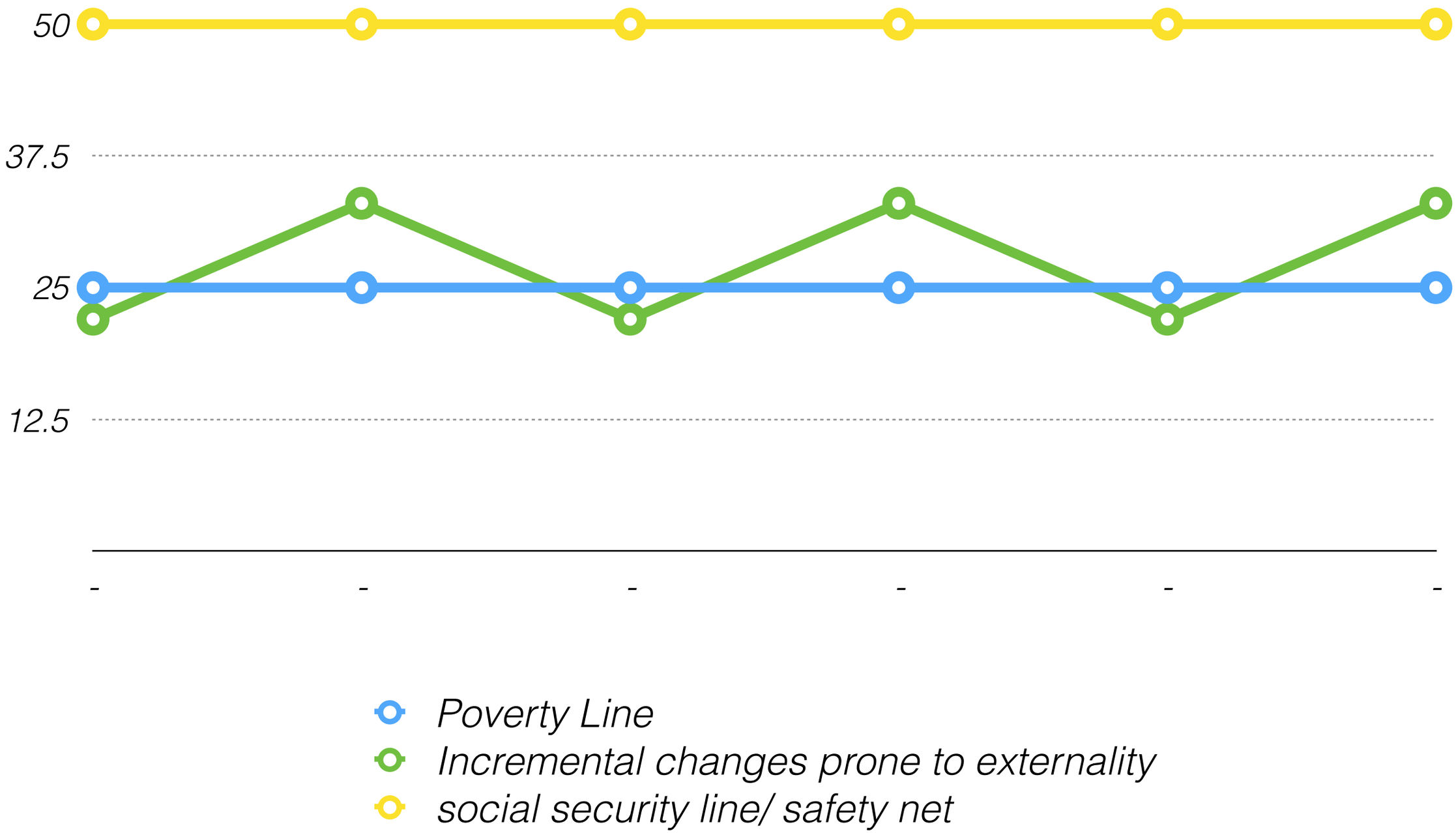
Sustainable Energy and Livelihoods

IRENA
International Renewable Energy Agency

IOREC
International Off-Grid Renewable Energy Conference & Exhibition

SELCO FOUNDATION


50
37.5
25
12.5
Poverty Line
Incremental changes prone to externality
social security line/ safety net

