ENERGY- AGRICULTURE NEXUS

FOR

RURAL ECONOMIC DEVELOPMENT

WORKSHOP

NOV 2019

THE RURAL ELECTRIFICATION AGENCY

Mandate

The mandate of REA is to catalyse the off-grid market to increase electricity access to rural and underserved communities through public & private sector engagement and participation.

MISSION

The Mission is to provide access to **reliable electric power supply** for rural dwellers irrespective of where they live and what they do, in a way that would allow a reasonable return on investment through appropriate tariff that is economically responsive and supportive of the average rural customer.

The role of Key Maker Model (KMM).
Key perspective in facilitating and operationalize
energy / Agric through Demand Assessment / Stimulation strategies for rural economic development in Nigeria.

PROBLEM

1. ***Over 80 Million Nigerians (Rural Areas) lack access to electricity , they rely heavily on firewood's and other source for electricity***

2. ***Lack of access to Clean, reliable & Affordable Energy***

GOAL

To have access to CLEAN, RELIABLE, AFFORDABLE ENERGY which meet the Sustainable Development Goals

Productive Use of Energy

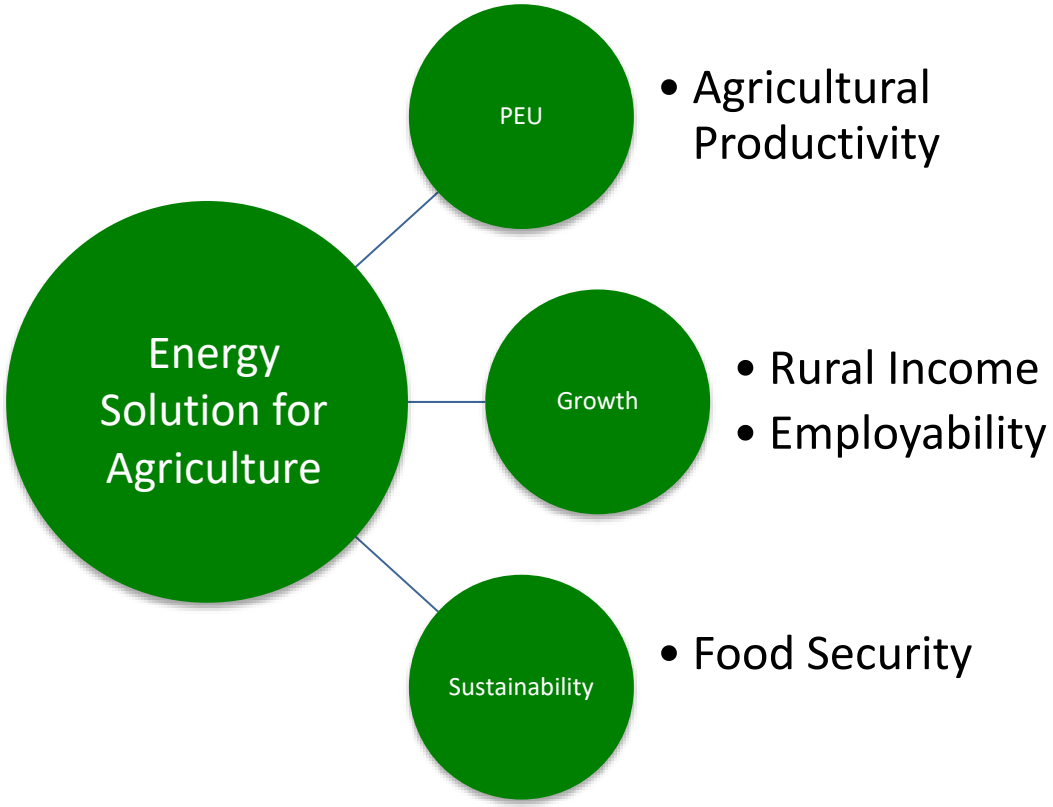
`is defined as "*directly increase incomes or add value to goods and services such as power for milling machine*"

Smallholder Energy Needs

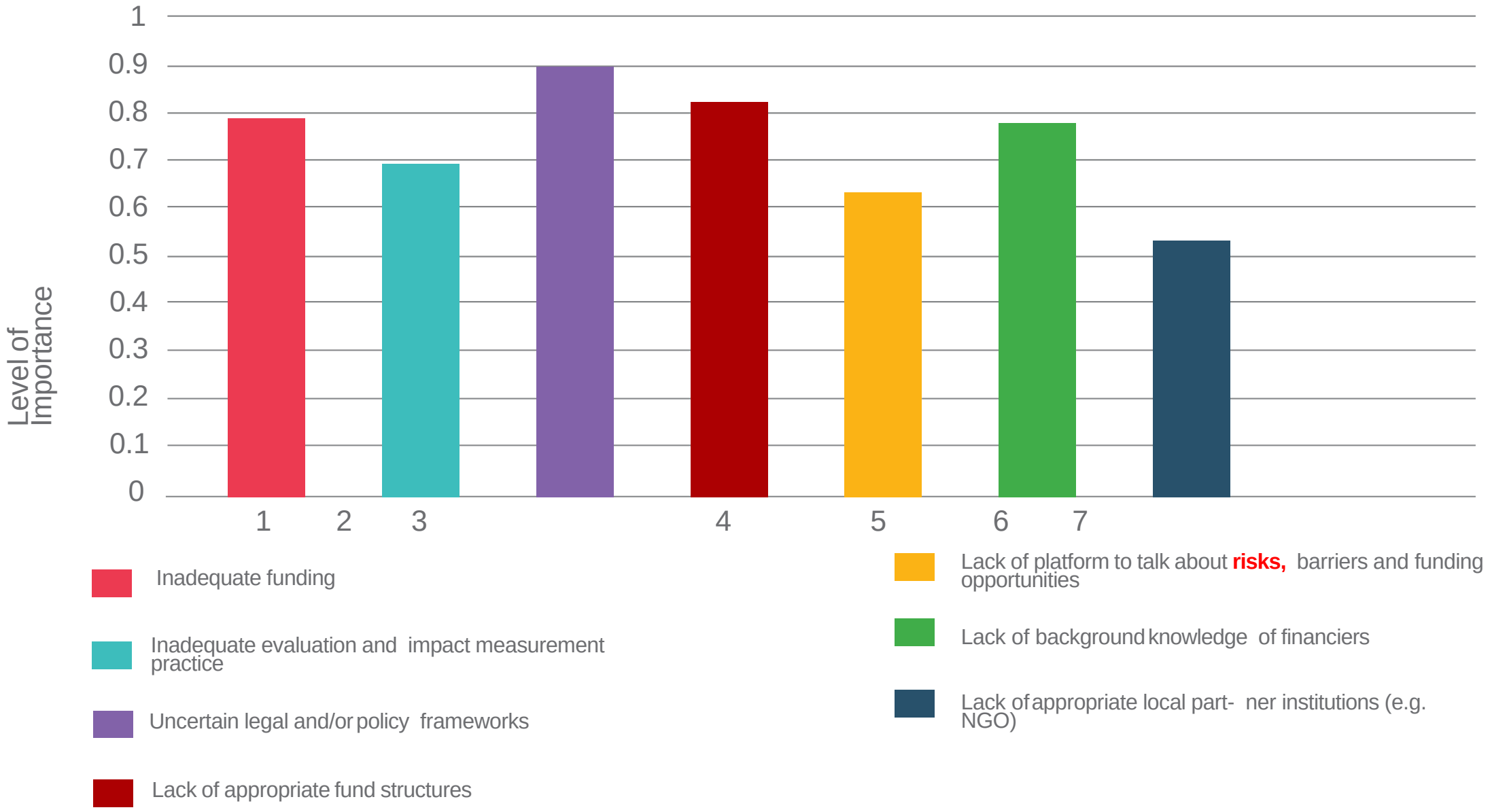
Quantifying the energy access gap in smallholder-based food systems is challenging, as energy sources and uses are diverse among the millions of small farms, rural enterprises and communities.

About 10-20% of grains are lost after harvest, accounting for about US$4bn. Key causes are lack of appropriate storage, processing, and cooling equipment.

