar system at a tariff similar to that of the grid.
- It is beneficial for technology suppliers to create **synergies** with actors with expertise in livestock production, who can help technology suppliers understand the correct feed ratios between commercial and farm-made feed depending the breed and development stage, with the final aim to support farmers in reaching the most efficient feeding practices.





SWITCH to Solar For a Thriving Agri-Fisheries Market

This document is produced as part of the SWITCH to Solar Project, funded by the European Union and the Czech Republic, and implemented by three partner agencies: People in Need, EnergyLab and Sevea. The goal of this document is to present the results of the study led by Sevea on the opportunities and challenges for solar cricket incubators in Cambodia.
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