

# Fuelling the Future of a Billion of Poor

## JABA Village's Experiment with

### **A D I R E**

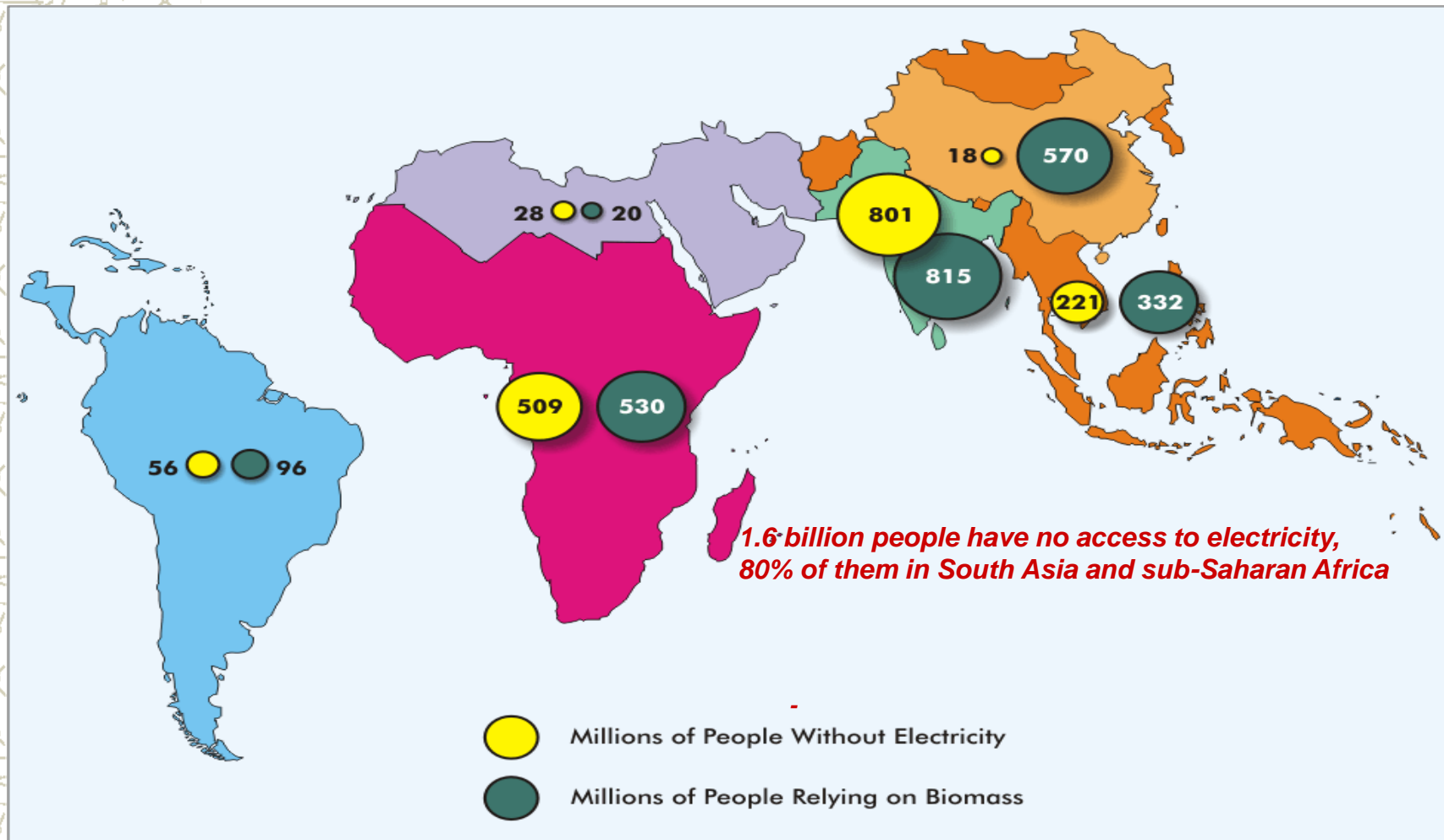
“Alternate **D**evelopment **I**nitiatives with **R**enewable **E**nergy”

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# Energy & Income Poverty Indian Sub Continent and Africa



# Fuel of Growth for A Billion Rich

(Approx GDP 1985 USD / Capita from Robert Lucas AER, 2004)