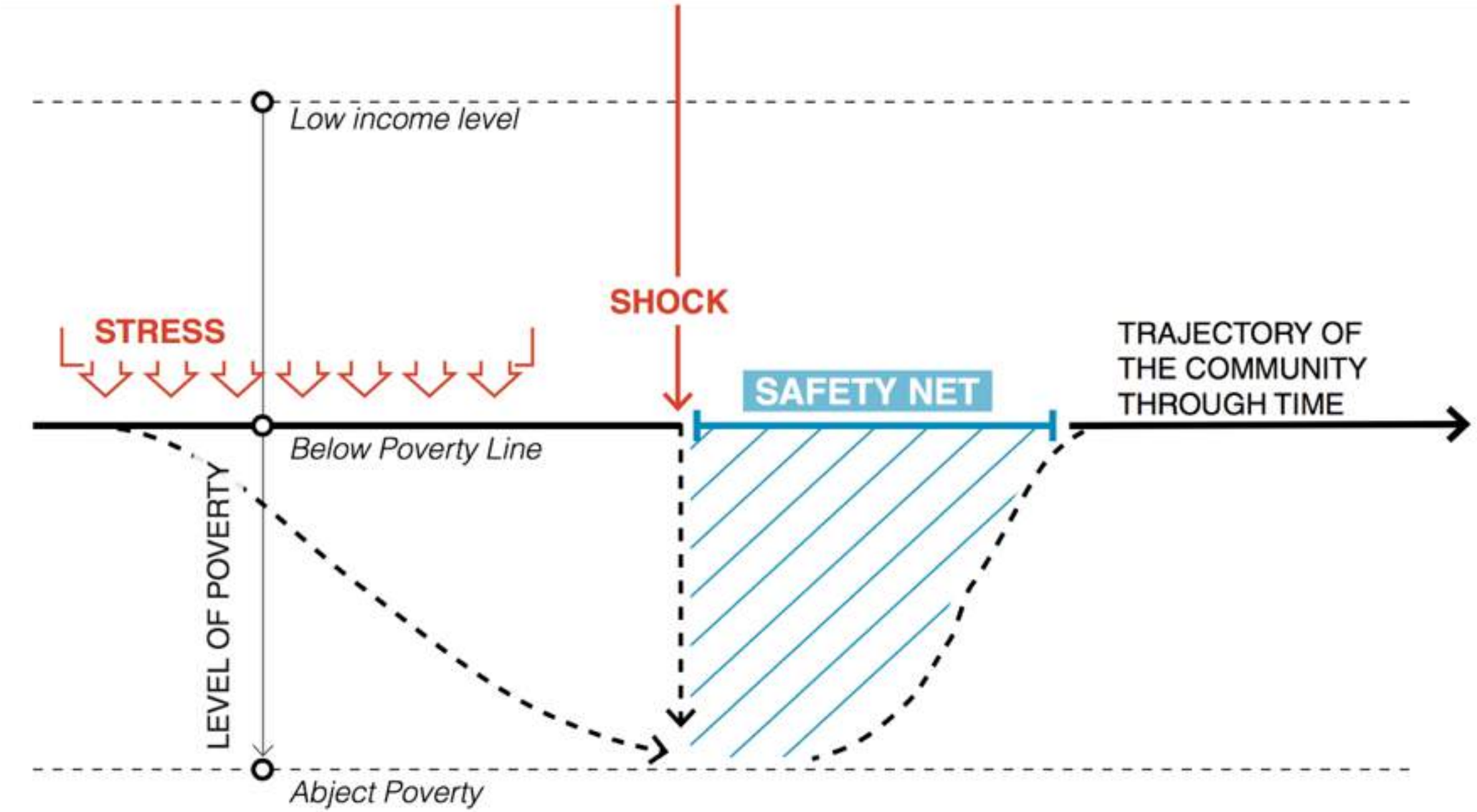


Fig. 1: Relationship between Safety Nets, Trajectory of Communities and Vulnerability of Communities across income/poverty levels and time

