Powering Off-grid Africa at the Village Level

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Turkana Basin and Sub-Saharan Africa

Least developed part of Kenya
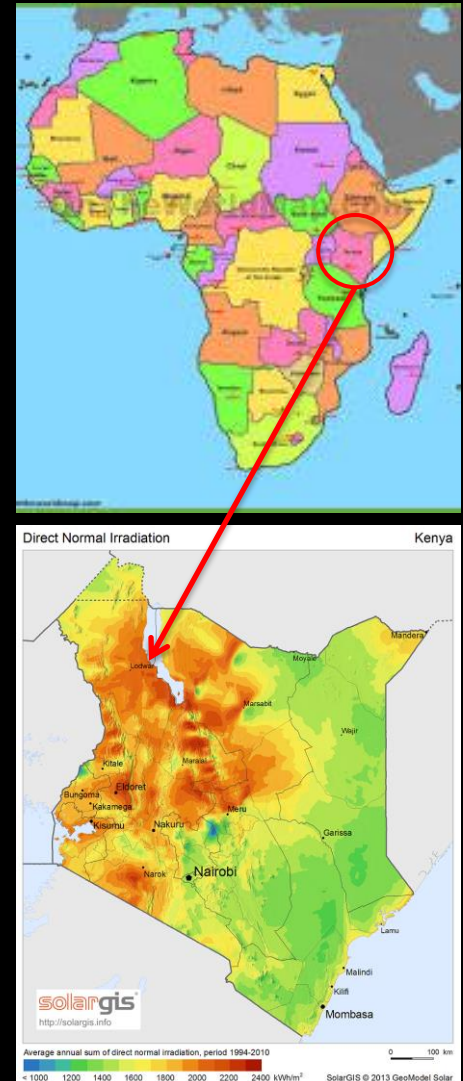
- 1 million people
- 2% of households electrified
- 10% access to clean water, sanitation
- 20% literate

Typical of rural Sub-Saharan Africa

- >500,000,000 people (X2 by 2100?)
- Half living on less than $1.25/day

The Need

Economic Development

Energy, water & information access are key

Energy: wood, charcoal, kerosene but plentiful sunlight, wind, geothermal resources

Water: biologically and chemically often unsafe but available – lake & large aquifers

Connectivity: cell phones a gigantic success in Africa but limited coverage in rural areas

SOSAED
(Sustainable Off-grid Solutions for African Economic Development)

Our goal: Provide tools for economic development to homes, institutions   and businesses in rural Kenya

Clean energy,* clean water, information

➔ Enhanced economic activity and

➔ Enhanced access to education, health care, security, community and personal empowerment

*Electric power generation, distribution, control, storage is the fundamental element in the toolbox

Approach

2 key elements:

Turkana Basin Institute

Base of operations, technology test bed

Self-sustaining model

Help people to create systems that provide what **they** need, and

The systems must be owned, operated maintained **locally**

Turkana Basin Institute

Built by Richard Leakey and Stony Brook University

Self-sustaining off-grid research center

Provides researchers the means to live and work long term in a hostile environment internet, water…)

Supports research in human origins, can serve as a technology test-bed

Economic development for neighbors

Engineering challenges for Stony Brook students

Global Innovation Field School

Self-Sustaining Model

Local Ownership (one model)

End-users participate in the design

Entrepreneur (local individual or group) sells equipment to end-users

End-users buy with financing (or lease-to-buy)

Project trains entrepreneurs, maintains equipment

supply chain and warehousing to repair/replace/expand

Sustainability comes from community buy-in and commitment
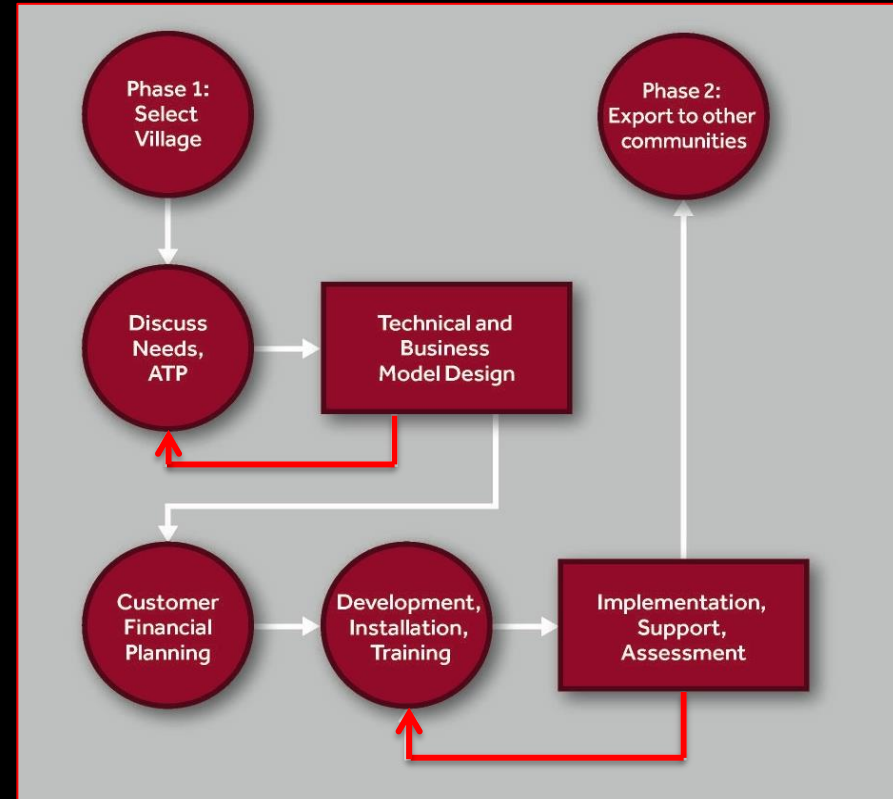
Phase 1: Proof of Concept

1 or 2 villages near TBI

Few hundred homes, < ~20 institutions & businesses

Early and ongoing discussions with owner, end-users

Feedback important:

Iterate based on village input and assessment to work out system bugs

Phase 2: Exporting the Concept

Big Market

Technology (easy, _mostly but not all_ off-the-shelf)
Place-dependent
Energy source, water quality, cell/broadband service

Population density (e.g., stand-alone vs. grid based)

Technology should be as simple, inexpensive, robust

Remote diagnosis , control, metering

Scalable to residence, business, institution

Phase 2: Exporting the Concept

Business model (hard, but issues are universal)

People-dependent

Local needs, culture, lifestyle

Ability & willingness to pay

Security

Financing

Ownership & accountability

Thanks

Questions?