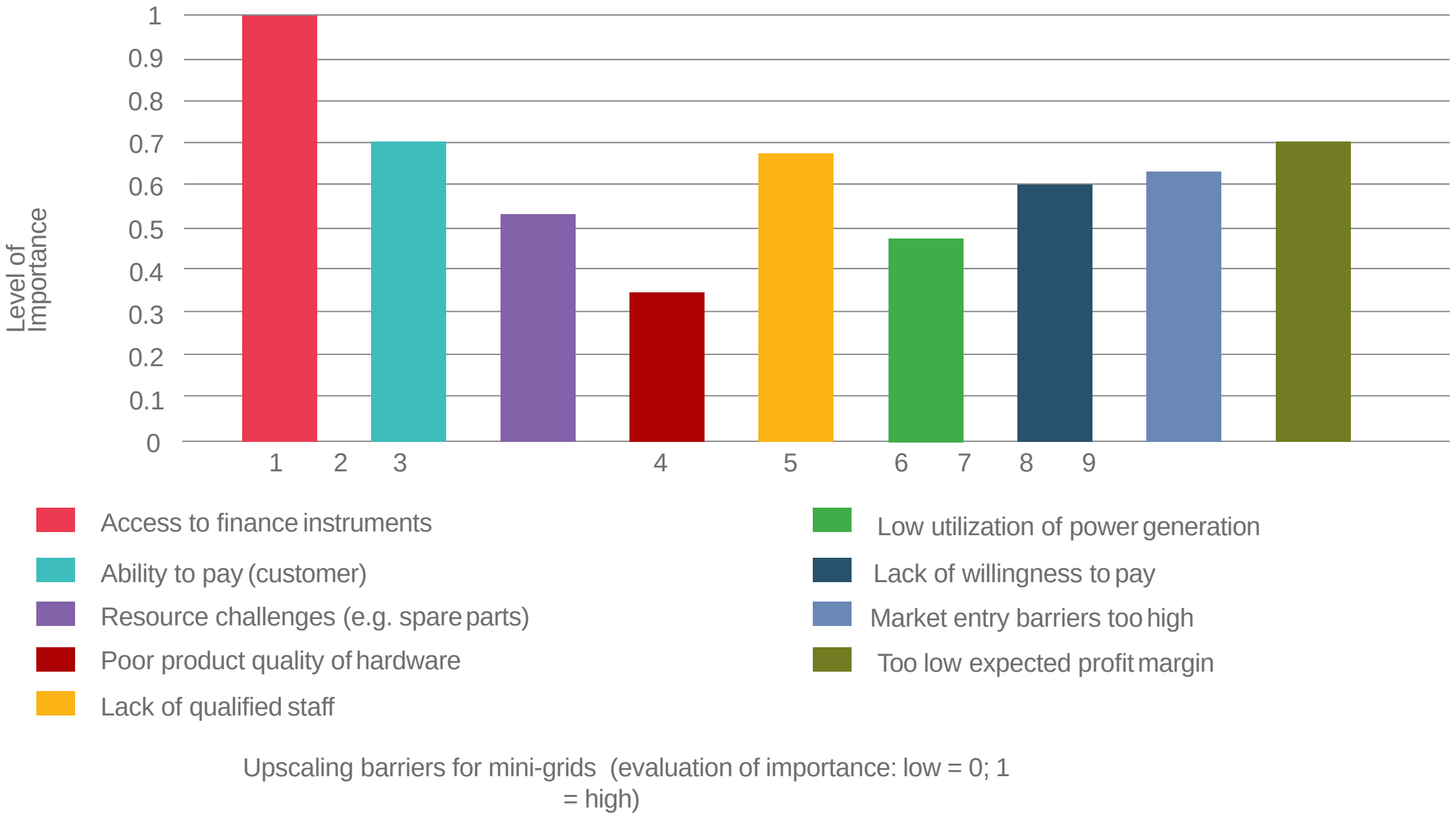
RURAL ECONOMIC DEVELOPMENT



A clean efficiency Energy in the Agriculture and Agro Value chain will stimulate increase in productivity, improve rural incomes, food security, create new businesses and jobs which will stimulate the Rural Economic Development



Common barriers and challenges of mini-grid operations (evaluation of importance: low = 0; 1 = high)


Level of Importance
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
2
3
4
5
6
7
8
9
Access to finance instruments
Ability to pay (customer)
Resource challenges (e.g. spare parts)
Poor product quality of hardware
Lack of qualified staff
Low utilization of power generation
Lack of willingness to pay
Market entry barriers too high
Too low expected profit margin
Upscaling barriers for mini-grids (evaluation of importance: low = 0; 1 = high)

To achieve this Objective

- *We must have an Enabling Institutions*
- *Regulations*
- *Policies*

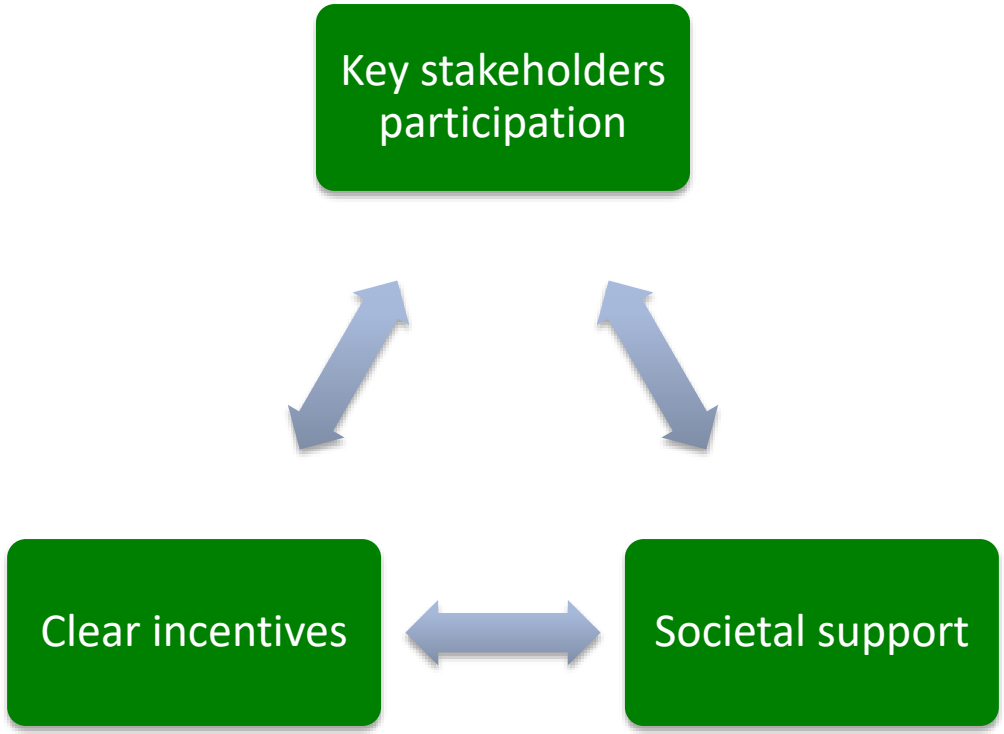
Government

To Create Conditions for functioning markets, enabling environment, economy efficiency, environmental sustainability, Social equity, correct market failures and government failures.

Promotion of Innovations and Technology to support the Renewable Energy

A clear mandate by government to ensure 30% of its energy needs are from Renewable Energy Sources and a timeline (2030) target.