Shift from beneficiaries and end users to partners, investors and innovators

Blacksmith blowers

Efficient Looms

Safety nets in terms of assets and investments

Solar Efficient Sewing Machine

Hawker Model

Benchmarking Solutions and Services for the Poor

Power Hammer Milling

Milking Machine

Very High Income Group

High Income Group

Middle Income Group

Low Income Group

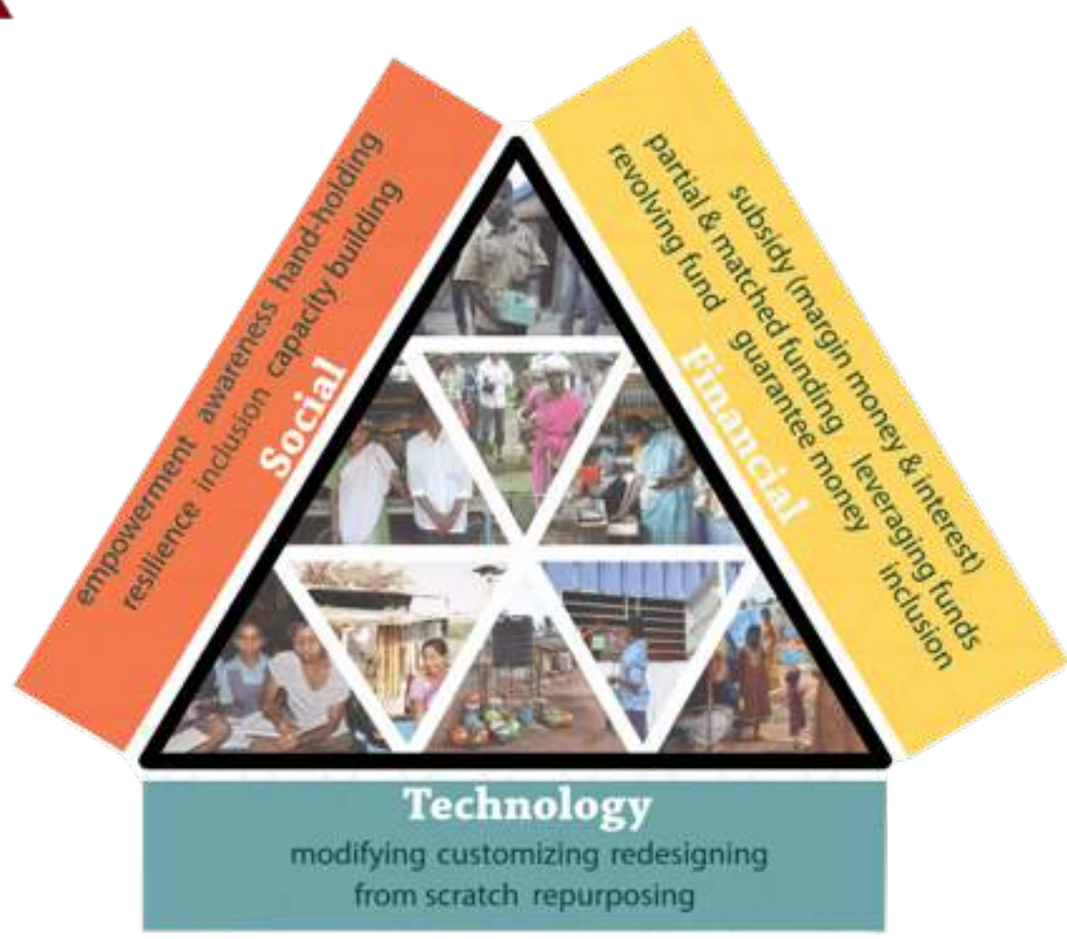
under market conditions

Very Low Income Group

not under market conditions

Abject Poverty

vulnerable communities like nomads, remote island dwellers, mining communities



Ecosystem for Sustainable Livelihoods

Financial inclusion with patient and flexible asset based financing

Human resource development at multiple levels

Appropriate **technology and design**

social, financial and environmental **inclusivity in policy** making

need-based social linkages, content development, **market linkages** etc

Efficient huller, polisher, de-stoner etc for remote tribal and rural areas- dependent on diesel (4 more machines ready to scale by quarter 3 2018-2019 - (co-developed by 3 different local entrepreneurs/ manufacturers)

Efficient Roti
Rolling Machine

Financial inclusion with patient and flexible asset based financing

Human resource development at multiple levels

Appropriate **technology and design**

social, financial and environmental **inclusivity in policy** making

need-based social linkages, content development, **market linkages** etc

Asset-based finance for an entrepreneurs to own the machine

A highly efficient roti rolling machine
An enterprise that can provide and service the packaged solution with solar energy