Year Dominant fuel	USA/ UK	France/ Germany	Japan	India
1800 Muscle power	600	600	600	600
1850 hydro / wind	1200	600	600	600
1900 Coal	3600	1200	600	600
1950 Oil	7200	3600	1200	600
2000 Electricity -coal, nuclear,gas	16000 330m	12000 140m	14000 120m	1200 1000m(People)

# The Problem in India

- ✱ India has 600,000 villages of 700 million people of which only 30% have electricity and clean cooking fuel
- ✱ Very remote possibility of connecting all the villages to grid system
- ✱ Manure and low cost wood are widely used as cooking fuel creating health hazards
- ✱ People crowding nearby cities in search of better lives
- ✱ National development depends on rural development

# Urban Capitalism ?

700m in India, 750 m in China and 1 b elsewhere: all Rural People are Cut off

China found rural incomes last year averaged only about \$355, less than a third of urban incomes. 26 million rural Chinese live in absolute poverty, earning less than \$80 a year.

<http://edition.cnn.com/2005/WORLD/asiapcf/08/22/china.stability.reuter>

In India, although much of the west and south may have a large middle class by 2020, a number of [rural] regions such as Bihar, Uttar Pradesh, and Orissa will remain underdeveloped

**Report of the National Intelligence Council's 2020 Project**

Annual rural income in Orissa (30 million people, 80%) is less than 100 dollar!

# Pitfalls and Risks

- ☛ Resources Plenty but Hands full with Crises
- ☛ Struggle for wealth distribution
- ☛ No Willingness to Support Chronically Poor
  - Aid Flows only for Tsunami/Hurricane/Earthquake
  - Low Financial Aid in Real Terms for Improving Economy
    - Prescribing Market Based Solution Where Exists only Barter!
    - Global Firms' Reluctance to Enter Rural Market
- ☛ Foreign Aid Neither Sufficient Nor Necessary

# What Grameen Bank's Md. Yunus Says

Foreign aid is less apt to accelerate economies or to improve people's lives.

- The only people benefiting from this aid are those who are already wealthy, though they do so in the name of the poor," he says.

"Maybe it's not that people are not credit worthy but that banks are not people worthy."

What is needed is a direct investment in local people to create entrepreneurial opportunities and economic growth from the bottom up.



# Rural Capitalism with Low Risk Clean Technologies

## Rural Residences

- Solar Light/Appliances
- Biogas Cooking
- Low Cost Rural Housing /Low Cost Health
- Solar Home (Coming Soon)

## Rural Business and Industry

- Biomass/Biogas Power
- Micro Hydro/Mini Grid

## Rural Transportation

- Minimized Travel/ Healthy Bicycle Mobility
- Bio Diesel Bus/Car(Coming Soon)
- Agricultural Tractor/Machinery need Biodiesel

