SOLUZ, Inc.

Richard Hansen, President

Soluz Business Model

Rural Electrification: Reaching the Dispersed, Low-Density Population

REIA2000 Conference

SOLUZ, Inc.

- SOLUZ, Inc. is a business and technology development company founded in 1993.
- Mission: Help people achieve **quality of life** with **sustainable energy** and generate a **profitable return** for investors.
- Focus-Rural areas of LAC region:
  - **Soluz Dominicana (1995)**
  - **Soluz Honduras.(1998)**

Soluz, Inc.

Presentation Overview

- The Rural Electrification Challenge
- SOLUZ Business Model
- Lessons Learned---What's needed?

Rural Electrification

Global Rural Market

- World population: 6B
- Population without electricity: 2B
- Households off grid: 400M

Rural Electrification

Dominican Republic Rural Market

- Population: 8M -- Grid Coverage: 75%
- Rural Pop: 3.2 -- Grid coverage: 35%
- Population without Grid Access: 2 M
- Households off-grid: 400,000

Rural Electrification

Honduras Rural Market

- Population: 6M -- Grid Coverage: 50%
- Rural Pop: 3.6 -- Grid coverage: 15%
- Population without Grid Access: 3 M
- Households off-grid: 580,000

Rural Electrification
Grid Extension

Least Cost Approach for connecting:

- Peri-urban and Concentrated rural areas

Cost of Distribution Limits reach:

- Typically $5,000-$10,000 per km

Not Cost Effective for serving many:

- Low-density, low-demand, rural areas

Rural Electrification
Niche for Photovoltaics

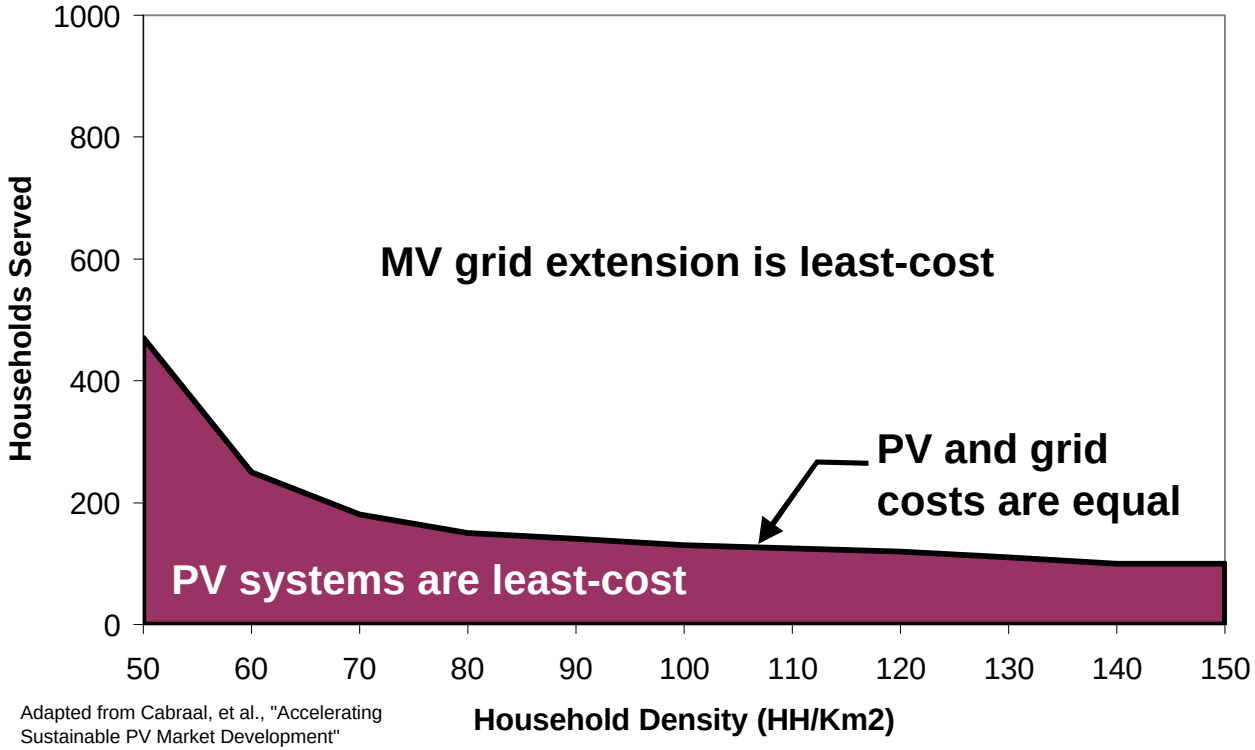
PV is a viable *pre-electrification*, appropriate for:

