



Energising agriculture value chains for sustainable business in remote areas

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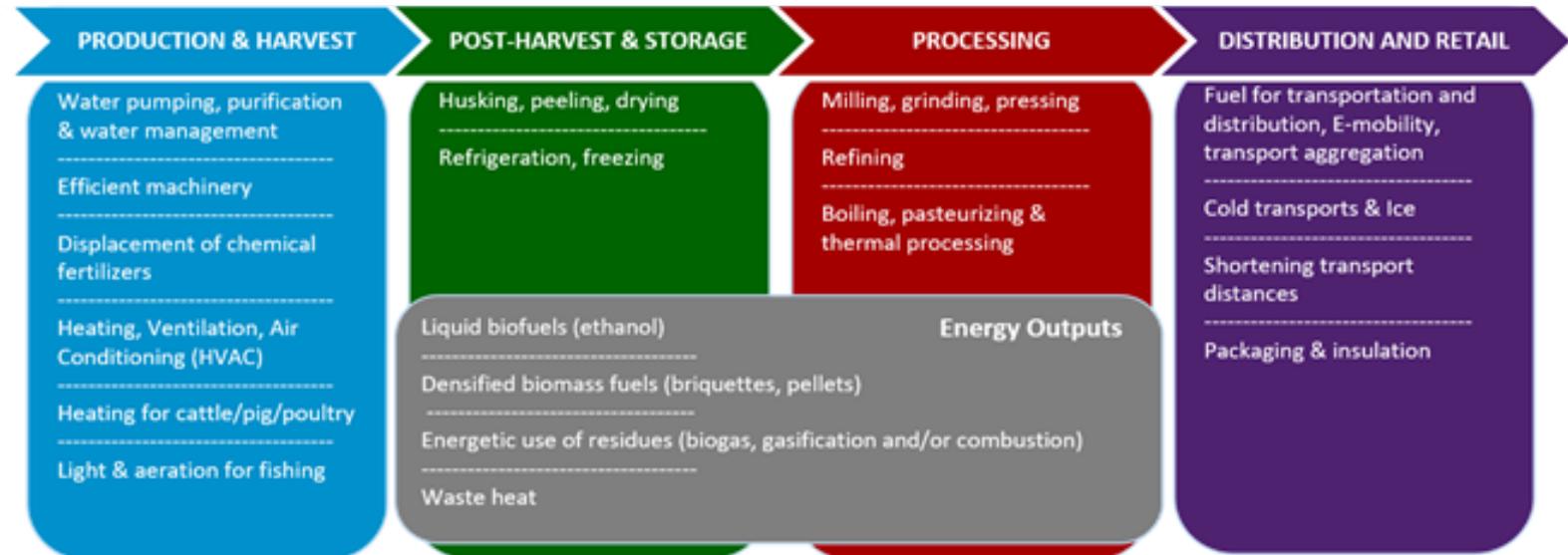
COP24, December 2018



WHY the Need to Link Energy with Agriculture?

- Energy is a *service* - a means to an end
- *Affordability* is a critical barrier to energy access
- *Productive use* of renewable energy is key to sustainability
- *Farmers* are the main source of such productivity in agriculture value chains
- *Resource-efficient agriculture value chains* are critical for climate change targets in developing countries
- Farmers need to *know more* for their motivation and ownership
- Close *integration* with energy and water is needed for the best efficiency

Energy-Agriculture Nexus Opportunities & Approach



Energy-Agriculture Nexus Opportunities & Approach

Approach / Intervention Focus for Energy Solutions in Agriculture

Triggering demand: Raising the awareness of agricultural businesses at the local level regarding the cost-benefit of improved energy applications.

Building capacity: Developing skills and services for agricultural businesses that help to use energy more efficiently while reducing food losses.

Facilitating supply: Developing markets for efficient equipment to generate clean energy for productive uses.

Brokering finance: Tailoring capacity and business development services, impact investment, relationship brokering and technical advisory support.