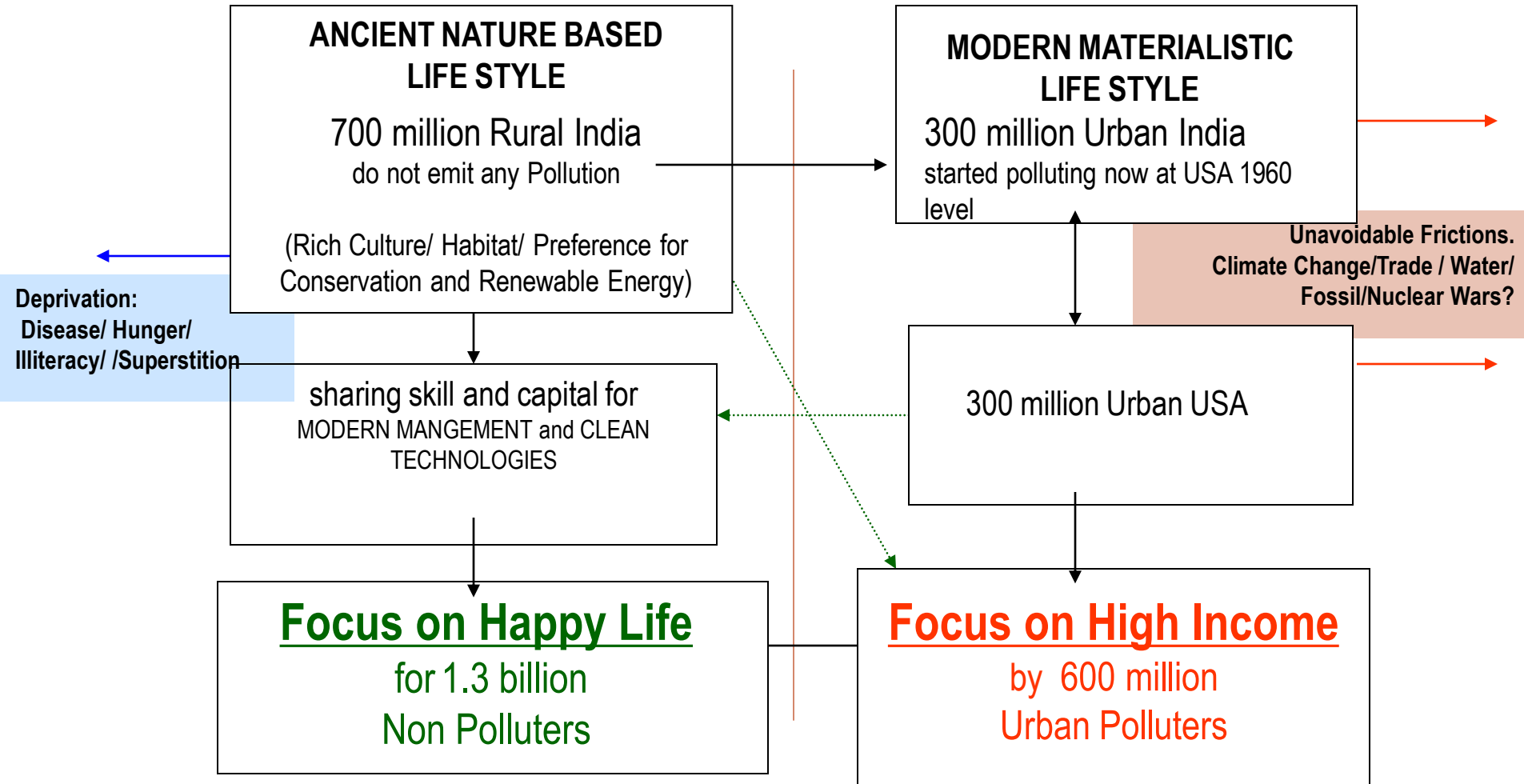


# DEVELOPMENT PATH TO MODERNITY (ADIRE)

## Sustainable Transition

vs.

## Unsustainable Present



# ADIRE Case Study



# A D I R E Project's Uniqueness



## Bypass Energy ladder with Modern Technology

- Leapfrog from Muscle Power / Ancient Biomass to Modern Renewables
- Modern Technology: SPV Powered Laptop, LCD TV, and Internet



## Modern Management

- Individual and Self Help Group
- No Government
- No International Official Aid



## Thrust on Local Income and Happy Life

- Rural Employment
- Beautifying and Modernizing Rural Areas to Keep the Cities Beautiful



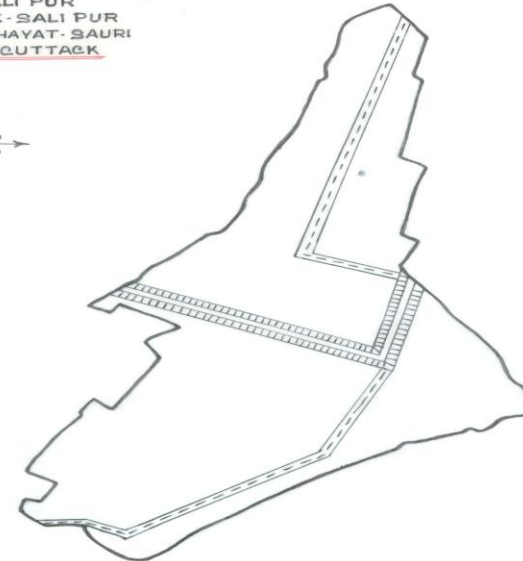
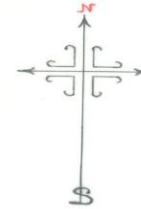
## Distributed Energy and Dispersed Development

# Demography and Lifestyle

- Population 417
- Households
  - 100 (Income < 100\$/m)
  - 4 (Income > 500\$/m)
- Farm Earners 87 (21%) 135 Acres
- Cash Earners 48 (12%) Jobs/Business
- Toilets 30 **+30** from 2003
- Water Pump 10 **+10** from 2003
- Energy in households