- Dispersed households, with
- Low energy needs, seeking
- High value from increased amounts of energy at a lower cost per unit of energy

Rural Electrification

Grid Extension vs. Distributed PV

Village Located 5 Km from MV Line

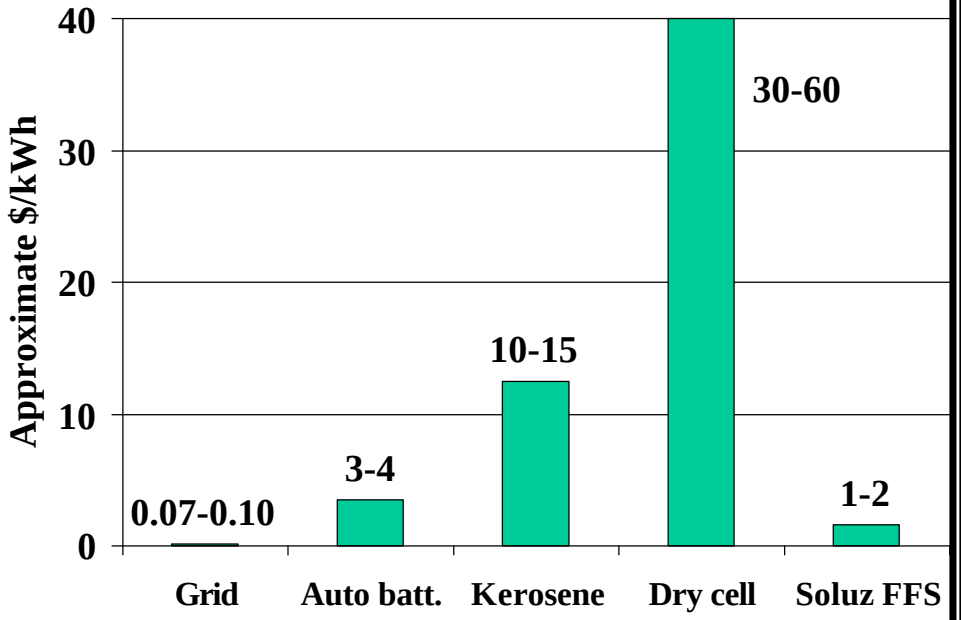


Adapted from Cabraal, et al., "Accelerating Sustainable PV Market Development"

Current Energy Sources versus PV ($/kWh)

- Urban Grid 7-10¢
  Rural Grid ?
- 12v battery $ 3-4
- Kerosene* $ 10-15
- Dry cells $ 30-60
- **PV $ 1-2**