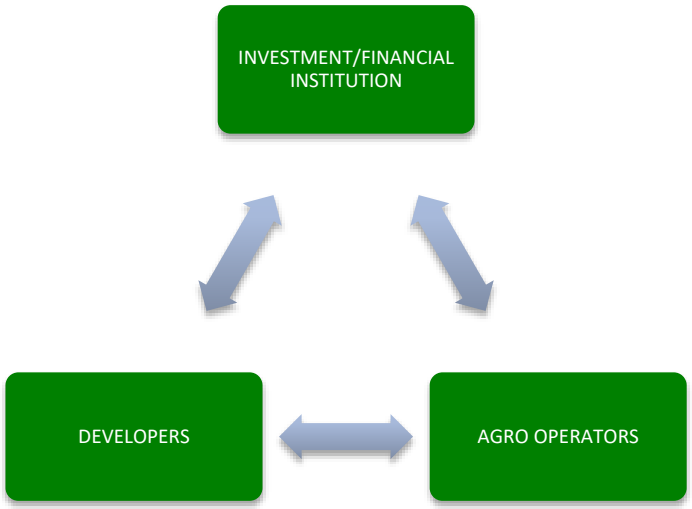
Nigeria needs to develop at least 8,000 Mini Grids if it is to meet his target. At the moment the present Mini-Grids are still having enormous challenges that if not addressed may hinder the progress done so far or meeting the target.



FINANCIAL CONSTRAINTS BY DEVELOPERS

Financial constraints or lack of credit are key determinant of long term sustainability of renewable Energy

- *High Transaction Cost*
- *Financial Capacity & Constraints*
- *Investments for Installation as well as Operations*



FINANCIAL OPPORTUNITIES

- *Private Public Partnership (PPPs)*
- *Community Business Association Partnership*
- *International and Local Development Partners*

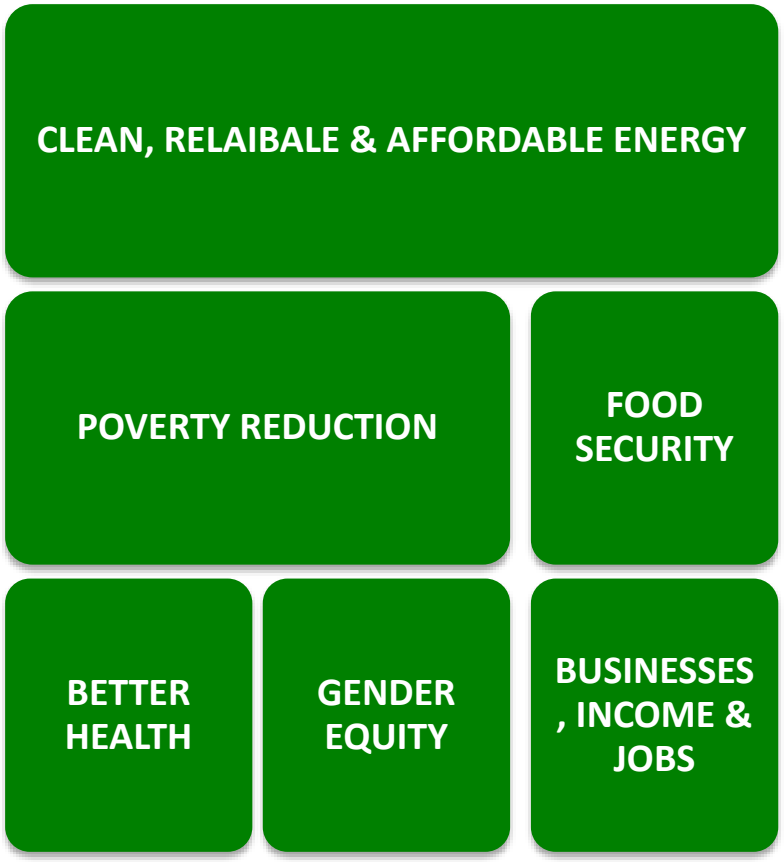
DEVELOPERS MUST BE ABLE TO HAVE TOTAL OWNERSHIP

That is the developer must be prepared to identify the value chain and a more broader value webs in operating, business and financials based on the ground research to see if the business will be viable, where to access initial funding's, how to finance operations, which technology is suitable, whether regulations provides any incentives such as soft loans, grants and tax reduction or elimination for a period of time.

- *Further conduct proper Business and Financial Planning (Business development & Social Innovations)*
- *Consider regulations & incentives*
- *To evaluate the sustainability & profitability of the project*
- *Investment planning*
- *Cost benefit Analysis*
- *Financial Analysis*

Energy and Agriculture are key and Essential Drivers to Stimulate Economic Growth

SOCIAL ECONOMIC IMPACTS

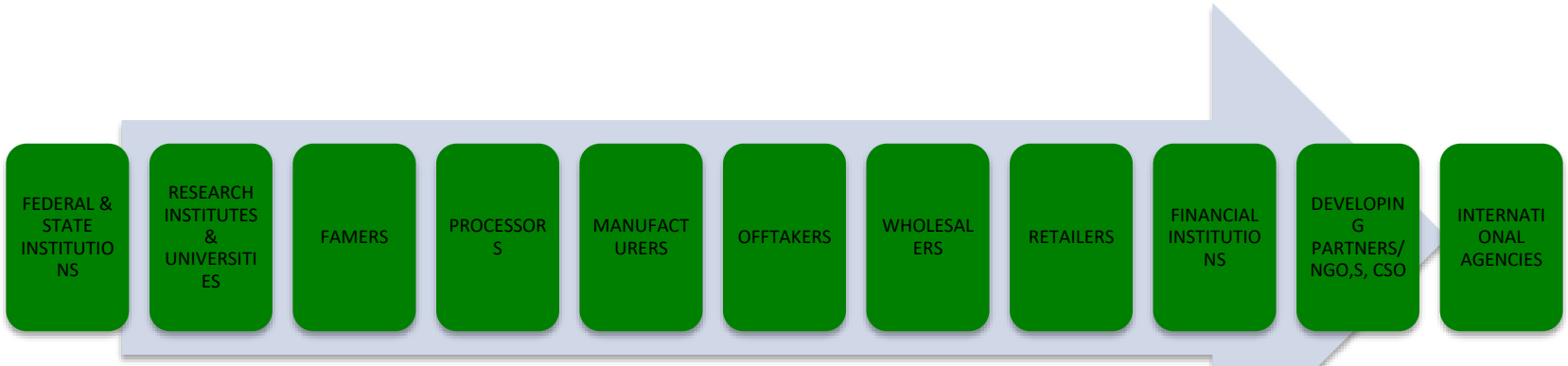


To Encourage Circular Economy to Boost Rural Economic Development

It will help to minimize resources use, promote clean technology adoptions, there is no waste and encourage recycling. Agricultural Production provides rapid opportunities to circular economy like solar energy for Irrigation water pumping or reuse of organic waste as source of energy.

Energy in Agricultural Value Chain

Agricultural Value Webs (Interconnectivity within the levels)



Renewable Energy across the Agriculture Value chain helps improv ofit opportunities, if harness properly; Irrigation, Drying crops, storage eating green houses and refrigerating in post harvest management

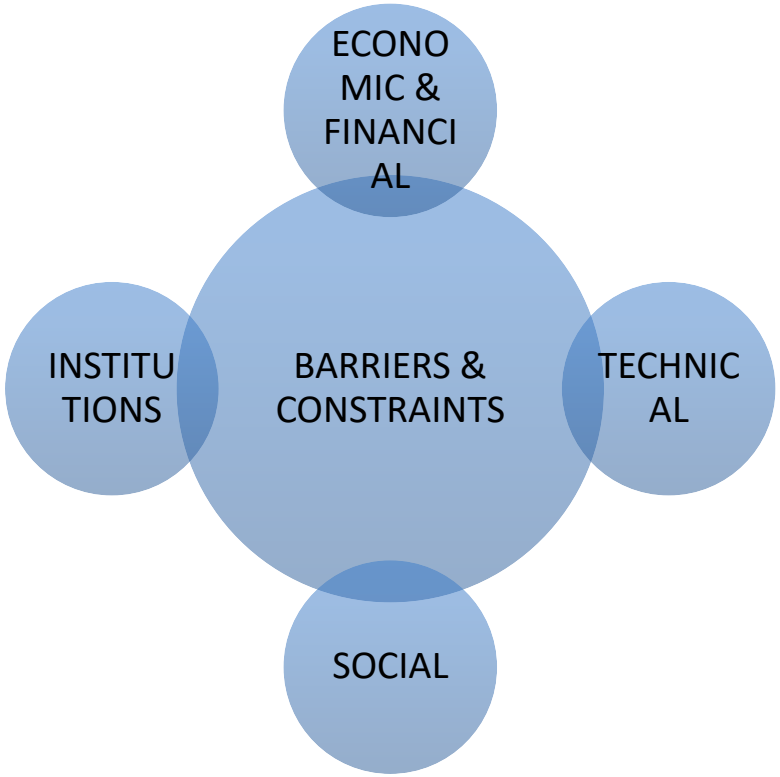
Economic Availability of Energy in Agriculture are ;