• Wood/ Dung	All	Non-commercial
• Kerosene	All	Subsidized
• Electricity	40 from 1970	Subsidized
• LPG	6 from 1995	Subsidized
• Biogas	4 from 2003	Unsubsidized economically
• Solar Lantern	22 from 2003	Unsubsidized financially

JAHANGIRA BAD  
Ps. SALI PUR  
BLOCK - SALI PUR  
PANCHAYAT - SAURI  
DIST. CUTTACK

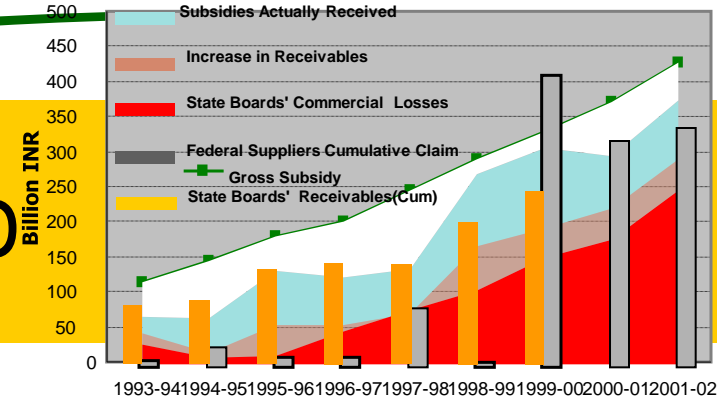


	CANAL
	ROAD

## Energy Use in JABA in 2002 with Their Cash Cost

	Quantity	Unit Price US Cents	Total USD	% Income spent
<b>Electricity</b>	100 kWh	6	6	6%
<b>Biomass</b>	80 kg	3	2.4	2.4%
<b>Cattle Manure</b>	10 kg	2	0.2	0.2%
<b>Kerosene</b>	3 liters	22	0.6	0.6%

# Rural Electricity Fiasco



- With Low collection rates and low tariffs, the quality and reliability of supply to rural consumer is worse
- Does not get the quality of service, attention, and problem resolution as promptly
- The incidence of theft through illegal connections is generally higher. T&D loss 5 b dollar. 20-50% of generation
- Excessive political interference to provide low-cost or free electricity often at remote locations with low demand density.

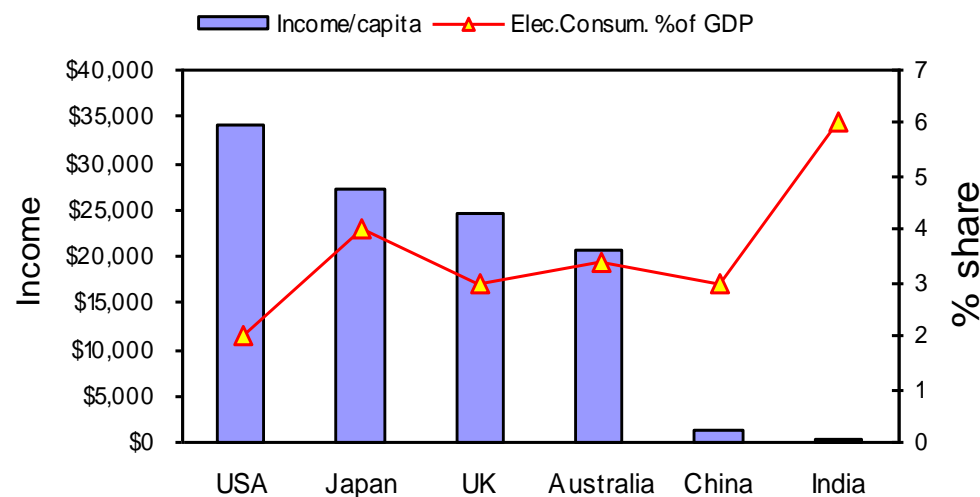


# Rising Expectation



- 💡 High-Cost
- 💡 Low Consumption

Income & Electricity Share as % of Income



When Income is Low

- A law and order issue
- Government change in India

# Distribution Grid Rural vs. Urban

The distribution system network is highly spread in Rural areas compared to Urban areas.