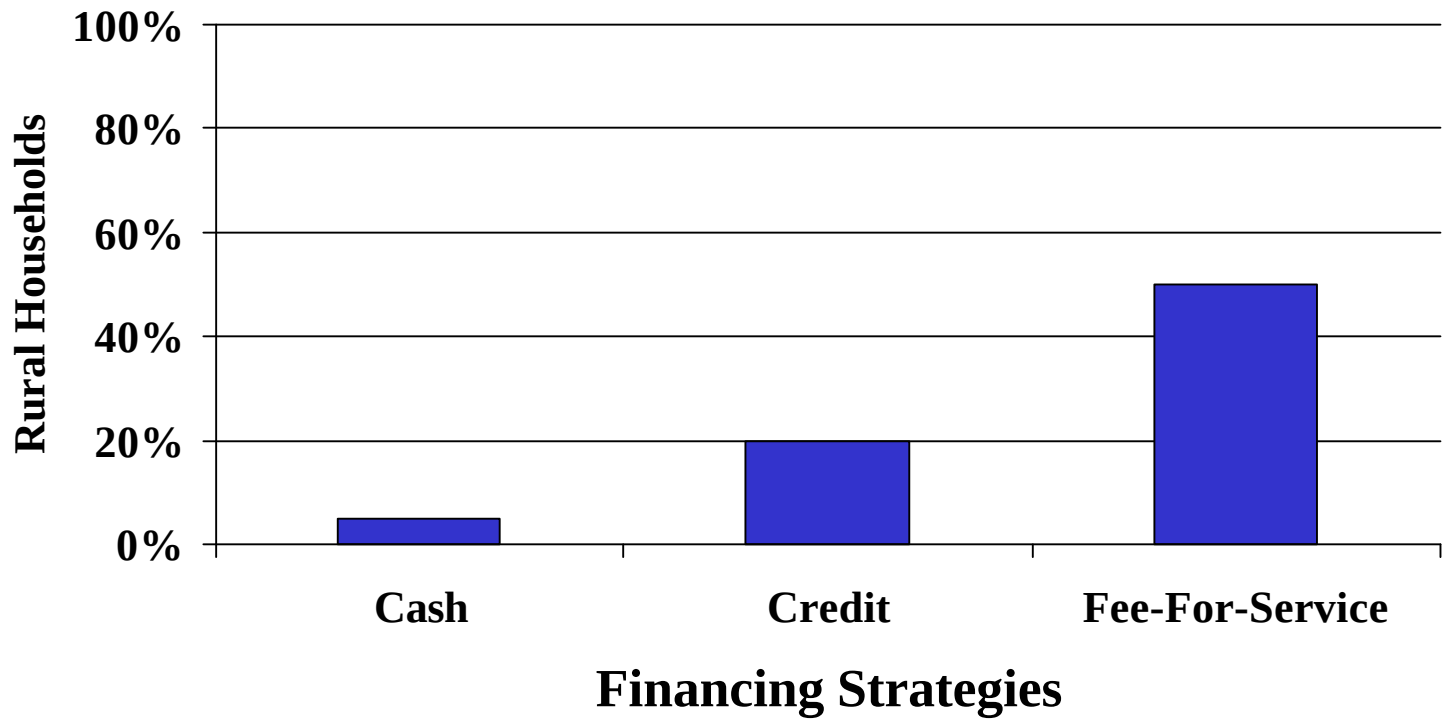
* Kerosene numbers are for lighting service equivalent to that from a CFL.



Monthly Energy Expenditures

[Expenditure graph
Median: $5.60]

Potential for PV Dissemination



Rural Electrification

Communal Niche for Photovoltaics

Rapid, cost effective, rural *public services for all*:

- Schools-Lighting, A/V, computers
- Clinics-Lighting, refrigeration
- Pumping Potable water
- Street and Community Area Lighting

Soluz Business Model
Wireless Power on Demand

- PV Rental or Fee-for-Service
- Satisfy *basic* electrical energy needs
- Target upper 50% of population
- Rural households and micro-enterprises
- Scale-up to minimum 5,000-customer
- Prepare for up to 10X: 50,000 customers

Soluz Business Model
Develop State-of-the-Art Model

PV business model development - ***Trail Blazing***:

- Business planning and financial engineering
  - Groundbreaking/small transactions are costly
- Business and technical systems development
  - Innovation/optimization of systems needed
- R&D is with actual business operations
  - Some degree of "trial and error" is necessary