Availability of effective demand, cost competiveness, enabling regulations, access to capital, private investments or credits and technical know how

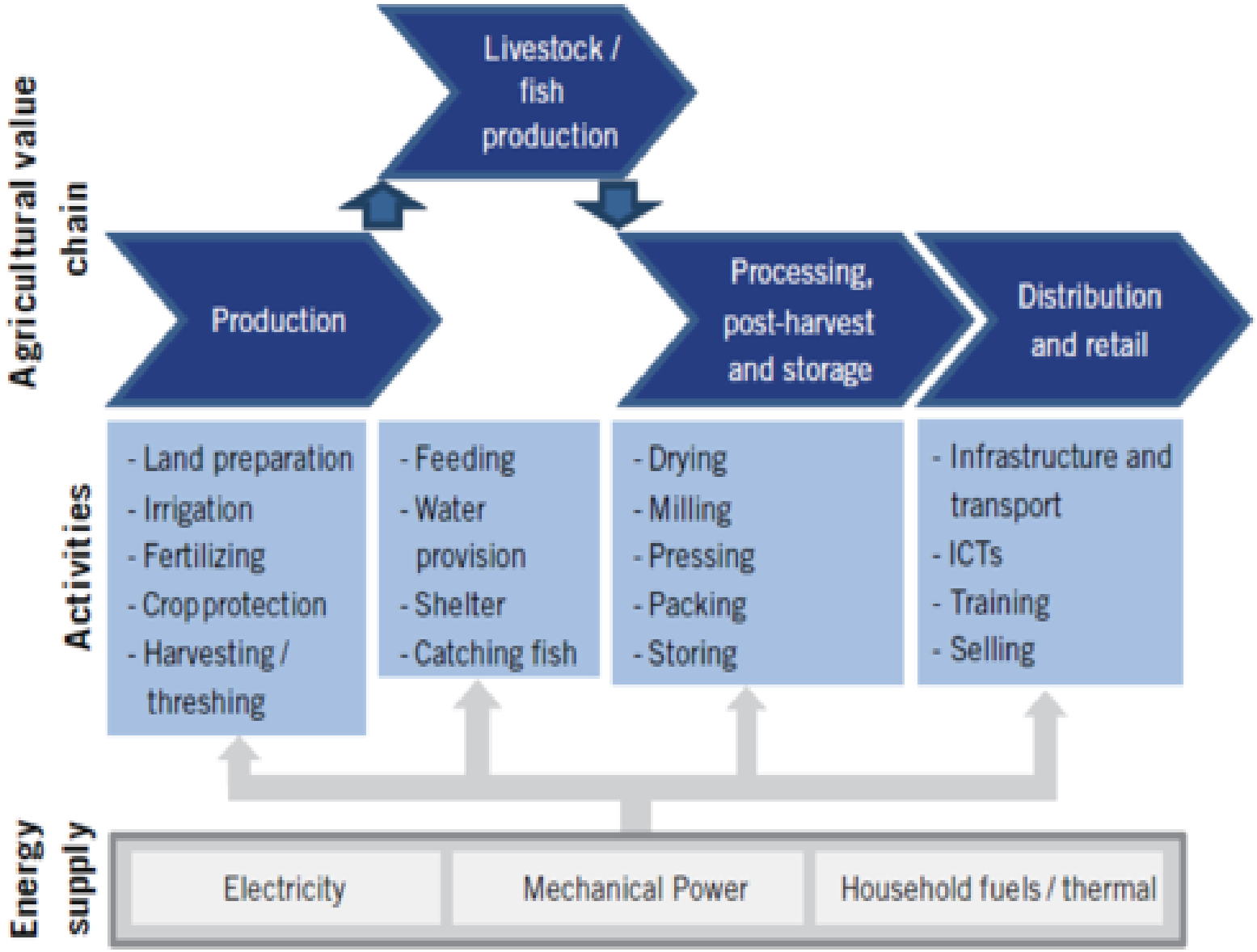
AGRO VALUE CHAIN

AGRO VALUE CHAIN	ENERGY DEPENDANCE	CAPITAL AVAILAIBILITY	MAJOR FOOD MARKETS	ENERGY INTENSISTY
• Subsistence farmers • Small family units • Small Businesses • Medium/Large corporate	• Zero/low • Low/medium • Medium/high • High	• Micro –Finance • Limited • Medium • Good	• Own Consumption • Local market/process for own use • Local/regional markets • Regional Market/Export	• LOW • LOW/HIGH • LOW/HIGH • LOW/HIGH

ECONOMIC ANALYSIS OF ENERGY IN THE AGRO VALUE CHAIN



AGRO VALUE CHAIN



Energy needs of smallholders and rural enterprises can be categorized by: energy for transport, and energy for production, processing and commercialization of goods, including diverse activities e.g. pumping water, irrigating crops, drying, while they are other energy inputs, such as indirect energy inputs (e.g. fertilizers) and household energy (e.g. for cooking).

Depending on the level of power needed and the resources available locally, different energy technologies are required:
Electrical energy: suitable for powering water pumps, milling machines, fridges;
Mechanical energy: suitable for production and processing e.g. for harvesters or tractors;
Household: suitable for different value-adding processes e.g. cooking, drying, cooling.

AGRO VALUE CHAIN

Irrigation

In Sub-Saharan Africa only 4% of land is irrigated. Irrigation would allow farmers to grow one or more crops throughout the year, decreasing farmers' vulnerability.

Processing

Key processing activities are drying, milling and pressing. Using machinery saves manual labor and increases efficiency. Drying and cooling of fruit and meat is crucial for preserving food and for meeting quality standards. There is potential for **applying energy technologies.**

Storage

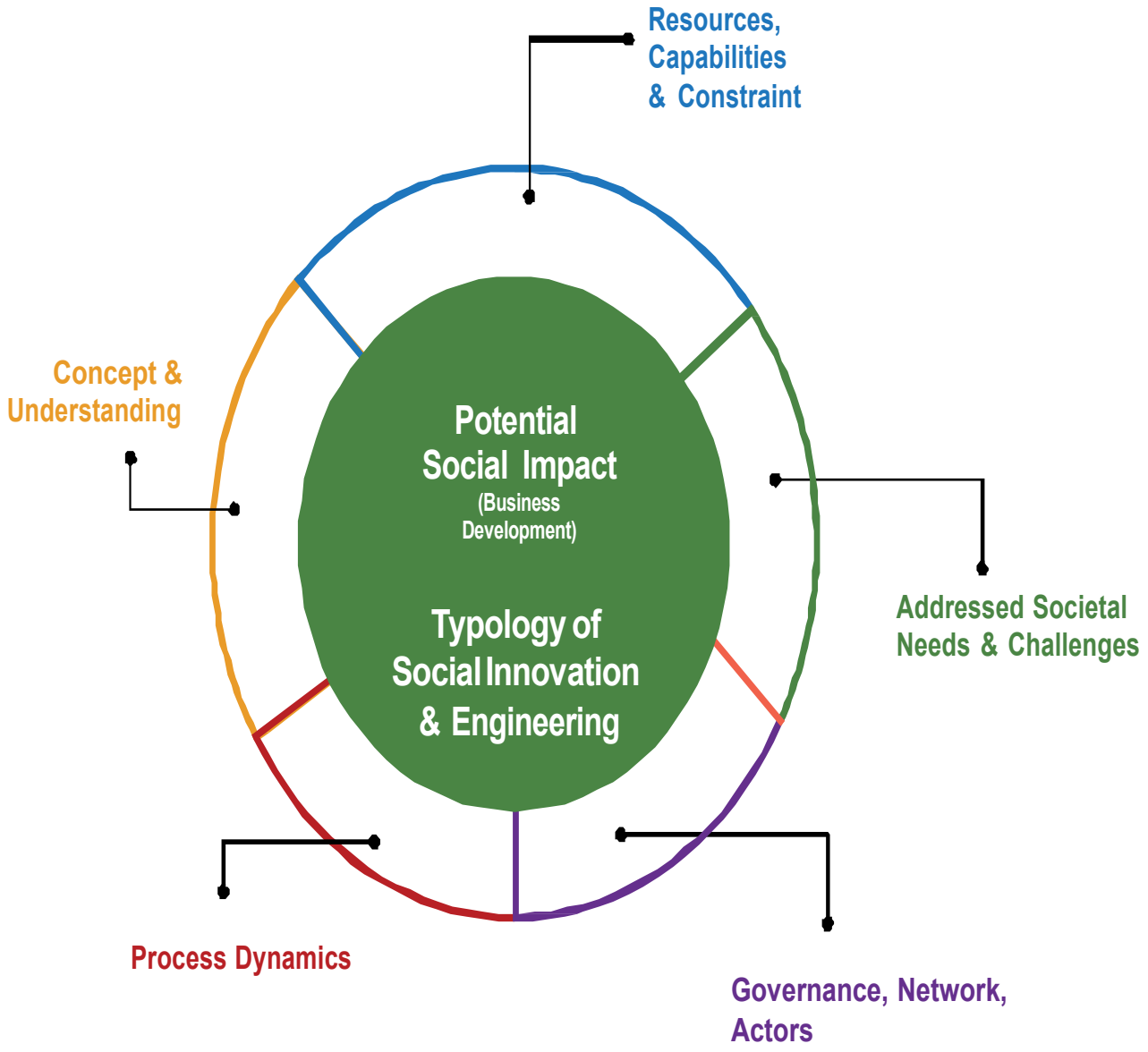
Improved storage is crucial for reducing post-harvest food losses. This includes refrigeration and **requires energy inputs**.

