The future of mini-grids: from low cost to high value.

Using demand driven design to maximize revenue and impact.
700M people need energy

Many groups trying

Although many successful none have truly reached replicable scale

Opportunity to develop a different paradigm for minigrids through partnerships and strengths based analysis
Why Electrify?

What is the core reason for electrification?

- Poverty alleviation through
  - Improved living conditions
  - Better communal facilities
  - Economic development through livelihoods

- Core objective informs response
Where an existing energy service, eg Kerosene lanterns is replaced by Solar Lanterns.

No net increase in energy utility is gained by the household.

There may be other benefits.

Achieves:
- Improved living conditions
- Better communal facilities
• Where the energy supply meets consumers’ existing energy service needs with additional capacity to meet other (planned) – usually productive – demand
• Minigrids are the only off-grid supply option that provides aggregate surplus supply
• Provides potential to stimulate and influence economic development
• Key strength of mini-grid
Demand Curve

Demand Growth

Watt-hours/day

Stage of development

Investment required

Subsistence based, non-diversified livelihoods, limited cash and income streams, poor access to and subsidised basic services (when accessed)

Secure livelihoods, fully integrated into cash economy, cash reserves, high degree of access to goods and services
• Devices & Home Energy Systems are generally substitution approaches;
• Good: but neither provide surplus energy;
• Current minigrid practice tends to compete for constrained resources in a substitution framework;
• Thereby comparing value of investments against completely different outcomes
Only mini-grids are capable of surplus supply

Surplus supply is the end goal of village electrification because it allows local productive activity to take place

Building mini-grids that cannot provide surplus power negates their ultimate benefit

Building mini-grids that cannot provide surplus power severely restricts their ability to leverage—and maximise—potential revenue

Mini-grid viability depends on leveraging the maximum potential revenue from consumers
Structural Barriers to scaled deployment of mini-grids

- Supply Chain
- Technology and design
- Operations & Maintenance
- Community Planning
- Governance
- Finance

Village level barriers
Program level barriers
Viability is defined by assessing whether:

• Program characteristics address respective barriers;
• Program addresses barriers at appropriate levels;
• Program is appropriate to context;
• Program can be replicated.

Demonstrated mechanism to build demand through livelihood development
Characteristics of a viable model

- Aggregated demand
- Maximised revenue
- Tailored technical design
- Optimised supply chain
- Mobilisation of Finance
Given viability characteristics, and barriers, existing models can be generally classified as focused toward:

- Finance (both private and public, grant debt and equity);
- Supply Chain (technology providers, construction companies, engineers); or,
- Consumers (including individual consumers, co-operatives, NGO’s). Each has unique strengths and motivations.

Each has unique strengths and motivations.
Many existing models with core strengths:

- Huskpower (Supplier);
- Bushlight (Consumer);
- Simpa Networks (Consumer);
- Sun Edison (Supplier);
- National Township Electrification Program - PRC (Finance);
- Electricity Services in Rural Areas Project – Senegal (Finance);
Although all participants operate with best intent, often their ability to break through some of the barriers is impeded by their relationship or position relative to the barriers.

Critically, few if any, of the existing participants have the capacity to aggregate demand at scale.
Recognising weaknesses - Playing to strengths

An effective model facilitates participants playing to their strengths in partnership with others, each resolving the barriers they best understand:

- Finance providers can aggregate and organise finance at a large scale;
- Suppliers can develop technical solutions to variable demand and environmental and resource contexts and build effective supply chains; and,
- Consumers can aggregate themselves locally to reduce administration costs, while ensuring effective revenue streams to support the finance model;
- Aggregate ownership and management model;
- Clustered, mutually supportive systems;
- Providing opportunities for maximizing the domestic and productive impact of mini-grid systems;
- Building efficiencies in planning and financing, program administration, equipment supply, and operation and maintenance.

A new paradigm

- Consumer
- Finance
- Suppliers
The intersection of capabilities identifies the area of greatest strength.

Facilitated engagement in this space is required.

So what does a possible model look like?
• Implementation will not look the same in all regions;

• All elements of a program must share a common set of objectives and must be:
  – Planned and coordinated;
  – Structured; and,
  – Delivered in an integrated manner.

Importantly the focus MUST be on achieving higher value NOT lowest cost outcomes.