Soluz Business Model

Investment Structure

- Business Model Development
  - Equity/debt & cost-share into parent company
    - Requires about $2 million during 2x5000 prove-out
- Operations Capitalization
  - Equity/debt into two subsidiaries
    - Two 5,000-customer operations - $5 Million total
    - Each 50,000-customer operation - $25 Million

Soluz Business Model

- Business Challenges:
  - Target/Serve poor, dispersed populations
  - Provide reliable, remote, quality service
  - Collect revenue efficiently
- Solutions:
  - Target able customers with right products
  - Establish local Delivery Structure
    - Local Soluz technicians
    - Collections through existing rural stores

Monthly Energy Expenditures

[Expenditure graph showing target population
Median: $5.60]

Soluz Business Model

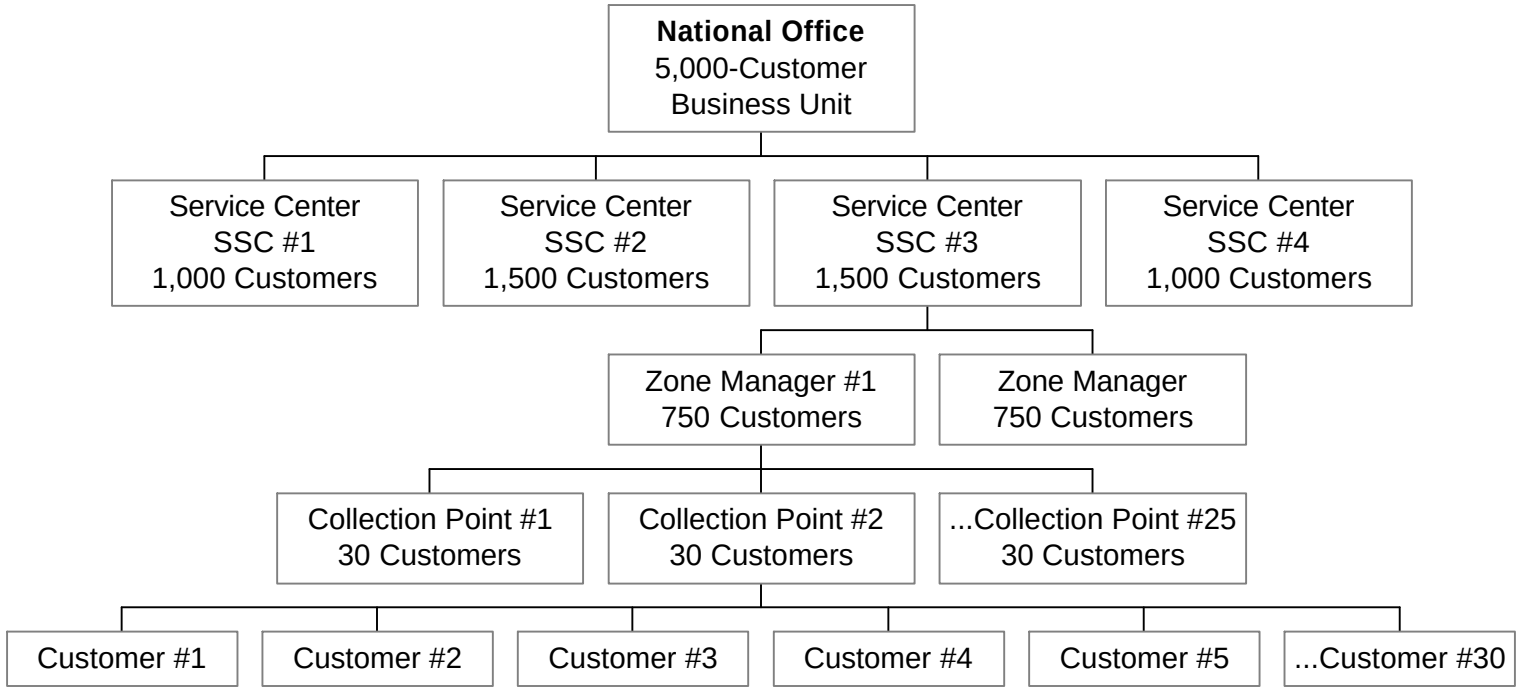
Standard PV Packages

Unit	Size	Fee	Lamps*	Energy (kWh/mth)
I	20W		1	2.4
II	30W		2	3.6
III	40W		3	4.8
IV	50W		4	6.0
V	60W	$20.00	5	7.2