ECONOMIC ANALYSIS OF ENERGY PROJECTS IN THE AGRO VALUE CHAIN

- *FEASIBILITY ANALYSIS: Access the ability to complete a project successfully taking account the Social, technical, Institution and Financial & Financial constraints and barriers.*
- *COST BENEFIT ANALYSIS (CBA): Comparing the incremental costs and the benefits of the projects. Comparing the potential situation "**With**" and "**without**" the project*
- *Micro assessment of investments in Sustainable Energy Solutions*

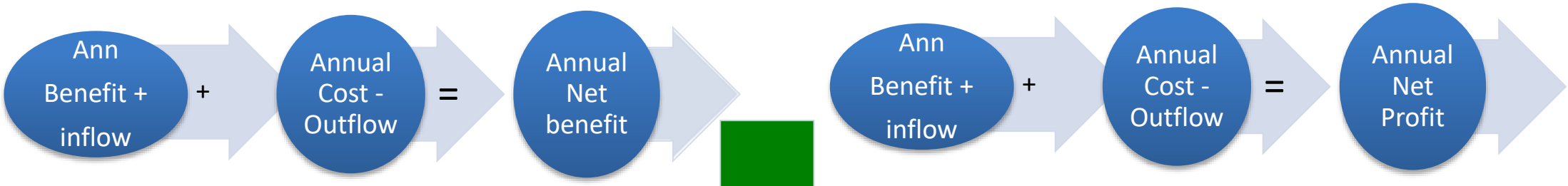
FEASIBILITY ANALYISIS

- TECHNICAL ISSUES
- ECONOMICAL ISSUES
- POLITICAL ISSUES
- ENVIRONMENTAL ISSUES



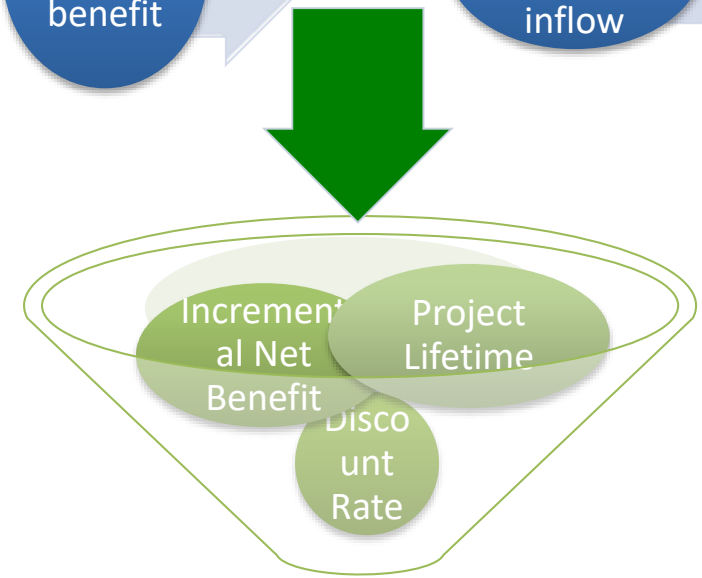
WITH = PROJECT SCENARIO

WITHOUT = BENCHMAKING SCENARIO



FINANCIAL

ECONOMIC



Profitability Indicators

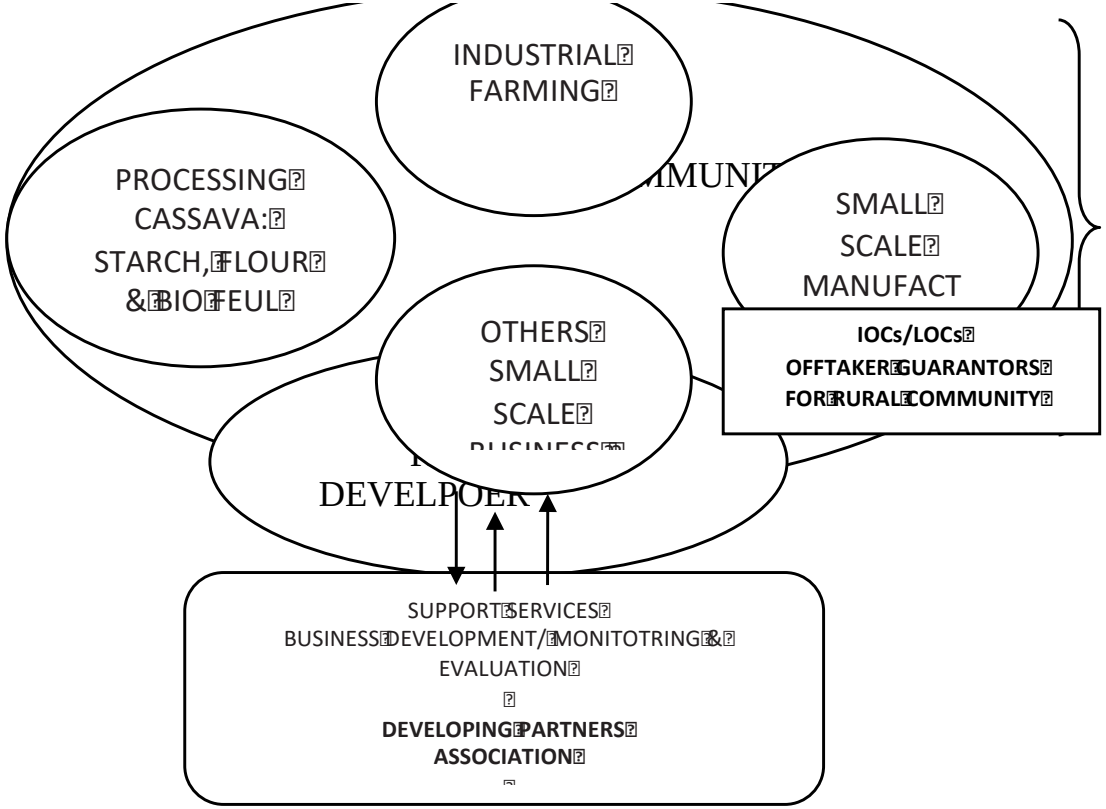
- NET PRESENT VALUE (NPV)
- INTERNAL RATE OF RETURN (IRR)
- BENEFIT COST (B/C) RATIO
- PAYBACK PERIOB (PBP)