⚡ HV lines/ MW connected load  
>7 times  
(6.8-15.4 km Vs. 0.8-2.7 km)

⚡ LV lines/ MW connected load  
>10 times  
(20.5-46.2 km Vs. 1.2-4.1 km)

⚡ The investment required

Rural : 12 - 30 Cents/kWh;  
Urban : 2 - 5 Cents /kWh

⚡ The simple payback period

Rural : 4 - 25 years;  
Urban : 1.5 - 4 years

*(USAID sponsored Study)*

# Electric Price going up

- ⚡ Grid, An Increasing Cost Industry
- ⚡ Pollution, No more Grandfathered
- ⚡ Cross Subsidy, In Market Places?
- ⚡ Perfect Storms, Terrorism/Cyclones Chasing Reliability/Safety/Security?
- ⚡ Risks of investment
  - Technology, Regulation, Lumpy Scale Economy

# Solution for Lighting Up

Fully Loaded Cost in INR/month (USD) started 2004

Technology	Grid	Kerosene	Solar PV lantern
Capital	25	0	50
Primary Fuel	45	105	0
Back-up Fuel	75	0	35
Labor	90	180	20
Total	235 (5\$)	285 (6\$)	105 (2.2\$)

That is Why Solar Lights ?

Household Saves 2.8-3.8\$/month = 40\$/year

For 138 million HHs =5.5 billion \$/year



# Facts of Renewable Electricity



## Too little?

- Poor can only afford a little (Kerosene Vs. Solar Lamp)
- Add in small increments later



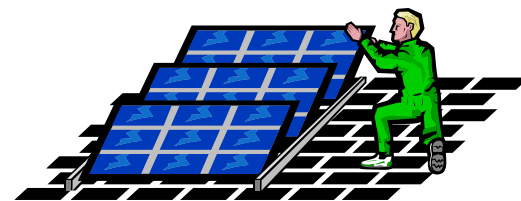
## Too Intermittent and unreliable?

- Grid Unavailable or Unreliable too
- Cooling/heating/irrigation do not need continuous supply
- Can use hybrid models



## Cannot be stored?

- Easy to store at sub-kWh level
- Willing to schedule and conserve to minimize storage
- First Conserve, Then, Design and Use (Combo Solar Lamp, TV, Laptop and Radio)



# Solution for Clean Cooking

## Costs In INR (Started 2005)

Technology	LPG	Kerosene	Biogas	Wood
Capital / Stove	1000	200	5000	10
Primary Fuel	375	400	0	250
Back-up Fuel	0	0	20	20
Labor	20	100	20	100
Total	405 (9\$)	505 (12\$)	100 (2.2\$)	370(8\$)