Enabling environment: providing advisory services and capacity building to governments, facilitating appropriate policy and regulatory frameworks.

PRODUCTION & HARVEST

Water pumping, purification
& water management

Efficient machinery

Displacement of chemical
fertilizers

Heating, Ventilation, Air
Conditioning (HVAC)

Heating for cattle/pig/poultry

Light & aeration for fishing

POST-HARVEST & STORAGE

Husking, peeling, drying

Refrigeration, freezing

Liquid biofuels (ethanol)

Densified biomass fuels (briquettes, pellets)

Energetic use of residues (biogas, gasification and/or combustion)

Waste heat

PROCESSING

Milling, grinding, pressing

Refining

Boiling, pasteurizing &
thermal processing

Energy Outputs

DISTRIBUTION AND RETAIL

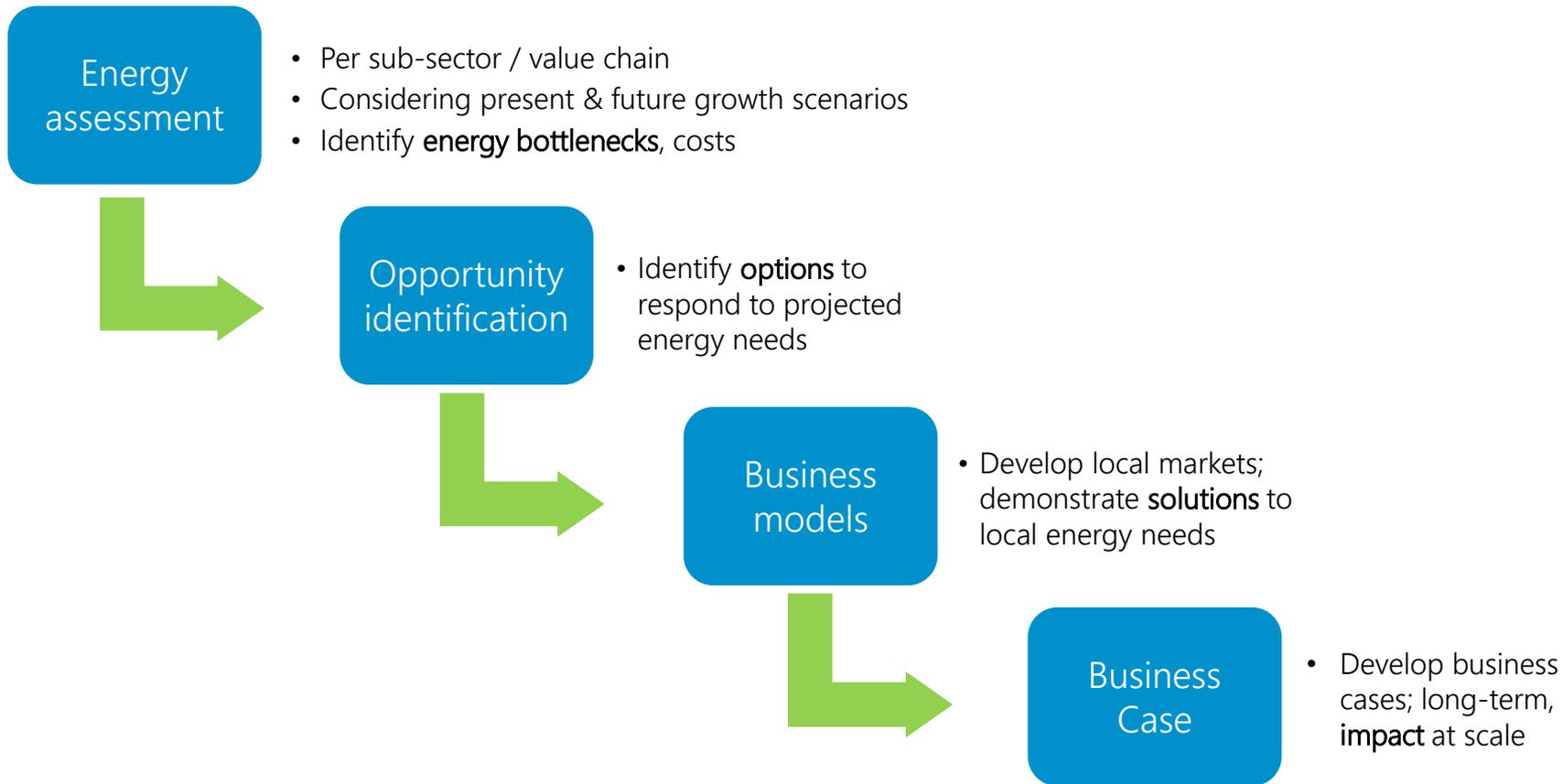
Fuel for transportation and
distribution, E-mobility,
transport aggregation