A SUSTAINABLE RURAL ECONOMIC DEVELOPMENT SUPPORTED WITH A VALUE CHAIN BASED STRATEGY

SMALL RURAL ECONOMIC HUB

SUSTAINABLE OUTCOME OF POWER IN THE RURAL COMMUNITY

- **SUSTAINABLE PAYMENT OF ENERGY USAGE**
- **EMPLOYMENT FROM THE COMMUNITIES**
- **RURAL DEVELOPMENT**
- **OTHER INDIRECT JOB CREATION**



STAKEHOLDER

REA/REF
MIN OF AGRICULTURE
STATE GOVERNMENT
OTHER RELEVANT AGGENCIES
PRIVATE SECTOR

SUSTAINABLE OUTCOMES:

- Massive youth & women employment & economy growth in all region
- Transfer of skills
- Creating a self-sustainable value chain in agricultural sector in the region
- Energy generation for essential services
- Elevating poverty & zero hunger
- Massive Commodity exchange & trading
- Good health system & well being
- Access to better education
- Clean energy
- Kick start industrialization & infrastructure
- Sustainable local communities

Promoting a "productive use of energy"

While aforementioned data and information provide a broad overview of energy gaps and needs, aligning priorities with local settings is crucial. Interventions need to be more people-centered, "bottom-up", and need to be better tailored to local contexts - as have shown experiences from energy as well as agricultural mechanization.

This requires to specifically answer; what do people want energy for? which type of equipment is used? what can people afford? what about the capacity to run and maintain systems?

Thus, it is necessary to take a holistic view on smallholders' energy needs beyond the farm gate. Projects at the Energy-Agriculture Nexus should therefore take a demand-led approach.

1. Value chain analysis can help pinpoint energy needs and opportunities

e.g. to identify bottlenecks to productivity, or pinpoint where energy could have biggest impacts on income, what is most cost-effective etc.

2. Needs assessments should place a strong emphasis on gender

Women make up about 43% of the agricultural workforce in developing countries. They mostly have less access to productive assets than men. If this access of women would increase, the respective yields could be raised by 20-30%.

3. Needs vary hugely across different farming systems

Smallholders are a heterogeneous group, working with diverse farming systems - depending on crops, locality, context, culture and agro-ecological zones. Thus, solutions have to be selected accordingly.

4. 'Modern energy services' is not always the answer to a benefit

Farmers need to weigh up the costs and the benefits of using modern energy services. Sometimes, significant improvements can be reached through low-cost technology.

CASE STUDY 1

CASE STUDY 1

key Parameters to evaluate the Business Scalability (Can the Business **Employ more workforce, gender inclusion, Higher & increased Revenue** and **Attractive & Speed to Market , High Commodity** and **Access to finance**) indicators (1-5); **1 been low and 5 been high**.

S/N	Business	Employ	Women	High revenue	Access to finance	Access to market	High commodity	Total Ranking
1	Rice Production	5	5	5	5	5	5	30
2	Cassava Production	4	5	4	4	4	5	26
3	Pharmaceutical store	1	1	3	1	4	4	14
4	Tailoring	2	2	1	2	2	2	11
5	Barbing	2	1	1	2	2	3	11
6	Phone Charging	2	1	1	1	4	4	13
7	Cosmetics	1	1	1	1	1	1	5
8	Viewing Centre	2	1	1	1	1	4	10
9	Provision, Food stuff and Bar	1	2	1	1	1	3	9
10	Welders	1	2	1	1	1	3	9

Note: The first high score will be given priority in developing the business, however, all other businesses will be given one form of support and assistance to boost sales, which will be incurred back from their energy cost with little margin deductions.

Present

Present Commercial Overview of the Annual Revenue Incomes per business and Average Energy Costs

S/N	Business Name	Number business	Average Revenue year	Average Cost of Energy	Month in a year of operations	Tonnes (1000 kg)
1	Rice Farmers	100	18,750,000.00	NILL	6 months	62.5 ton (1250bags of 50kg)
2	Rice Mill Processors	9	8,400,000.00	3,780,000.00	12 months	62.5 tons
3	Pharmaceutical store	7	6,048,000.00	672,000.00	12months	
4	Tailoring	8	6,912,000.00	1,152,000.00	12months	
5	Barbing	12	10,368,000.00	2,304,000.00	12months	
6	Phone Charging	10	2,880,000.00	960,000.00	12months	
7	Viewing Centre	2	2,530,000.00	806,400.00	12months	
8	Provision and Bar	1	2,950,000.00	240,000.00	12months	
9	Provision and food stuff	1	1,440,000.00	366,000.00	12 Month	
10	Welder	3	4,320,000.00	3,024,000.00	12months	
	Grand Total	**155**	**64,598,000.00**	**13,304,400.00**		

Scalability of the agricultural produce (RICE)

Summary of Rice Production Financial Projection for Increased Productivity

SHORT TERM		**MEDIUM TERM** (50%) Increase		**LONG TERM** (100%) Increase	
62 -100 tons		Increased capacity tonnes to 200-300 tons		Scale up to 500-1000 tonnes	
Present Revenue	23,000,000	Expected Revenue	60,000,000	Proposed Revenue	120,000,000
Cost of Energy	3,780,000	Cost of Energy (+10%)	8,310,000	Cost of Energy	16,620,000
Energy Capacity	120kw	Future Energy Capacity	180kw	Future Energy Capacity	240kw
Employment	Over 250	Employment	Over 375	Employment	Over 500
Make it more effective and robust		Getting the State Government, Related support stakeholders, financial Institutions and medium scale Investors to support the Rice Production		Having an industrial farming and large-scale processing of Rice Production. Working with Big Offtakes,	

CASE STUDY 2

GENDER (WOMEN DRIVEN)
SOUTH(PRIIVATE BASED OPERATOR)

UPSTREAM
(Irrigation)

High Cost of Energy Annually

Revenue Income Annually

Operational Over heads Cost

Profit

MIDSTREAM
(Processing & Factory)

High Cost of Energy Annually

Revenue Income Annually

Operational Over heads Cost

Profit

DOWNSTREAM

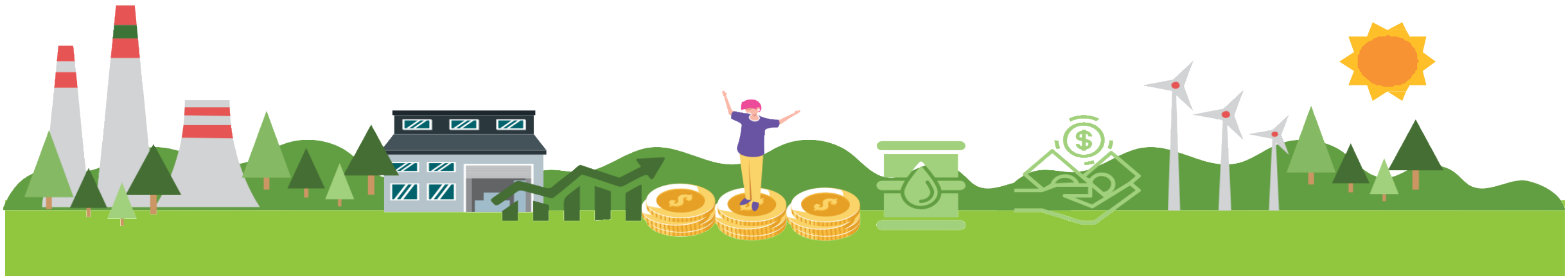
Fuel Consumption

Logistics Cost

Expenses Annually

Less Supply (High Demand)

Less Supply (High Demand)



GENDER (WOMEN DRIVEN)
NORTH (COMMUNITY BASED OPERATOR)

UPSTREAM
(Irrigation)

High Cost of Energy Annually

Revenue Income Annually

Operational Over heads Cost

MIDSTREAM
(Processing & Factory)

High Cost of Energy Annually

Revenue Income Annually

Operational Over heads Cost

DOWNSTREAM

Open Market

Less Storage

Waste

Waste

Less Supply (High Demand)

