RURAL ENERGY

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GOALS, STRATEGIES AND POLICIES

- **GOAL = AN OBJECTIVE TO BE ACHIEVED**
- **STRATEGY = A BROAD PLAN TO ACHIEVE GOAL**
- **POLICY = A SPECIFIC COURSE OF ACTION TO IMPLEMENT A STRATEGY**

SUSTAINABLE DEVELOPMENT

= ECONOMIC GROWTH THAT IS

- ECONOMICALLY EFFICIENT
- NEED-ORIENTED AND EQUITABLE
- SELF-RELIANT
- ENVIRONMENTALLY SOUND

SUSTAINABLE DEVELOPMENT

= GROWTH --> NECESSARY CONDITION
BUT NOT SUFFICIENT; IN ADDITION,

- ECONOMY
- EQUITY
- EMPOWERMENT
- ENVIRONMENTAL SOUNDNESS

THRUST OF SUSTAINABLE DEVELOPMENT

- **POVERTY ALLEVIATION**
- **EMPOWERMENT OF WOMEN**

SUSTAINABLE RURAL DEVELOPMENT

= RURAL ECONOMIC GROWTH THAT IS

ECONOMICALLY EFFICIENT
NEED-ORIENTED AND EQUITABLE
SELF-RELIANT
ENVIRONMENTALLY SOUND

ENERGY SYSTEMS

= ENERGY SOURCES

+ ENERGY DEVICES

+ ENERGY SERVICES

SUSTAINABLE RURAL ENERGY SYSTEMS

= ENERGY SYSTEMS THAT ARE INSTRUMENTS OF SUSTAINABLE RURAL DEVELOPMENT

COMPONENTS OF STRATEGY FOR SUSTAINABLE RURAL ENERGY

- **OUTPUTS**
  - **ENERGY SERVICES**
  - **ENERGY DEVICES**
  - **ENERGY SOURCES**
- **PROCESS**
  - **PROJECT-LEVEL IMPLEMENTATION**
  - **PROGRAM-LEVEL LARGE-SCALE REPLICATION**

ENERGY AND POVERTY ALLEVIATION

- If the energy system is to promote poverty alleviation,
- (improvement of the living conditions of the poor)
- then, its focus must be on **rural poor**.

Its emphasis must be on **energy services**;
not merely on energy consumption (or supply) as an ends in themselves

Urgently required -->
improvement of energy services
to better life of the poor

Betterment of the life of the rural poor requires an improvement of the Physical Quality of Life (PQOL)
or the Human Development Index

Improvement of HDI has three crucial dimensions

- **empowerment --** strengthening of endogenous self-reliance
- **equity --** marked increase in access of poor to energy services
- **environmental soundness**

For an energy system to be in the interests of the rural poor, it must qualify from three points of view

- Is it increasing the access of the rural poor to energy services?
- Is it strengthening their self-reliance?
- Is it improving the quality of their environment (starting with their immediate environment!)

- Relationship between HDI and energy is not just a matter of conjecture
- There is an empirical basis to this relationship

Strictly speaking,
relationship must be between
energy **services** and HDI,
but if end-use efficiency is
virtually a constant,
energy consumption can be taken
as a proxy for energy services.

To a first approximation, the
relationship between HDI and
energy can be considered to have
two regimes

Regime I: the “elastic region”

- (HDI)/ E is high
- **small** inputs of energy (small improvements of energy services) **-->** **large** improvements in HDI

Regime II, the “inelastic region”.

- (HDI)/ E is small
- **large** inputs of energy are required for achieving only **small** improvements in HDI

Important implication of "elastic" Regime I

- Direct improvement of HDI can be achieved with more energy services
- Energy Services --> HDI

Shift from kerosene lamps to electric lights is example of improvement of energy services at reduced operating costs

“Elastic” Regime

- Coupling between HDI & income (for operating costs) can be reduced
- HDI can even get decoupled from income
- HDI increases w/o income increases)

Important implication of “inelastic” Regime II

- **Indirect** improvement of HDI can be achieved via increased income through improvements of energy services
- Energy Services --> Increased Income --> HDI increase

“Inelastic” Regime II

- HDI is coupled to income.
- But, income-coupled improvement of HDI depends on important conditions

Improvement of HDI via income-generation depends on

- which gender gets the income?
- what the income is used for (HDI improvement? or drink? gambling? conspicuous consumption?