# Income and Employment

## ✦ Increased Income

- Flexible Work Hours
- Improved Productivity/Morale
- Health/Sanitation

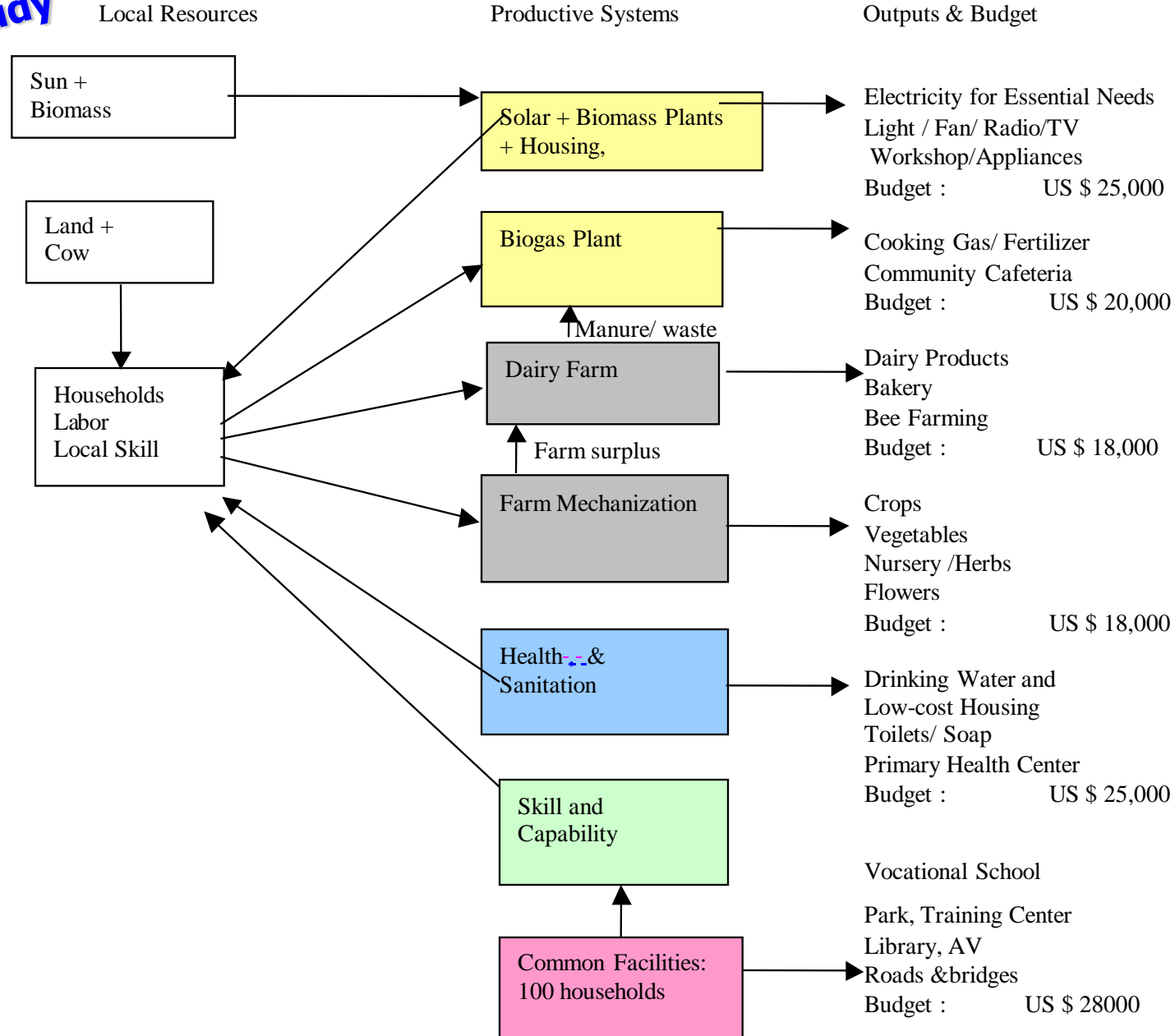
## ✦ Employment Opportunities

- Rural Energy Chain
- Rural Enterprise
- Modern Farming
- Housing and Construction



# Integrating Modern Technology in Rural Life

## ADIRE Case Study



# Capital Added by 2005 (\$20,000)



- ☛ **Tractor** added 8 productive labor, released 20 unproductive
- ☛ **Brick Machine/ Tube Wells** captured 12 surplus labor
- ☛ **Biogas Plants** provided clean cooking fuel, income and leisure
- ☛ **SPV systems/Solar Lights/ Fans** comfortable life for 100
- ☛ **Hand Tools/ Trolley/ Power Tools** convenience and income
- ☛ **Laptop/ Desktop/Mobile phone/Internet** education and skill
- ☛ **Candle Moulds/ Sewing/Knitting Machine** 5 jobs
- ☛ **Microfinance** All of the above



# What is done by 2005...

## Infrastructure

Road, Bridge, Canal Work (\$6000)





**ADIRE**  
Case Study

# Present State of Housing



Houses



# What is done by 2005...

## Housing



Energy Efficient Low Cost Housing  
Using  
Compressed Stabilized Earth Blocks





# Eco-friendly Low-cost Buildings



**House Models taken from  
Auroville Earth Institute, website**

# What is done by 2005...

## Health & Sanitation

Health Camp, Toilets, Park, Drinking Water (\$2000)









# What is done by 2005...

## Education & Skill development



Information Kiosk,  
Job Training, Off site (\$2000)



# What is done by 2005...

## Education & Skill development



**Evening School kids with teachers**





# What is done by 2005...

## Clean Energy

Solar System, Lamps, Fans  
(\$5000)



