Making villages-
MODEL CLEAN ENERGY VILLAGES
concepts and intervention possibilities
October 2014
CONTENTS

Introduction

Approach

Possible Interventions

1. Home Lighting + Mobile Charging
2. Natural Lighting and Ventilation
3. Powering Education
4. E-Bus (Computer lab)
5. E-Shala (Digital Education)
6. Light for Education
7. IEC- Integrated Energy Centers
8. Minigrids
9. Sewing Machines
10. Hawker Lighting
11. Water Pumps
12. Community Lighting
13. Water Purification
14. Cold Storage
INTRODUCTION

SELCO
SELCO India is a 20 year old social enterprise that provides customized sustainable solutions to under served communities. SELCO creates and disseminates last mile innovations for poor settlements with the aim of creating socially, financially and environmentally sustainable communities. Selco works primarily on energy access issues in the fields of Agriculture, Education, Health, Information and Livelihoods. SELCO directly operated in Karnataka, Tamil Nadu, Adhrapradesh, Kerela, Bihar and Maharashtra.

NEED ASSESSMENTS AND PARTNERSHIPS
To develop model energy villages SELCO identifies issues and potential areas of interventions through an in-depth need assessment. On deeper understanding SELCO bridges gaps by engaging with local partners (NGOs, financial institutes, local community leaders etc). By working with existing partners, brining in needed (local and external) partners and custom designing sustainable solutions SELCO aims for long term impact in areas of energy access, well being, health, livelihoods, education, water, infrastructure and beyond.
Approach

Understanding need, barriers and contexts

Customized solution (technology, product, service or system)

Developing appropriate financial models (facilitating end user financing)

Servicing, monitoring, evaluation.

Sales financed to enable local asset ownership of systems
3 stakeholders: Financial institution, service provider and customer
Customized and leveraged Financing techniques
First cost barriers
- Down payments
- Interest rates
- Transaction costs
- Interest rates
- Guarantees
Customer segments
- Cash flows

Customization
Investment vs Expenditure
Customer service
Local Supply Chain
One on One Service
HOME ENERGY SYSTEMS
(lightning + mobile charging)

About
This traditional model connects rural, un-electrified, under-electrified and remote households to the appropriate solar technology and the financing mechanism. By doing so, the user not only avails of an asset in the form of the solar home lighting system, but also becomes part of the financial system and is able to build a credit history. The home lighting system allows for customization based on the needs of rural users. One of the most significant benefits of the model is the impact on education and livelihoods.

Impact
1. Households avail of an asset and are able to build credit history
2. Access to improved lighting for school going children for reading and completion of school work
3. Significant health benefits for children and parents by eliminating use of kerosene
4. Reduced risk of fires caused by kerosene
5. Significant savings to households that can be invested in other productive uses
NATURAL LIGHTING AND VENTILATION

About
An installation that improves natural lighting and ventilation - Airlite is a custom designed FRP sheet which enables sufficient lighting and ventilation for low-income households. It helps improve well being, productivity and circulation of air in dark and closed homes. Airlite can be customized and easily retrofitted in multiple households. User segments include: Home based businesses, work spaces, class rooms and day care centers.

Impact
1. Easy to install, instantly brightens space and improves productivity
2. Can be reused and moved as needed
3. brings in diffused natural light (not direct sunlight)
4. Improves ventilation by 20%-30%
SOLAR POWERING EDUCATION

About
This program includes lighting for schools, evening tuitions, n-computing systems, powering learning aids and tools for all educational purposes. Inadequate infrastructure in certain rural areas and constant power outages in grid-connected areas has resulted in many batches of students having to graduate without being able to use a computer or evening light in the students' life. Solar systems are able to reliably power computers, DVD players etc that can play a crucial role in learning.

Impact
1. Efficient n-computing systems
2. Exposure to interactive education material
3. Facilitates understanding of the basics of computer applications
4. Ensures complete reliable resources for learning
E-BUS (SOLAR POWERED COMPUTER LAB ON A BUS)

About
E-bus is a solar powered computer lab in a bus which travels around multiple villages catering to chosen under-served rural informal and government schools. The bus can house upto 12 laptop points and 1 projector to equip children with basic computer knowledge and provide access to other educational content. The model is an efficient way of ensuring computer education reaches maximum number of students.

Impact
1. Students learn basics of computers, opening up a variety of possibilities through and after school
2. Understand syllabus better through audio visual aids
3. Peak interest level by giving them access to better learning tools
4. Watch videos and play games on health and hygiene (or other awareness/information) modules
5. Access easy, affordable, quality education, Since the bus arrives right at their school (near their community).
E-SHALA
(Digital Education Program)

About
Digital aids can be extremely useful if used in the education system. However, in the Indian rural education context, digital education aids such as multimedia kits, special learning software, projectors, tablets, are almost completely absent. Solar powering a computing device coupled with a projector and tablets for teachers in the E-shala program is combined with teacher training and relevant content. This becomes the best digital learning aid for students.