Micro-entrepreneur market linkage training for the roti rolling businesses

Schemes and policies that support that system

Accessible market linkages
Demand in local estuarants, hostels, marriages etc

Example of building the ecosystem for micro entrepreneurs to access appropritate technologies

ngala Patil has

Panel Discussion

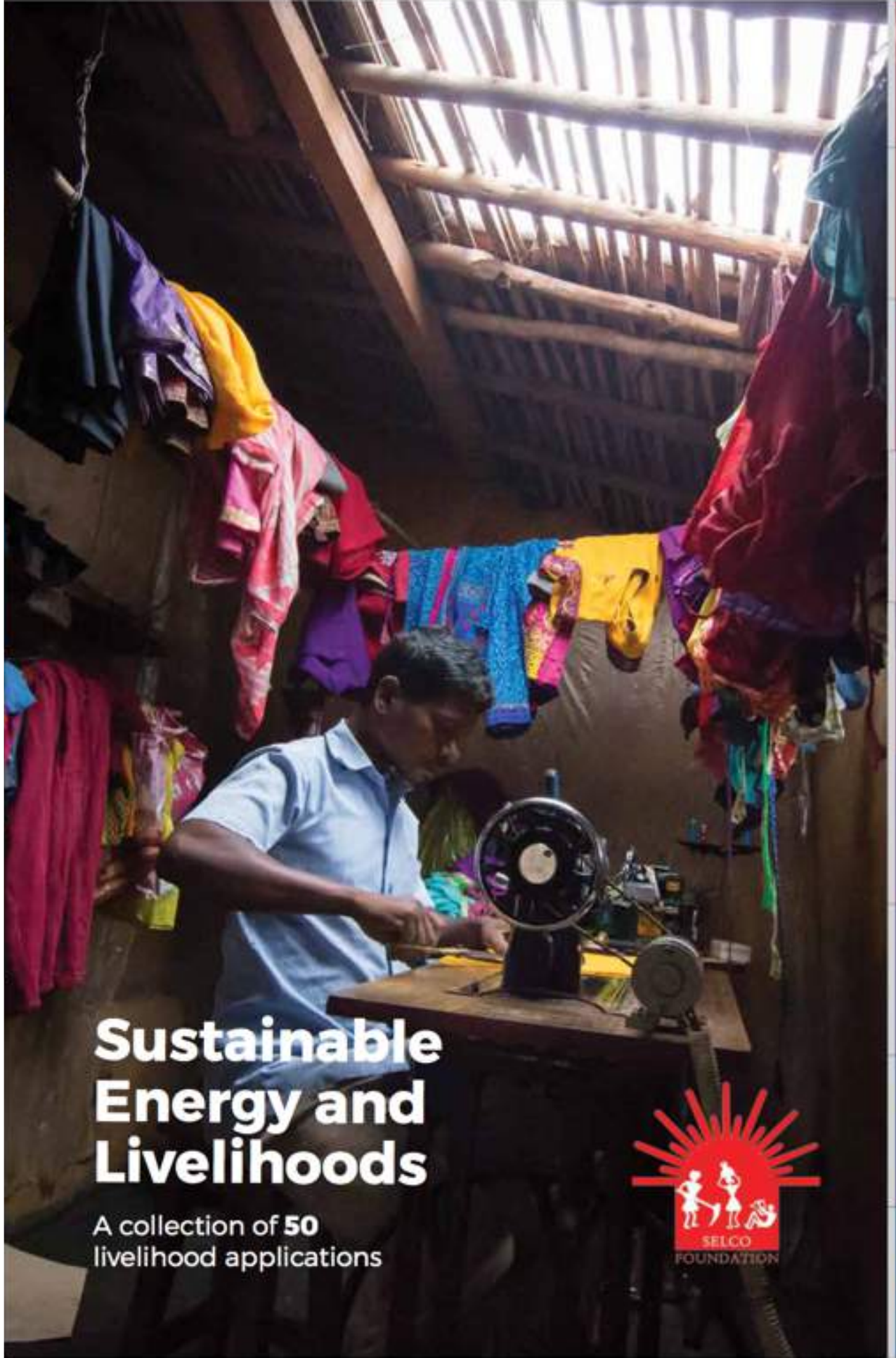
How might we scale an ecosystem driven approach to sustainable energy for livelihoods?

