

# POWER FOR ALL RESEARCH SUMMARY

## Productive use leveraging solar energy is the next frontier of energy market

**POWER  
FOR  
ALL**

IFC's Lighting Global released a market study on productive use leveraging solar energy (PULSE) in October 2019, focusing on smallholder farmers in sub-Saharan Africa (SSA) with a deeper dive in Kenya, Zimbabwe and Cote d'Ivoire. The three PULSE applications included in this report are: 1) irrigation, 2) cooling and refrigeration, and 3) agro-processing. This Research Summary highlights key market trends and insights of these PULSE applications from the study.

**With a large farming population still dependent on human or animal power, market potential for PULSE appliances in SSA is high. However, most technologies are not yet mature except for solar irrigation.**

- » There is a demand at scale for PULSE. About 90% of land in SSA is farmed by human or animal power. Only 15% of irrigable land is irrigated in Côte d'Ivoire, 50% of milk is spoiled in Kenya's informal markets and 50% of maize is threshed manually in Zimbabwe. (14,34,39)
- » As of 2018, the addressable market for PULSE appliances is estimated to be US\$ 11 billion today in SSA. However, the serviceable market is only US\$ 734 million, taking into consideration the affordability challenge. (20)
- » Solar water pump is ready to scale. Among the US\$ 734 million serviceable market in SSA in 2018, solar irrigation made up 62%, cooling and refrigeration 26% and agro-processing 12%. (20)
- » In SSA, 700,000 farming households have demand for solar water pumps in 2018. It has the potential to reach 2.8 million by 2030. In the second half of 2018, only about 5,000 units were sold. (21,22)
- » Solar cooling and refrigeration, although contributing to more than half of PULSE applications' addressable market of US\$ 11 billion, has a serviceable market of barely US\$ 191 million because of poor utilization and affordability challenge. (22)
- » Solar agro-processing is least ready for scale, with the potential to serve 54,000 smallholder farmers in SSA. Milling and threshing put high pressure on solar systems and is often not competitive with diesel units. (16)

**PULSE applications often favor larger, commercial farmers because smallholder farmers are limited by the ability to pay for the upfront costs, low appliance utilization and access to market to ensure product uptake.**

- » Although yield uplifts can be as high as 2.5- to 3.2-fold, solar water pumps' capital cost is still more than 60% higher than their diesel-powered counterparts, which makes them inaccessible for many farmers. Currently, over 65% of solar irrigation is utilized by commercial farms. (33,35)
- » Solar cold chain's economic viability is dependent on its utilization. Only milk farmers who produce more than 15 liters/day in Kenya or 7.5 liters/day in Zimbabwe can benefit from solar milk chilling. (36)
- » Agro-processing activities put high pressure on PV-based systems and are rarely proven as commercially viable. Solar grinders, for example, are twice as expensive as diesel ones and their costs increase every third year due to component replacements. (38,40)
- » In Kenya, highly-utilized (85%+) solar mills can break even with diesel mills after 2 years. This means that solar mills need to be located where population density is high. (38) Côte d'Ivoire has high demand for rice mills. However, solar hullers have 70% less capacity than diesel ones but cost 6 times more. (39)

**US\$ 11 BN**

ADDRESSABLE PULSE MARKET  
IN SSA

**US\$ 734 MN**

SERVICEABLE PULSE  
MARKET IN SSA

**700,000**

FARMERS WITH DEMAND FOR  
SOLAR IRRIGATION IN SSA

### Join the conversation:

powerforall.org  
twitter.com/power4all2025  
facebook.com/pwr4all

---

# POWER FOR ALL RESEARCH SUMMARY

## Productive use leveraging solar energy is the next frontier of energy market

---

### By the Numbers:

# US\$ 11 BN

ADDRESSABLE PULSE MARKET  
IN SSA

# US\$ 734 MN

SERVICEABLE PULSE  
MARKET IN SSA

# 700,000

FARMERS WITH DEMAND FOR  
SOLAR IRRIGATION IN SSA

**Energy access and agricultural actors must work together to realize full PULSE market potential, leveraging appliance cost decline and growing consumer ability to pay.**

- » Energy access and agricultural actors working together can break down market barriers that both sectors share, such as consumer financing, last-mile distribution, access to market intelligence, etc. (43,44)
- » Governments can support the synergy between energy access and agriculture by incorporating PULSE into electrification and agricultural transformation strategies. (42)
- » The serviceable market for solar water pump may grow by 12.3% annually, solar cooling 17.4% and solar agro-processing 13.9%, considering product cost decline and growing consumer ability to pay. (21,22,24)
- » A 40% drop in price can make solar milk chillers economically viable at year 2 for smallholder farmers in Kenya who produce 10 liters per day, and for solar grinder in Côte d'Ivoire to achieve 2-year payback at 50% utilization rate. (36,37,39)
- » Entrants of large multinational companies such as Lorentz and Embraco signals high potential of PULSE and can potentially drive down cost due to their economies of scale. (29)

### Share the Message

- » PULSE is the next frontier of energy market, with solar irrigation already at the tipping point of scale and solar cooling and agro-processing emerging.
- » Energy access and agricultural practitioners must not work in silos, as the two sectors serve similar customers and share similar challenges of finance and distribution.

---

#### Sources:

1. "The Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa." Lighting Global. October 2019