Impacts
1. Audio visual aids help in making lessons interesting
2. Simplify difficult concepts and improve knowledge dissemination
3. Peaks students interests and inspires them to learn
4. Optimizes use of existing audio-visual labs in areas with power shortages
LIGHT FOR EDUCATION

About
This model consists of a central charging station at the school, a study light that a student keeps at home and a portable pocket size battery pack that the student carries to and from school. Every student brings the battery pack to school in the morning, keeps it for charge throughout the day and takes it home in the evening according to school timings.

Impact
1. Decentralized model, independent of grid
2. Cost effective, reduces expense of providing individual panels
3. Provides safe, bright, sufficient light at home to study
4. Improves attendance, as students need to come to school to charge battery
5. Parents see an added value in school
INTEGRATED ENERGY CENTERS (Central charging station + community center)

About
Energy centre’s are essentially solar powered independent service centers for rural/urban/peri-urban spaces where services like lighting, mobile charging, charged batteries, are provided on a daily/monthly rental basis. Integrated energy centers (IEC) are energy centers that are co-located with any community space like a library, education centre, health centre etc OR vice versa i.e. education, health, finance services can be introduced in the energy providing unit so that these centers will become a hub for the underprivileged to access services that are either difficult to obtain or unreliable.

Impact
1. Customized local ownership models (small scale entrepreneurs, operators from the community or community owned and run systems
2. Catalyzes and introduces services on a need basis
3. Community hub for multiple partners and social interventions (can be used for services related to health, education, energy access, awareness, livelihood etc.)
MINIGRIDS

About
Custom solar mini-grid systems to electrify multiple households work well in villages where ownership of land and mini-grid is well defined. Minigrid systems provide basic lighting and mobile charging to all the houses and an additional option for a fan and television. A local collection mechanism is tailored to the technical solution.

Impact
1. Ensures flexible energy access (can add on capacity and appliances)
2. Collections can be combined with land rent/other services as per ownership specification to enable easy collections.
SEWING MACHINES
(Solar + Energy Efficiency)

About
In many communities the opportunity for income generation through vocational training or creating a work (productivity) center could greatly benefit the users. In order for this to happen sustainably there are two components to this project- solar powered machines for- 1. Vocational training and 2. Improving productivity and 3. providing better opportunities. Motors of existing machines are also replaced by much more efficient motors to enable solar powering and reduce electricity or diesel costs.

Impacts
1. Increases productivity, quality of work and time taken to finish work
2. Given men/women the opportunity to start their own business
3. Provides access to skill training in under-served communities
HAWKER LIGHTING
(Individual and entrepreneur model)

About
Often lack of reliable energy access in villages prevents local businesses from thriving. Moreover, street vendors and petty shops are forced to use expensive, unclean fuel to manage businesses after sunset. This creates a large dent in their savings and prevents them from improving their business. Hawker project provides clean energy powered sufficient lighting to street vendors through an installment or a rental model. This consist or an individual or a central charging station.

Impact
1. Better lighting for display and longer hours improves livelihood by attracting more customers
2. Heavy savings on recurring unclean fuel costs
3. Since Hawkers have a daily income, flexibility to pay a daily rent to a local entrepreneur
4. Local entrepreneur initiates and expands business as need in his/her village.
WATER PUMPS

About
Solar water pumps range from Agricultural pumping, domestic and institutional requirements and micro pumping. 3 phase AC pumps and DC pumps with no battery are customized for irrigation purposes.

Impact
1. Reduced maintenance cost of motor by overcoming issues of: Low voltage (starter issues); Frequent switching between 3 phase – single phase; Transformer problems, wire burning
2. Increased convenience for the farmer: Ability to pump water during the day rather than deal with at odd times
3. Expected increase in crop yield and income
   Larger area can be covered
   Works during summer as well- reduced diesel costs
WATER PURIFICATION

About
SELCO implements solar powered community sized water purification units or villages and slums with over 30-50 households. Existing units can be solar powered. For new systems SELCO works on ground data (quality of water, course of water, community dynamics etc) to design systems appropriate for local conditions.

Impact

Economic Impact
* Reduced Cost on availing purified water
* Reduced expenditure on health
* Increased productivity time (due to time saved to access water)

Social Impact
* Entrepreneurship/ Operator mode empowers local individual from the community
* Increased well being of children enables them to learn and have better attendance in the informal school in the community
* Women need not worry about water access, source and type and hence spend time on income generating activities.
COLD STORAGE

About
Mini, medium and large scale cold storages have applications across various sectors. SELCO can package solutions for petty shops, bakeries, vegetable and fruit vendors, fish storage units/other cold storages, vaccine boxes and cooling for households purposes. SELCO works with appropriate technology partners to develop and implement sustainable cooling solutions that directly impact well being, health and livelihoods in a community.

Impact
1. Facilitates livelihoods and savings for fruit and vegetable vendors, fishermen and entrepreneurs dealing in perishable goods etc
2. Facilitates health by catering to ILRs and vaccine boxes in off grid/remote locations
3. Helps in increasing income, reducing wastage and improving accessibility for entrepreneurs, workers and communities.
COMMUNITY LIGHTING

About
Street lighting LED And CFL with varying wattages and outputs are designed and installed for community welfare.

Impact
1. Customized street lighting and area lighting for roads, schools, community centers and village panchayats
2. Makes the areas safe and secure
3. Enables activities after sunset which is crucial to development