* Plus radio/television

Soluz Business Model

Service Delivery Structure



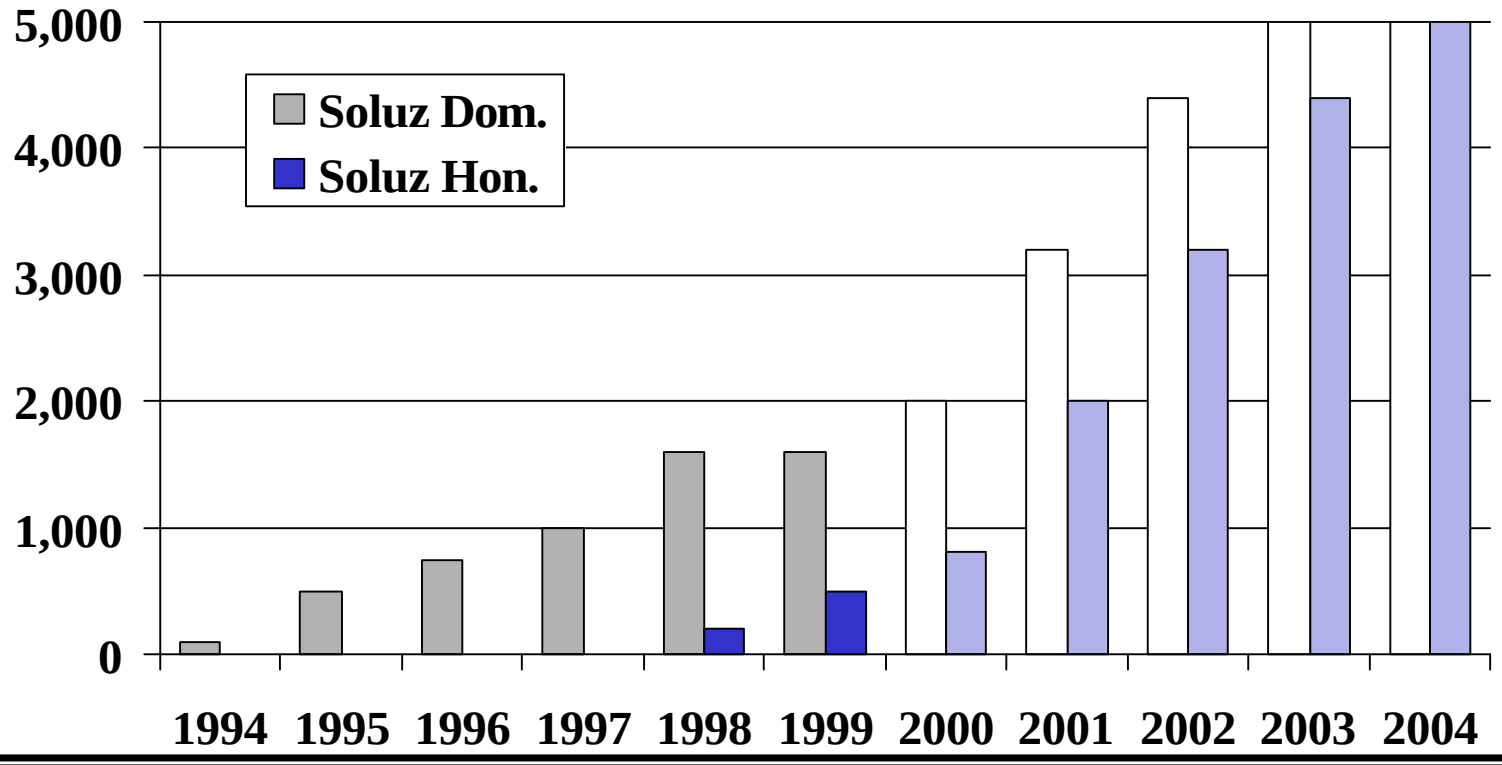
Soluz Business Model

Operation Status/Plans

	Soluz Dom.	Soluz Hon.
Market	400,000	580,000
SOLUZ ownership	73%	66%
Founded	1995	1998
Investment	$1.5M	$1.5M
Total Customers	3700	1300
FFS (sys. owned)	2000	700
Capital needed	+$1.25M	+$1.0M
Goal - 5000 FFS	***2003***	***2004***

Fee-For-Service Progression

Soluz Dominicana and Soluz Honduras



Investment Transactions

Soluz Honduras ($1.550M)

Oct 97	$50k (debt)	EEAF/CFA
Jan 98	$50k (conditional)	EEAF/CFA
Jun 98	$250k (equity)	SunLight
Jun 98	$100k (debt)	E&Co (Heinz)
Jun 99	$100k (debt)	E&Co (IDB/MIF)
Jul 2000	$500k (debt/equity)	IFC/SME (GEF)
Oct 2000	$250k (debt/equity)	CFA
Nov 2000	$250k (debt/equity)	Triodos

Soluz Business Model
Expanded Service Offer

- Public services
  - Schools - lighting, A/V
  - Clinics - lighting, refrigeration, communications
  - Community centers - lighting
  - Other - street lighting, communications
- Expanded micro-enterprise use
- Lower-income market

Lessons Learned
Market/Technical

- Proven willingness to pay $10-20/month
  - Collections management is critical
- Subsidy required for poorest
  - A partial payment for small *lifeline* systems
- Technical Design Optimization
  - R&D for improved reliability and cost

Lessons Learned

Potential Private Roles

- Role of private companies in PV *delivery*
  - Great potential for lead role to build efficient FFS delivery operations
  - Attracting private capital is a key role
  - …but rural experience on team is critical
- Role of local NGOs - *can* help in PV *usage*