Solar Panels on the Rooftop







# Economic Development – Income Generation

**28 Jobs**, Dresses, Candles, Brick Machine,  
Tractor, School, IT, Microfinance (\$10000)



**Micro financing**



**Dress Designers**



**Candle Making**





# Social Engagement..



# Social Engagement..

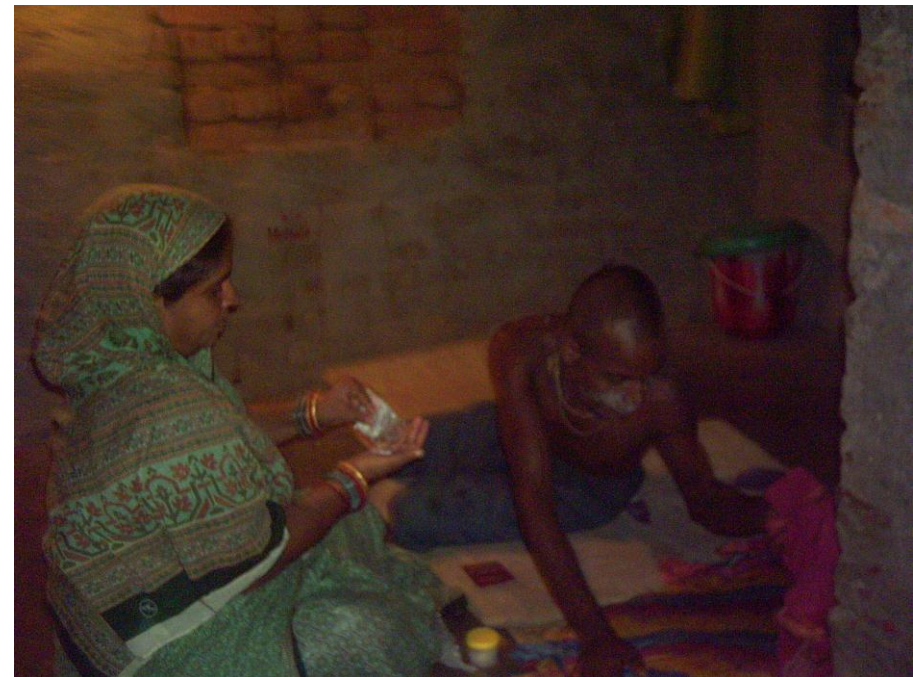


Venture Name/ Purpose	Capital Goods/ Inventory	Sources of Energy	Capacity of Energy Resources	Input Employment of Resources		
				Capital One time USD	Energy USD/ Y (Material)	Labor No of jobs
Transportation, Farming and Construction	Tractor	Diesel Engine	25 kW Engine	\$8000	\$2000	6
Low Cost Houses Construction	Brick Machine, SPV lighting	Manual Labor	2x20W SPV	\$2500	(Cement)	8
Clothes making	Stitching machine	SPV	1x10 W SPV	\$200	(Clothes)	3
Grocery, Candle making	Mould	SPV/ Paraffin	2x10W SPV	\$200	(Paraffin wax)	3
Solar Shop for leasing and maintenance	Maintaining 22 Lanterns + 3 SHS	Grid and back up SPV	1x10W SPV	\$2000	(Solar systems)	1
Microfinance for homes/shops	Office and small loans	SPV and Biogas	12x10W SPV	\$2000	-	1
Cooking and water heating	Biogas plants	Cow dung -	4 x 1 cum + Larger plan	\$600+ ?	(Bricks, Cement)	1 -
<b>TOTAL</b>	-	-	<b>180W SPV</b>	<b>\$15500</b>	<b>\$2000</b>	<b>23</b>
Canal Construction	Tractor	Labor, SPV	4x10W shared	\$2000	(Cement, Bricks)	4
Road Construction	Tractor, Solar lights	Labor, SPV	4x10W shared	\$3000	(Stones)	4
Bridge / Start up Construction	Tractor, Solar lights	Labor, SPV	4x10W shared	\$12000	(Cement)	4
Health Clinic/ Club house	House, Solar lights	SPV	1x40W	\$500	(Medicine)	1
<b>TOTAL</b>	-	-	<b>80W SPV</b>	<b>\$15500</b>	-	<b>13+</b>
Computer and communication Center /School	Laptop, TV, Video Phone Cam, Room	SHS back up to grid electricity	1x40W SPV	\$1400	\$50	4
Milk and income for poor	4 Cows	Cow dung	Supplier of energy	\$500	-	2
Old age home and health care	Medical appliances	Solar light	1x 40W SPV shared	\$300	\$50	1
Energy Fair and Health programs	Evening illumination	Solar light	1x 40W SPV shared	\$500	\$20	Part time
Cultural programs	Speakers and Mic.	Solar light	1x 40W SPV shared	\$300	\$20	Part time
<b>TOTAL</b>	-	-	<b>80W SPV</b>	<b>\$3000</b>	<b>\$140</b>	<b>7+</b>