Cold transports & Ice

Shortening transport
distances

Packaging & insulation

Energy-Agriculture Nexus: Areas of Engagement



HOW to Link Energy with Agriculture?

- SNV *experience at the community level* in Africa e.g. solar for irrigation
- Critical factors:
 - 1) Effective *local engagement* with farmers
 - 2) Good understanding of *affordability*
- *Demonstrate* a financially viable business model (hence sustainability)
- Clean & efficient energy supply *improves agricultural output*
- Must reflect the availability of *local energy sources*

Local engagement is critical to acceptance, motivation and success

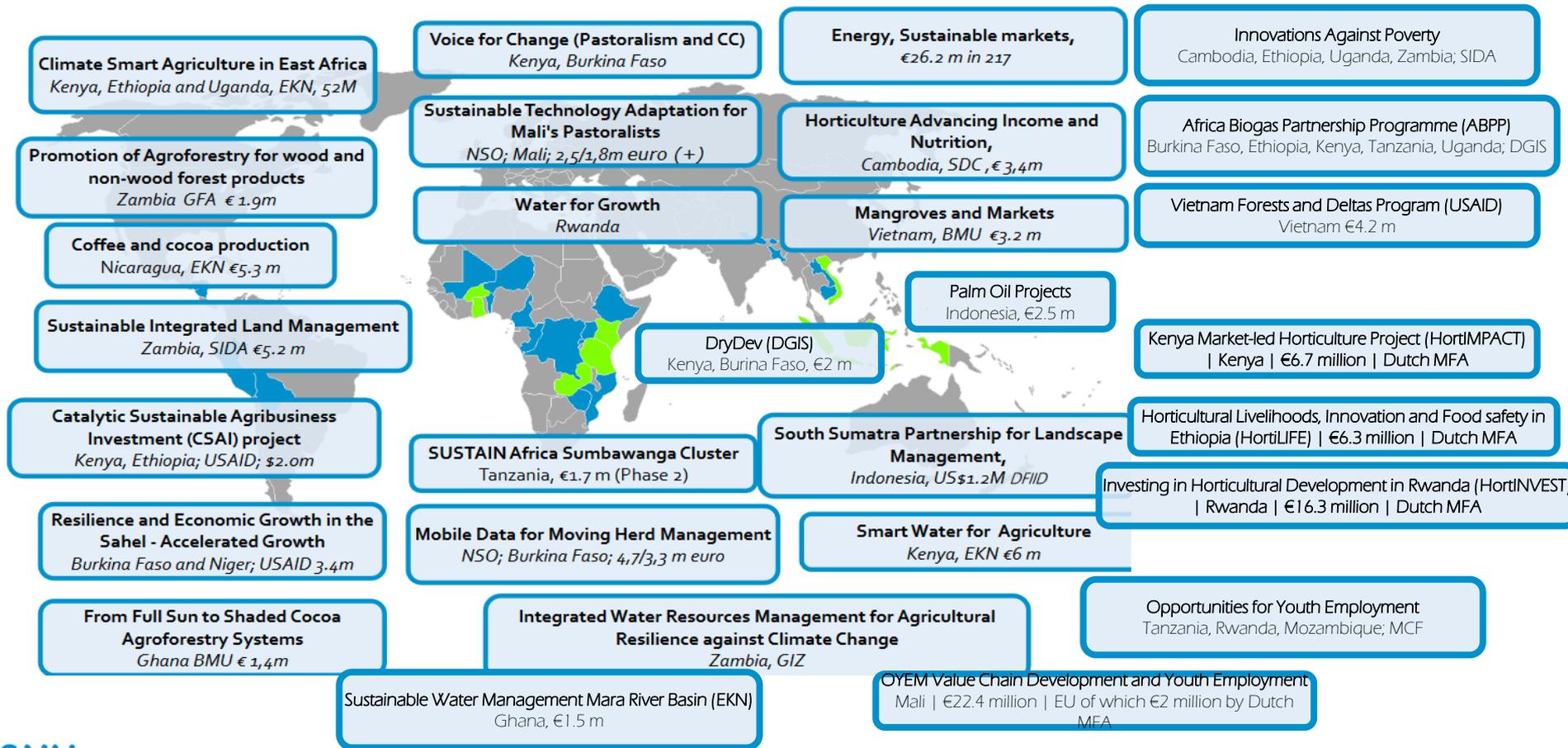


SNV

Thank you!

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Building on existing SNV track-record





SNV

CSA EA:
Potential Business
Cases

SolarNow / FuturePump



- Country of operations: Uganda (founded from The Netherlands)
- Products/Services: PAYG solar systems, water pumping, irrigation
- Solar household systems, as well as 1kwp solar systems, advertised for schools, small businesses and health facilities
- As a farming solution they offer a 80W irrigation pump (FuturePump, Sunflower)



#FuturepumpTour



#FuturepumpTour

Uganda

Pop: 41.49 million (2016) World Bank

Language: English, Swahili & Luganda

Capital: Kampala



Futurepump Distributor:
SolarNow



There are around 2.5 million
smallholding farms in Uganda



Agriculture employs over 70%
of the population in Uganda

Smallholder Farmers

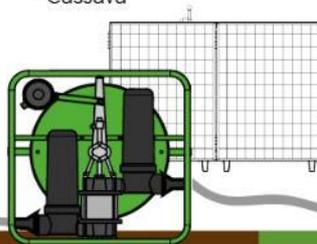
Smallholders are the backbone of Uganda,
providing not only export crops but subsistence
foods for the majority of the population.

Popular crops includes:

- Coffee
- Plantains
- Cassava

Smallholder farmers
make up over 80% of
the farming community
in Uganda.

Did you know... Uganda
has enough arable land to
produce food for
200 million people?