  - Rural development NGOs - communal services
  - Micro-credit NGOs - end-user credit niche

Lessons Learned

Financial-Equity/Debt Transactions

- PV Fee-For-Service
  - is ***new---high risk---capital intensive***

  ...all factors still limiting commercial growth rate
- Financial transaction costs with new funding mechanisms are high (10%-20%)
- Typical pipeline-to-closure cycle time is long = 1-2 yrs (up to 3-5 yrs)

What Would Make a Difference?
Financing of *Innovation*

- There is a ***delivery innovation*** cost-sharing gap for private rural PV delivery.
- Developing PV business models for rural energy delivery requires risk-taking but has a high benchmarking value for ***all***.
- Trail Blazers - fuel a few business operations to ***lead/leverage*** the way.

Lessons Learned

Policy/Regulatory

- Government can affect private PV efforts
  - Subsidies can undermine market
  - Grid extension can negatively affect PV plans
- Integrate - public services/private delivery
  - Clinics - Health Department
  - Schools - Education Department
  - Community water delivery - Water Dept.

What Could Make a Difference?

Policy - manage risk for *50,000 scale*

- Rural electrification planning/linkage:
  - Access to transparent RE plans
  - Policy of compensation for value of private PV "pre-electrification" when grid is extended
  - Concessions/licensing for large-scale plans
  - Rural electrification loans for PV delivery
  - Ongoing service subsidies to extend a minimal "lifeline" service ***to the poor***

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Solar Electric Energy Delivery™

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