UPSTREAM

- Access to Storage
- Less Quality Seeds
- Less Quality Yields
- Capacity Building
- Less Irrigation
- Lack of Energy
- Lack of Technical Knowhow
- Lack of Quality Health Care
- Lack of Financial Inclusion

MIDSTREAM

- High Cost of Energy
- Lack of Financial Support
- Lack of Offtakers Ownership/ Cooperation towards robust Supply Chain
- Less Utilization of by-products due to Capital
- Not able to meet Offtakers demand
- Specification
- Lack of Quality Health Care

DOWNSTREAM

- High Cost of Logistics
- Capacity tonage is very low
- Lack of Streamlined Market
- Less Cooperation within the Distributors & Operators
- Rigid Mode of Payment
- Less of long-term planning

Inadequate of Support for Farmer

>> Healthcare
>> Capacity Development
>> Fertilizer/Equipment

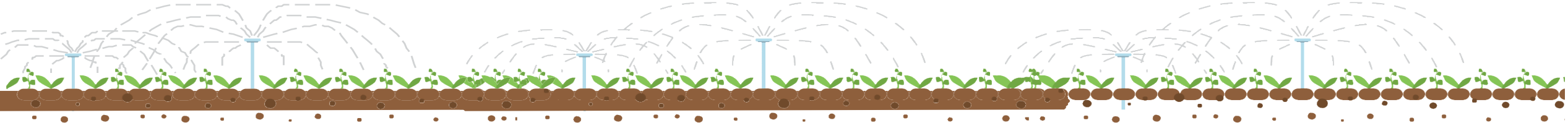
Poor Infrastructure

>> Bad Roads
>> No Grid Connection

Energy

>> Lack of Access
>> High Cost

Poor Engagement accross Value Chain



COMMUNITY BASED

UPSTREAM
(Irrigation)

- Access to Storage
- Less Quality Seeds
- Less Quality Yields
- Capacity Building
- Less Irrigation
- Lack of Energy
- Lack of Technical Knowhow
- Lack of Quality Health Care
- Lack of Financial Inclusion

MIDSTREAM

- High Cost of Energy
- Lack of Financial Support
- Lack of Offtakers Ownership/ Cooperation towards robust Supply Chain
- Less Utilization of by-products due to Capital
- Not able to meet Offtakers demand
- Specification
- Lack of Quality Health Care

DOWNSTREAM

- High Cost of Logistics
- Capacity tonage is very low
- Lack of Streamlined Market
- Less Cooperation within the Distributors & Operators
- Rigid Mode of Payment
- Less of long-term planning

Poor Infrastructure

>> Access to Water
>> No Grid Connection
>> Lack of Storage Facilities

Energy

>> Lack of Access
>> High Cost

Capacity

>> Lack of Knowledge & Training on Farming MEthods

BROAD SOLUTION

UPSTREAM

- Access to Energy
- Access to Finance
- Proper Irrigation Service
- Technical Capacity
- Storage Facility
- Warehouse Facility

Production Flow
Information Flow

MIDSTREAM

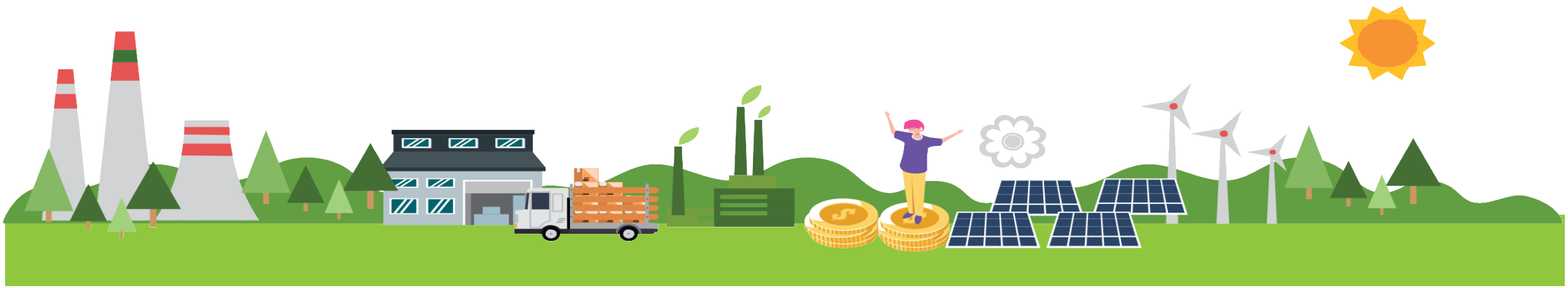
- Access to Energy
- Access to Finance

Product Flow
Information Flow

DOWNSTREAM

- Wide Distribution Network
- Exportation
- Increase Local Market Demand
- Increase GDP

Fianance Flow | Institution Support | Customer Feedback



Energy Solutions	Financial Model
Mini Grid Solution	Pay as You Go (PAYG)
Stand Alone Solution	Lease to own solution (25% unfront equity contribution)
Solar Home System Solution	Diesel swap cost (lease to own)

PRIVATE OPERATOR (SOUTH)

The assessment of the energy needs resulted in a total energy demand of approximately 1650Kwh daily for (South) the farmland and the processing outlays, with a combined energy demand of 25,000 watt per hour and the production factory reflecting an energy demand of 50,000 watt per hour.

Output from energy assessment				
Level of Activity	Unit	Hours/ Day	Energy Needs (watts per hour)	Total Energy per day (KWH)
Farmland	1	24	5,000	125
Small Business (Processing)	1	12	25,000	300
Production (Factory)	1	24	50,000	1,200
Total Energy Need			80,000	1,625

In order to deliver the above power capacity, the system being considered is a Stand Alone System. The farmland, processing outlay and the production factory will make use of this technology options but on different scales - this is illustrated in table 5, utilising different funding/payment methods and structures to be discussed later.

Table 5: Potential off-grid technology to be deployed in cassava vale chain

Deployment Locations	Technology System (Off Grid
FarmlandCommunity	A Stand-alone Solution (Power capacity = 5 - 10kw)
The Processing Community	A Stand-alone Solution (Power capacity = 20-25kw)
The Production Factory (is in the Grid area) - Barrack area, within the main town	A Stand-alone Solution (Power capacity = 50 - 60 kw)

Underpinning the tables above is the breakdown of the equipment within the upstream, midstream and downstream reflecting their individual power capacity. This is illustrated in tables 6.

List of equipment and their power capacities	
ISEYIN (EAGLESON)	
Processing Equipment's	Energy Output
Upstream	
Water pumping	5kw

Midstream (Processing)	
Dry sieve	3.0kw
Cutting machine	7.5kw
Washing slot	2.5kw
Rasper	7.5kw
Filter press	2.0kw
Bore hole pumping	2.5kw
Total	25Kw
Midstream (production)	
Production plant	50Kw

PAYBACK PERIOD				
	Cashflow N	PBP		
Year 0	-10,560,000	-10,560,000		
Year 3	3,600,000	3,840,000	2.933333333	2.9 yrs

PAYBACK PERIOD					
	CashFlow N	DF @10%	D. Cash-flow	PBP	
Year 0	-10,560,000	1		-10,560,000	
Year 4	3,600,000	0.683	2,458,800	848,400	3.5 years

FINANCIAL MODEL FOR OFF-GRID POWER SYSTEMS SOUTH

An initial cost for outright purchase and implementation for the Stand-alone Systems in any of model will range from N10, 000,000.00 to N15, 000,000.00. With a straight-line tariff, based on 25% of revenue generated from sales to the off-takers, a payback within 3 to 5 years could be guaranteed. Additionally, the assumed funding structure is depicted within the input template. Accordingly, the financial model with the payback period is illustrated in subsequent figures below.

However, with initial outright purchase demonstrating some level of difficulty for various flexible finance and payment models for deploying the suitable technology above were identified and discussed including the nature of the payment structure as detailed below.