Our Distributor



Branches: 45

Founded: 2011

www.solarnow.eu

'We're committed to addressing the huge
unmet market need for energy in East
Africa as an organisation focused on
quality.'

For us, quality isn't just about products.
It's about trust and relationships.'

- SolarNow



SimuSolar / SunCulture



- Country: Tanzania
- Year Incorporated: 2014
- Products/Services: solar equipment for smallholder farmers and fisheries
- Website: <http://www.simusolar.com>
- Distributor of high-quality, affordable clean energy solutions for off-grid homes and businesses in Sub-Saharan Africa, starting in Tanzania. Including financial services (PAYG).
- Mobile payment enabled purchase of plug-and-play systems, such as **fishing lights, solar irrigation and efficient borehole pumps** from various suppliers. SimuSolar finances purchases applies a remote monitoring systems and provides after sales services proactively through agent-hubs.
- SunCulture solar irrigation pumps (120Wp - 1.5kwp) with a 2 year payback plan (PAYG)



RafikiPower

- **Country:** Tanzania
- **Year Incorporated:** 2013
- **Products/Services:** develop, own and operate mini-grids; including productive use options (water pumping, irrigation)
- Partners include **Inspirafarms** <http://www.inspirafarms.com/> (turn-key **refrigerated storage solutions**), **MobiSol** and **PowerProviders**, with track record for water supply systems (household and irrigation) between 5kw and 80kw
- To date, Rafiki Power has successfully installed and are operating eight mini-grids (solar PV and battery) in Tanzania, connecting more than 950 households and businesses.
- Acting as a rural utility company, Rafiki Power builds decentralized, smart, container-based solar PV and battery energy solutions for regions where basic services such as electricity, running water, lighting and cooling are non-existent.