# What is not done by 2005...

## Health & Sanitation



# Other Income Generating Activities (To start in 2006)

- Integrated Dairy Farm with Biogas Plant
- Farm Machinery with Biodiesel Plantation
- Workshop with Biomass Power Plant
- A Mobile Hospital and A Modern Village School with Solar Power





## Lessons Learnt

### 💡 Economic

- Low Income
  - High Risk Upfront Cost
  - No Microfinance Support
- Competing Interest
- High Transaction Costs

### 💡 Social

- Lack of Aspiration
- Rigid Caste Group
- Low Land Access

### 💡 Institutional

- No Training Institution
- No Skill and Enterprise
- Risk Management Structure
- NGO/ Diaspora to lead Govt./ Local Bodies

### 💡 Cultural

- Individualism/Nepotism
- Satisfied with Too Little
- Emotional to Social Customs
- No Avenues to use Talents

# Harnessing Cultural Capital

## Dysfunctional

### High Local Pollution and Internalized Cost

- Public Open Toilet System: Stomach problems and Malaria
- Daily Domestic Fuel: Fire Wood and Kerosene
- Agricultural Practices: Ancient Cultivation practice

### No Commercial Orientation

- Dependence on Government or God
- Business and Profit comes only after Good Social Relation
- Barter Economy through Labor Exchange

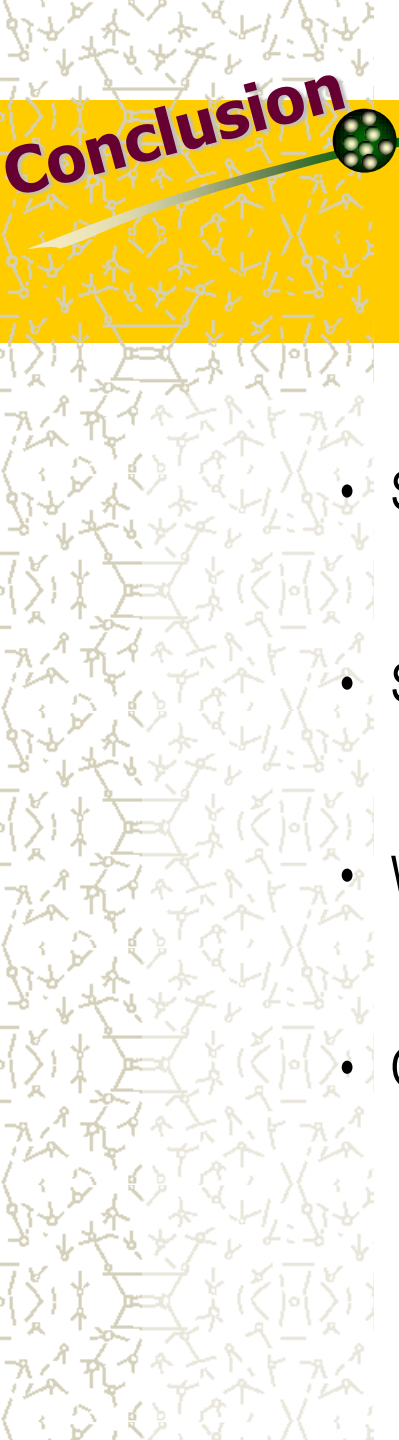
## Functionalize

### Low Global Pollution and No External Cost

- Primary Health, Sanitation, Nourishment
- Biogas cooking, Solar lighting, Biomass Power
- Tractors, SPV Pumping, Energy Plantation

### Social Entrepreneurship

- Self Help using local Skill and Labor
- Business and Profit helps Good Social Relation, practice religion better
- Labor to pay for biogas, solar, health and nourishment



## Conclusion

# Ready to Move Ahead

- Skill Training through Rotary Club
- Socio-Commercial Entrepreneurship
- Willing to Volunteer and Work in other Villages, States
- Creating interest in USA Companies (WPSC, ??)



## Conclusion

# Yunus' vision of trickle-up economics

By issuing the poor credit for self-employment, the Grameen Bank effectively creates jobs, promotes trade, and sustains local entrepreneurs. Collectively, these entrepreneurs begin to work together and assert their influence on local culture, economies, and government bodies until their impact is broad enough to influence laws, global business practices, and the political and economic status of nations.

This cycle is the key to solving the poverty problem once and for all: "These millions of small people with their millions of small pursuits can add up to create the biggest development wonder"



# Can Make a Difference

Thank You

Questions?