Panelists

1. Bikash Pandey, Director of Clean Energy, Winrock International
2. Garrick Lee, Senior Energy Access Consultant, Efficiency for Access Coalition
3. Guruprakash Shetty, Assistant General Manager (Operations), SELCO Solar Pvt. Ltd.
4. Gigi Wing-Davies, Program Development Manager – Green Society, HIVOS

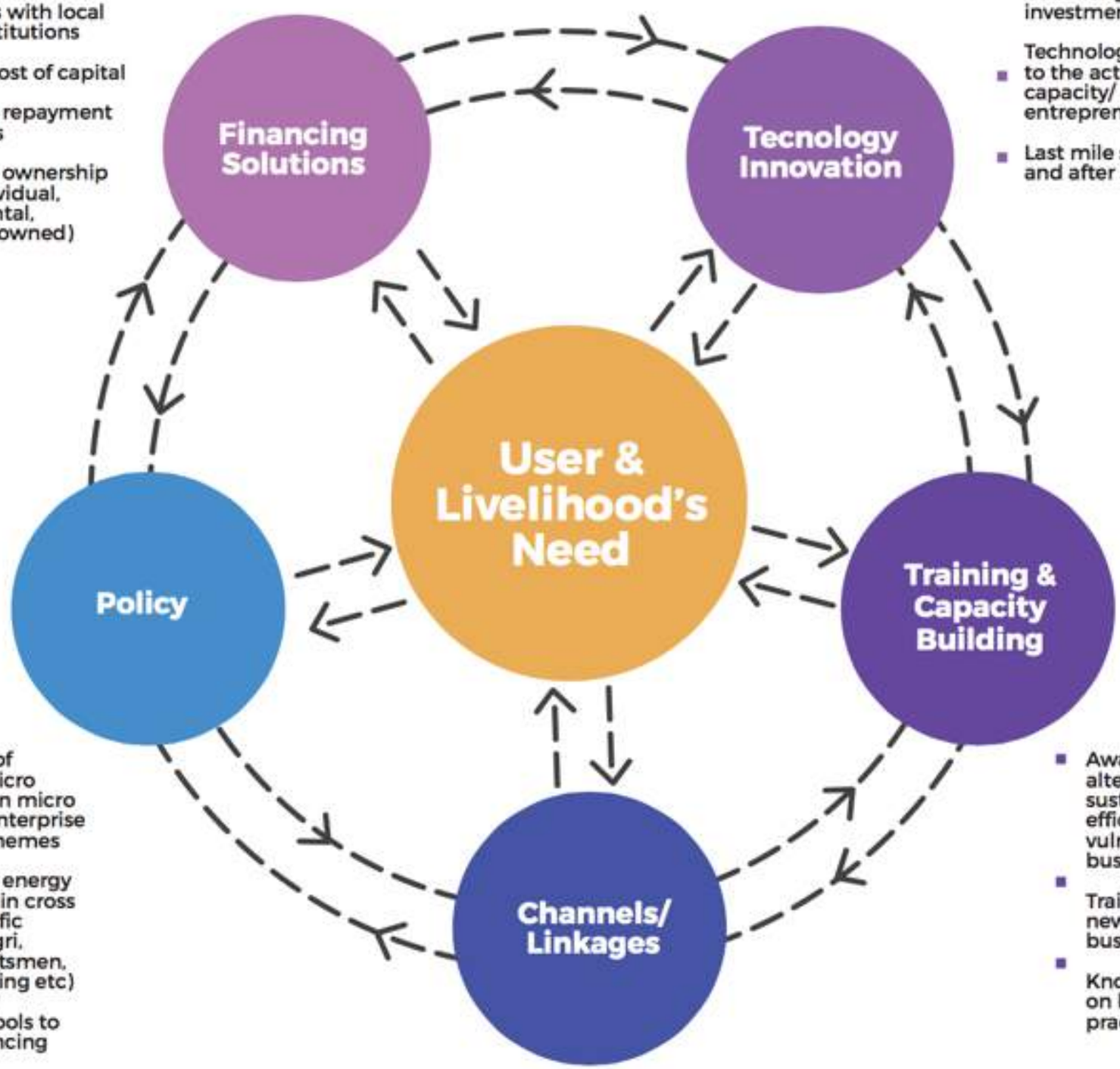
Moderator

Huda Jaffer, Lead, Design & Innovations, SELCO Foundation


Sustainable Energy and Livelihoods
A collection of 50 livelihood applications
SELCO FOUNDATION
Textile
Agriculture
Animal Husbandry
Food Processing
Blacksmithy
Carpentry
Pottery
Cottage Industries
Services & Retail