The proposed project will create benefits for both Rafiki Power and the local communities



PROJECT COST	
CAPEX	
Drilling	10%
Hardware	60%
Installation works	15%
Software integration	5%
Project management	10%



BENEFITS FOR RAFIKI POWER

- **More balanced load profile** with stable pump usage
- **Higher revenue** due to income growth in communities
- **Better management of remote assets** through AMMP
- **Explore a new business model** with the water-energy-agriculture nexus

BENEFITS FOR COMMUNITIES

- **Reduce cost of living** with cheaper water supply
- **Improve health** with clean and safe drinking water
- **Improve harvest and therefore cash in-flow** due to more available water for farming
- **Encourage income growth** by bringing other value-added services to use water for better farming practices

- **Country:** Agsol is registered in Australia, and has operational bases in China, Papua New Guinea, and Kenya. Focus on expansion in **Uganda, Kenya, Tanzania**
- **Products/Services:** solar powered agro-processing
- **Website:** <https://agsol.com/products/>
- **New Machine:** Multiple Crops, Multiple Functions, Modular, Stackable
 - **UNIVERSAL GRAIN MILL:** Flour production from cereal grains and dried tubers – 50 -100 kg/hr. Interchangeable milling heads for the right job – hammer mill, pin mill, disk mill, flaking mill.
 - **MULTI-FUNCTION SHAFT / SCREW / AUGER MILL:** Rice mill, oil expeller, mincer, pelletiser. Reduction screw with interchangeable screens and exit gates for different feedstocks and requirements
- **Flour mill:** 500-1000Wp for 150-300kg/day lower is possible
- Prices in the range of 1000USD retail, 650USD for distributors
- Agsol's solar powered agro-processing machines pay for a meaningfully scaled solar system faster than anything else on the market – typically less than 2 years. PayGo
- The **power platform** is an adaptable power unit that can run multiple machines and devices. At the heart of the Platform is the Smart Solar control Box. It comes with high amp 24V outlets that can power milling machines, clean water supply, small businesses or a nano grid. It also has low amp 12V outputs for lights, phone chargers and small appliances.



Village Industrial Power

- **Country:** Kenya, Tanzania
- **Products/Services:** Village Industrial Power (VIP) Systems, on biomass energy.
- **Website:** <http://villageindustrialpower.com/>
- Designed the 3c generation of the VIP technology to be installed in **Kenya, India, Tanzania and Benin**. The project resulted in the field testing of five beta prototype steam-driven micro combined heat and power units capable of producing **7.5 kW of electricity and 40 kW of thermal energy for agro-processing facilities** and residential and commercial end-users.
- In 2017, with funding from Shell Foundation, VIP ran **6 pilots in Kenya in the fruit and vegetable and maize drying sectors** and was able to validate the value proposition, increasing farmers' incomes by up to 7 times, and the business model for the farmers based on a lease to own model. Three VIP units are currently installed in Kenya with two under contract for sales.
- VIP's mobile power plant unit is robust, reliable, and on demand, enabling farmers to process their own crops and participate directly in the value chain.