These payment models – based on preferred options by operator - are:

(i) –Lease to Own – preference 2
(ii) Diesel SWAP Solar System Cost Model. – Preference 3
(iii) PAYG (Pay As You Go) /PPA – preference 1

Lease to Own model is designed where the midstream (the production) pays between 25-30% of the total cost of the project and spreads the payment of the balance over an agreed timeline

Lease To Own

Table 7: (Lease To Own)		
Equity Contribution	30% upfront payment	Payment Plan
30%	3,000,000.00	36month
Capital Investment	70% (Spread payment)	Monthly Payment
N10, 000,000.00	7,000,000.00	N 195,000
Note: This model is accompanied with an agreement within the developer and the Operator, which gives conditions on how the payment plan will be fulfilled, and also defaults in payments will be agreed. After the payment has been completed the client has full ownership of the system, but can engage the developer to provide and operations and maintenance services.		

Diesel Swap

Capital Investment	Diesel per Litre	Payment Plan
N10, 000,000.00	250* 1000 = 250,000	48month
Diesel consumption	80% diesel Cost monthly	Monthly Payment
1,000 litres per month	200,000	N 200,000.00
Note: This model is accompanied with an agreement within the developer and the client, which gives conditions on how the payment plan will be fulfilled, and also defaults in payments will be agreed. After the payment has been completed the client has full ownership of the system, but can engage the developer to provide and operations and maintenance services.		

COMMUNITY BASED OPERATOR (NORTH)

ENERGY SOLUTION: OFF-GRID POWER SYSTEMS

The households require an approximate energy demand of between 60-100 watt, which is able to power their homes and significantly improve their standard of living. For cassava production, machinery for manufacturing cassava produce will require a power capacity of approximately 10-1000w. A breakdown of this is presented in table below.

List of equipment and their power capacities	
Northern Operators	
Processing Equipment's	Energy Output
Upstream	
Water pumping	Nill (Manually done)
Midstream (small-scale Processing)	
Grinding processing machine	800watt

Integrating both the community and the expected large processor based energy assessment findings; the table below provides a pictorial view of expected energy demands from both inputs:

Description	Unit	Watt	Total Watt	Total Kilo Watt
Households	150	60-100W	15,000watt	15KW
Small Processing	8	800w	6400watt	6.4 W
Production (Factory)	1	24	50,000	1,200
Total Energy Need			80,000	1,625

FINANCIAL MODEL FOR OFF-GRID POWER SYSTEMS

For the SHS based off-grid power system, the following assumptions are illustrated in figures below. Accordingly, the financial model with the payback period is illustrated in subsequent figures below.

PAYBACK PERIOD				
		Cashflow N	PBP	
Payback Period	Year 0	-14,400,000	-14,400,000	
	Year 1	3,600,000	-10,800,000	
	Year 2	3,600,000	-7,200,000	
	Year 3	3,600,000	-3,600,000	
	Year 4	3,600,000	0	4

THE SCALABILITY OF BOTH OPERATORS BUSINESS

A key element to note is that within each operator, the expectation is for Operator to meet off-takers demand per month (as against the existing tonnes per month). The innovative approach being proposed would serve to address operational challenges and lack of/inadequate energy access across the existing value chain. This would ensure further profitability for both operators as illustrated in below table, on the assumption that a n increased tonnes is to be supplied as a result of the increase in energy access and efficient operational inputs.

Private Operator (South)				
DESCRIPTION	PROPOSED PLAN FOR 50 TONNES PER MONTH	(PRESENT) 30 TONNES PER MONTH	INCREASE OR (DECREASE)	PERCENTAGE
Cash Inflow (Revenue)	8,000,000.00	4,800,000.00	3,200,000.00	66.6%
Cash Out Flow	4,403,497.05	2,642,098.05	1,761,399.00	
Net Cash Flow	3,596,502.05	2,157,901.05	1,438,601.00	
Variable Cost (Logistics cost from midstream to upstream; levy; and, Miscellaneous operational activities).	600,000.00	400,000.00	200,000.00	50%
Profit Before Tax	2,996,502.00	1,757,901.05	1,238,600.05	70.3%
INCOME PER TONNE OF HQCF = 160,000	FIXED COST (EXPENSES) PER TONNE = 88,069.95		MARGIN PER TONNE = 71,930.05	
NOTE: The variable cost is quite dynamic and at the moment logistics cost is taking up over 80% of the variable cost due to the bad road, the unstapled prices in diesel. While 20% is for unforeseen situations that may arise putting that under the miscellaneous operational activities.				

COMMUNITY BASED OPERATOR (NORTH)

Our analysis from the 'proposed' value expects viable financial projection within the context of introducing large processor and production.

Private Operator (South) SUMMARY FOR FARMERS (WITHOUT LARGE PROCESSORS & PRODUCTIONS) FINANCIAL PROJECTION				
DESCRIPTION	PROPOSED PLAN 80 TONS PER MONTH	(PRESENT) 40 TONS PER MONTH	INCREASE OR (DECREASE)	PERCENTAGE
CASH INFLOW (REVENUE)	1,200,000.00	600,000.00	600,000.00	100%
CASH OUT FLOW	400,000.00	200,000.00	200,000.00	
NET CASH FLOW	800,000.00	400,000.00	400,000.00	
INCOME PER 1 TON OF CASSAVA = 15,000	FIXED COST (EXPENSES) PER 1 TON = 5,000		MARGIN PER 1 TON = 10,000	
NOTE: The variable cost is quite dynamic and at the moment logistics cost is taking up over 80% of the variable cost due to the bad road, the unstapled prices in diesel. While 20% is for unforeseen situations that may arise putting that under the miscellaneous operational activities.				

SUMMARY FOR FARMERS (WITH LARGE PROCESSORS & PRODUCTIONS) FINANCIAL PROJECTION				
DESCRIPTION	PROPOSED PLAN 120 TONS PER MONTH	(PRESENT) 40 TONS PER MONTH	INCREASE OR (DECREASE)	PERCENTAGE
CASH INFLOW (REVENUE)	1,800,000.00	600,000.00	1,200,000.00	175%
CASH OUT FLOW	600,000.00	200,000.00	400,000.00	
NET CASH FLOW	1,200,000.00	400,000.00	800,000.00	
INCOME PER 1 TON OF CASSAVA = 15,000	FIXED COST (EXPENSES) PER 1 TON = 5,000		MARGIN PER 1 TON = 10,000	

BASED ON THE FOLLOWING BUSINESS DEVELOPMENT ASSESEMENT PROGRAM AND THE SOCIAL INNOVATION/ENGINEERING PROGRAM CARRIED OUT TO OPTIMISE THE SUPPLY CHAIN OF BOTH OPERATORS AND TO MAKE IT ATTRACTIVE FOR AN ENERGY DEVELOPER TO PLUG IN. FURTHER REQUIREMENT ARE NEED FROM ALL STAKEHOLDERS

STAKEHOLDER	STAKEHOLDER	STAKEHOLDER
PRIVATE OPERATOR (SOUTH)	COMMUNITY BASED OPERATOR (NORTH)	ENERGY DEVELOPER
FURTHER ASSESEMENTS & REQUIREMENTS FROM EACH STAKHOLDERS		
Whether the Business has the Capacity to Expand? Or consider at horizontal or vertical integration?	Whether the Community Based systems have the Capacity to attract Investors or a cooperative system of practice?	The developer will require to evaluate the Annual Cash flow of both operators (Especially their present energy cost), to ascertain whether their operations can sustain the long term Energy expansion plan
Do they have the right Business and Technical Capacity to the Operators or can it attract technical partners?	Do they have the right Business and Technical Capacity to the Operators or can it attract technical partners?	To agree with the Operator the suitable energy solution and a financial model to adopt. Both the operators and the developers must come to a joint agreement on which plan they intend adopting.
The Business can attract Investors or Access to Finance?	Can it attract Investors or Access to Finance?	To ascertain if the developer has what it takes to expand as their the operators business expands. To confirm if they have the technical know how to carry out this plan and lastly if they have the financial prowess to deliver the project
If above conditions and requirements are meant, then it is more suitable for a financial institution or an investors to invest in both operations and also the energy developer		

QUESTION/ANSWER SESSION
THANK YOU