ECOSYSTEM NEEDS

- Financing based on perceived cash flows
- Partnerships with local financial institutions
- Affordable cost of capital
- Appropriate repayment mechanisms
- Appropriate ownership models(individual, operator, rental, community owned)



- Access to efficient technologies which will build long term assets/ investments
- Technologies which cater to the actual need and capacity/ market of the entrepreneur/cooperative
- Last mile supply chains and after sales service

- Awareness of informal/ micro livelihoods in micro and small enterprise financial schemes
- Sustainable energy recognition in cross sector specific schemes (agri, artisan/ craftsmen, manufacturing etc)
- De risking tools to unlock financing

- Awareness on alternatives to sustain/ improve efficiency in existing vulnerable businesses
- Training to begin new sustainable businesses
- Knowledge transfer on best/worst practices

- Access to stable input sources (backward linkages)
- Access to consistent or existing or newer linkages to sell end products

[1] https://www.worldbank.org/en/topic/energy/overview

COTTON PICKING

Harvesting of cotton buds

User Group

Cotton farmers and farm labourers

Energy Intervention

Hand-held cotton picking machine

GINNING

Separation of cotton fibres and seeds

User Group

Mill workers at large scale mills or by weavers at small scale units

Energy Intervention

Ginning machine for short staple cotton

SPINNING

Spinning of roved cotton yarn into threads

User Group

Skilled spinners at decentralized or centralized units

Energy Intervention

'Charkhas' (Spinning Machines)

WEAVING

Weaving of threads into cloth

User Group

Skilled weavers working at decentralized or centralized units

Energy Intervention

Looms for weavers

SEWING

Stitching of cloth or other materials for various purposes

User Group

Individual home based entrepreneurs/ tailoring units

Energy Intervention

Sewing machines of various capacities



DAIRY

MILKING
System of harvesting milk quickly and gently

Energy Intervention

Milking Machine

COLLECTION
Harvested milk collected at collection centres

Energy Intervention

Weighing and Testing

VALUE ADD
Shaking up the milk/ cream to make butter

Energy Intervention

Butter Churners

POULTRY

LIGHTING
Keeps the chicks warm

Energy Intervention

Lights

BROODING
Nurturing chicks for 2-3 weeks before selling

Energy Intervention

Brooders

INCUBATION
Hatching of eggs

Energy Intervention

Egg Incubators

TYPOLOGIES OF TECHNICAL SOLUTIONS

HOME BASED

TYPE OF STITCHING
Normal tailoring with straight stitching

TYPE OF MATERIALS
Cotton, silk, synthetic, nylon, polyester

PRODUCTS MANUFACTURED
Household tools, small hardware products, small agri tools

MARKET LINKAGE
Individual orders and orders from shops

SHOP BASED

TYPE OF STITCHING
Normal tailoring with straight stitching

TYPE OF MATERIALS
Plastic, cloth

PRODUCTS MANUFACTURED
Bags (plastic fertilizer bags)

MARKET LINKAGE
Individual orders and bulk orders from centres which is passed on to home based tailors. Takes market linkage risk

COTTAGE INDUSTRY

TYPE OF STITCHING
Industrial tailoring with high speed straight stitching

TYPE OF MATERIALS
Leather, denim, plastic, cloth, jute

PRODUCTS MANUFACTURED
Bags, uniforms, denims, gunny bags

MARKET LINKAGE
Direct bulk orders from retailers which is given to the tailors employed at the centre

60 W PMDC Motor

80 W PMDC Motor

High speed Universal AC Motor

	PMDC Motor	High speed PMDC motor	High speed Universal AC motor
POWER CONSUMPTION	60 W	80 W	250 W
OPERATING VOLTAGE	12V DC	12V DC	230V DC
ENERGY REQUIREMENT	240 Wh (4 hours)	320 Wh (4 hours)	1000 Wh (4 hours)
SOLAR MODULE	60 Wp, 12V	60 Wp, 12V	250 Wp, 12V
BATTERY	30 Ah, 12V x 1	110 Ah, 12V x 1	80 Ah, 12V x 2
INVERTER	NA	800 VA	800 VA
STITCHES/MINUTE	300	300	2000-2500

TYPES OF BLACKSMITHS

\+ Solar Powered Angle Grinders

\+ Solar Powered Power Hammers

Solar Powered Portable or Fixed Blowers

1. NOMADIC

PRODUCTS MANUFACTURED

Household tools, small hardware products, small agri tools

USER GROUP

Nomadic - traveling constantly on predefined routes, making metal products and selling them in villages on the way and returning to their home village once in a year.