HUSK Power

- **Country:** Tanzania
- **Year Incorporated:**
- **Products/Services:** develop, build, own and operate biomass Mini-Grids (20-250kW) and distribution networks in Tanzania, also sells household and commercial appliances, such as TVs and freezers to biomass gasification systems to power Ag-processing units.
- **Website:** <http://www.huskpowersystems.com/what-we-do/>
- Sells its proprietary **gasification plants and maintenance services to agro-processing units** like rice mills to help them reduce diesel consumption by up to 60%. Grid compatible AC power and actively promote and sell highly efficient appliances like TV, ceiling fans, refrigerators and freezers etc.
- Husk (India) also sells SHS to customers who are not on its mini-grid network.
- Husk developed a proprietary method to convert waste of gasification, rice husk char, to incense sticks and employs women to manufacture these.
- Generators around 32Kw, can run for 6-8 hours per day and use 50kg of rice husk or corn cobs
- Claims: We are the only company with 100% renewable, 24/7 and 365 days powered mini-grids in operation in Tanzania (solar/biomass hybrid)
- Interested to work on biomass densification, captive solutions for processors and household energy



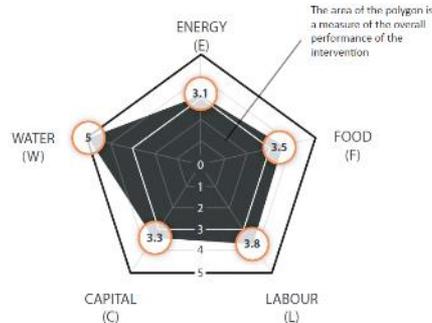
Pamoja Clean Tech-2434UG - A Nexus Solution



Company and partners

- Registered in Uganda in 2013 producing **mini grid electricity from biomass fuel** in off grid areas.
- Currently in partnership with Lythan Investments Ltd (and Uganda industrial research institute) for **grain drying, storage and processing services**.
- Supporting local farmers through training in sustainable farming practices, use of **biochar fertilizer, access to affordable irrigation technology, and post-harvest handling services**.

- Already operating two micro-grids in Uganda and distributing **electricity to 220 customers**.
- Currently implementing a biomass based mini-grid in Bukurungo village, Kamwenge district, western Uganda. Will supply electricity to a large trading center of 610 households and an Agro-processing Hub. The biomass gasification system will be **initially of 75kW and will be scaled up to 200kW** after the demand increases.



Innovation

- First company in Uganda for producing electricity from biomass (75kw)
- Entrepreneurial hub model is new concept-promoting productive use of electricity
- Integrates multiple payGo-enabled PU applications



Social and environmental impact

- 88 new jobs created for LIP
- 3283 LIP with increased income
- 32000 LIP with access to BGAS



Commercial impact

- EUR 78,787 generated in revenue from sales of electricity and related services.
- EUR 25,398 in profits after tax
- NPV \$51,111.06 (discount rate 7%)
- IRR 20%



Funding

- IAP : 120,000 € 31%
- Company: 135,200 € 35%
- Others: 131,300 € 34%
- (Other Non Private: 33,800 € (?))



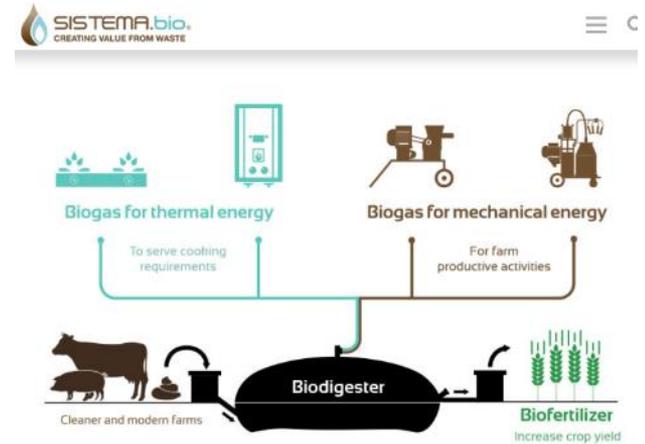
Key Interventions/actions

- Design of enterprise incubation program
- Training and contracting local entrepreneurs
- Set up revolving fund for PAYG elect
- Construction of grain processing facility



Biobolsa

- **Country:** Kenya
- **Products/Services:** Biogas plants and appliances, incl. cooling technology
- Time of milk cooling: 2.5 hours/ 150 litre. The equipment has a capacity of 300 litre, this taking as premise that the farms milks twice and the milk is cooled twice a day.
- Biobolsa's system uses biogas to power a 4-piece milking system with a capacity of 50 cows in two hours.
- Cooling system installed within the framework of the SNV-implemented biogas programme in Nicaragua. Also partner of ABPP (Kenya).

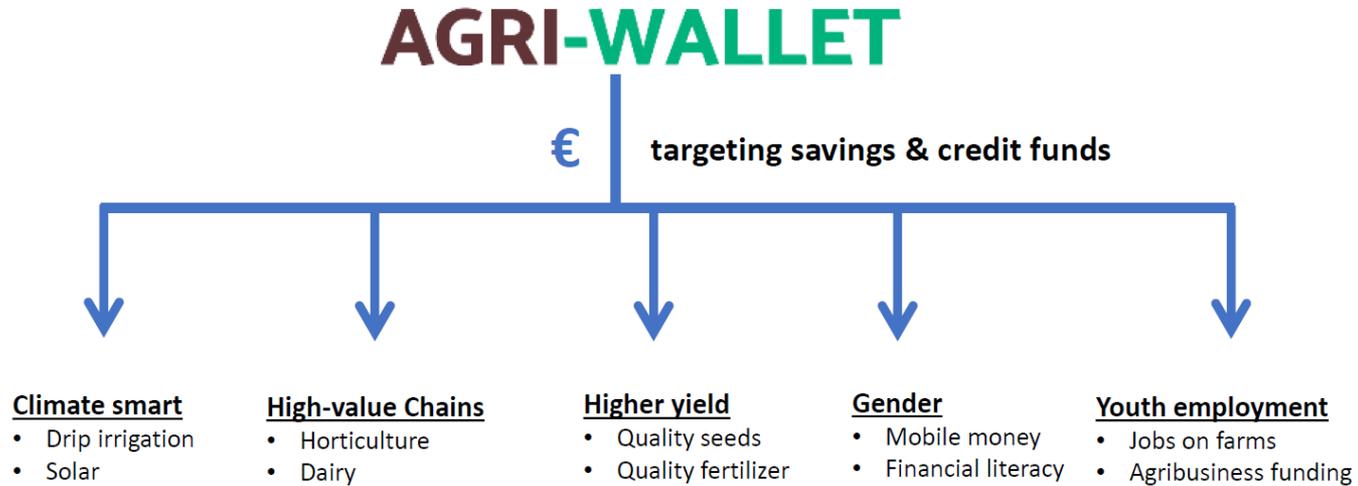


Agriwallet

- Hortimpact Kenya works with Agriwallet who uses blockchain for digital payment to farmers and mobile savings.
- App for mobile savings, uses SMS and enables households to save on their phone. HH can make savings and get payments channelled as tokens which can be only used for a certain purpose ie agri-inputs.
- To start **savings-for-purpose digitally** is a very good step to **reducing risk and improve credit rating for mini-financing options** of value chains; including solar powered irrigation and other solutions.



AGRI-WALLET



JUMEME

- **Country:** Tanzania
- **Year Incorporated:** 2014
- **Products/Services:** develop, build, own and operate solar-powered mini-grids in rural areas; powering processing facilities for staple foods

- A **hybrid power** station in Bwisya features solar power and a bank of batteries to support 250 customers. By the end of 2016, all the villages on Ukara will be connected to this mini-grid. Customers pay the installation charges in installments and pre-pay for power.
- **Milling machines connected grind their staple foods of cassava and maize**, new carpentry equipment, business coaching from GVEP and a loan scheme offered to entrepreneurs by JUMEME.
- Jumeme in the lake region of northern Tanzania is milling imported maize to produce flour for sale to the local community, and using freezers to make ice for preservation of fish, both for local fishermen and to support their own tilapia fishing business

- **Some other leads in the same space:** PowerGen, TTA, Husk Power, ENGIE's Power Corner initiative; AnZA; SolarSisters; TWENDE