MONTHLY INCOME

INR 10,000-15,000

LABOUR REQUIREMENTS

Family members engage in the task with occasional assistance from customers

TOOLS USED

Manual blowers, hand cranked wheels, manual angle grinders and hammers

2. SMALL SCALE

PRODUCTS MANUFACTURED

Household tools, small hardware products, small agri tools, cultural products

USER GROUP

Small workspace, usually adjacent to the home or near a market place; livelihood seasonal- dependent primarily on agri season

LABOUR REQUIREMENTS

Hire 1-2 labourers depending on the workload; expenditure INR 150 -250 day for hand cranked blower

MONTHLY INCOME

INR 10,000-15,000

TOOLS USED

Manual blowers, hand cranked wheels, manual angle grinders and hammers

3. MID - SCALE

PRODUCTS MANUFACTURED

Agri tools or machinery, gates, railings, hardware products, automotive garages

USER GROUP

Small workshop -, usually near a market place; primarily dependent on the agri season

LABOUR REQUIREMENTS

Hire 2-3 labourers depending on the workload; expenditure INR 250 - 400 per day for hand cranked blower + hammering

MONTHLY INCOME

INR 15,000-25,000

TOOLS USED

Basic blacksmithy tools, Power Hammers, Angle grinders

4. LARGE SCALE

PRODUCTS MANUFACTURED

Agri tools or machinery, gates, railings automotive components, customised products, lifestyle products

USER GROUP

Fabrication workshops - usually near the marketplace - caters to wide variety of customers

LABOUR REQUIREMENTS

Highly skilled tradesperson employed; expenditure INR 400 -500 per day for hand cranked blower + hammering

MONTHLY INCOME

INR 25,000-60,000

TOOLS USED

Power hammers, Heavy duty bending jig, Quick change conversion dies, Lathe machines, Oxy - Acetylene and arc welding

OWNERSHIP MODELS

HOME BASED ENTREPRENEURS
(Individual ownership)

CONSUMER

Smaller shops, Temples, Rural and urban hotels

AVG. PROFIT PER MONTH

INR 12,000-15,000 (INR 4 per roti)

LABOUR

Family members support in preparation, market linkage and delivery

FINANCIAL MODEL

Selling 200 rotis a day at an average, and with existing financial products- 20% of the profit per month, would pay back the loan in 2 years

ENTERPRISE MODEL
(employing multiple members with clear task division)

CONSUMER

Smaller shops, Canteen, temple, weddings, restaurants

INCOME (AVG)

INR 30,000 (INR 4 per roti)

LABOUR

The Self Help Group (SHG) and shared ownership model for the enterprise results in profit being shared between its different members equally. The tasks in the enterprise are divided, and no extra labour costs are incurred.

FINANCIAL MODEL

Selling 400 rotis a day at an average, and with existing financial products- 10% of the profit per month, would pay back the loan in 2 years

CANTEEN, RESTAURANTS

CONSUMER

students, families, neighbours, local community

INCOME (AVG)

INR 40,000 - 50,000 (INR 10 per roti)

LABOUR

Women and young boys from the local community are employed to handle various tasks related to meal preparation, cooking and cleaning.

FINANCIAL MODEL

Selling 400 rotis a day at an average, and with existing financial products- 15% of the profit per month, would pay back the loan in 1 years

Gross Earnings

No Change

Raw Materials & Other Expenses

Increase - Due to EMI and Increased productivity

Operational Costs

100% Reduction

Net Income

Increase - Offsets from operational cost and increased productivity

IMPACTS

IMPROVED HEALTH & WELLBEING

All the blacksmiths where interventions were carried out, reported a reduction in impact of injuries related to physiological and upper limb musculoskeletal disorders (MSD). This has improved the health and wellbeing of not only blacksmiths, but of children and women engaged in the livelihood.

INCREASED PRODUCTIVITY

With the additional provision of lighting, the workshop operational hours gets extended by 2-3 hours per day thereby improving their productivity during peak season.

Percentage increase in productivity of the blacksmith **+20 - 30%**

INCOME INCREASE

Without the additional requirement of a typically difficult to find and expensive labourer, the expense component for the blacksmith has come down drastically

Percentage decrease in operational expenses of the blacksmith **-45%**

Video Link