Implication of "Elastic" and "Inelastic" Regions

- **Elastic region guarantees direct improvement of HDI**
- **Improvement of HDI via income depends on what income is used for**
- **Direct improvement of HDI is a necessary condition for launch of improvement via income**

Impact of energy on the HDI depends on the end-uses of energy and on the tasks that energy performs

Direct/elastic impact of energy is associated *inter alia* with, and is produced by

- Cooking (C)
- Supply of Safe water (SW)
- Lighting (L)

Indirect/"inelastic" impact of energy is associated with, and is produced by

- Electric drives(ED) [Motors, Pumps, Compressors]
- Process Heat (PH) [Processing Industries]

ENERGY SERVICES

TO IMPROVE THE HDI

- ***DIRECTLY*** **(COOKING, SAFE WATER, LIGHTING, ETC....)**
- ***INDIRECTLY*** **VIA EMPLOYMENT- AND INCOME-GENERATION (MOTORS, PROCESS HEAT, ETC....)**

ENERGY DEVICES

THAT ARE

- **UNIVERSALLY ACCESSIBLE**
- **AFFORDABLE**

CRITERIA FOR THE CHOICE OF END-USE DEVICES

Are they accessible to the rural poor?

- do devices have a low enough first cost and operating cost? or
- do they have the same/lower operating cost as traditional devices after innovative financing (to convert unacceptable initial costs into affordable operating costs)?

CRITERIA FOR THE CHOICE OF END-USE DEVICES (CONTINUED)

- are they environmentally sound?
- do they directly improves HDI? and/or generate income which (used constructively) improves HDI?
- do they benefit women?

ENERGY SOURCES

THAT ARE

DECENTRALIZED

LOCALLY AVAILABLE

SMALL-SCALE

RENEWABLE (PARTICULARLY BIOMASS-BASED)

AMENABLE TO AND FACILITATORS OF LOCAL CONTROL

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Primary sources of energy are Fuels and Electricity

- Fuels for Cooking (Stoves) and for Process Heat (Boilers/Furnaces/kilns)
- Electricity for Lighting (Lamps) and for Electric Drives (Motors, Pumps, Compressors)

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CRITERIA FOR THE CHOICE OF ENERGY SOURCES

- SOURCES THAT ARE **COMPATIBLE WITH HIGH-EFFICIENCY END-USE DEVICES**

CRITERIA FOR THE CHOICE OF ENERGY SOURCES

- SOURCES THAT **FACILITATE ACCESS BY RURAL POOR** THROUGH
  - HOME/HOUSEHOLD SYSTEMS FOR ISOLATED HOMESTEADS (LOW HOUSING DENSITY)
  - MICRO-UTILITIES AND COMMUNITY-SCALE SYSTEMS FOR COMPACT SETTLEMENTS (HIGH HOUSING DENSITY).

Access to (and penetration by) home systems depends upon the cost of the energy source

- costly sources restrict access
- cheap sources facilitate widespread penetration

- Household systems commandeer capital, energy resources and entrepreneurship
- Are micro-utilities (which increase access by rural poor) therefore preempted by household systems?

- Elitist energy sources are sources
  - –that are **inaccessible** to rural poor (i.e... accessible only to rural elite)
  - –that can only be afforded by the rural elite (they are beyond the means of the rural poor).

Window of technological opportunity

- upper-bounded (after the most favorable financing scheme) by the maximum possible household expenditure on energy (say 15%).

Operating costs of traditional devices (e.g..., kerosene lamps) are an important bench-mark because invariably they define the maximum possible expenditure on energy

- But, (after favorable financing scheme), operating costs of proposed (improved) devices (e.g..., electric lights) can be even lower than the operating costs of traditional devices (kerosene lamps)
- Thus, technology can widen window of technological opportunity

Elitist sources and end-use devices

- bypass the rural poor
- do not alleviate poverty
- make a negligible contribution to energy system
- hardly mitigate negative environmental impacts

But, elitist sources and end-use devices can offer a small high-profit market for profit-making enterprises

IMPORTANT QUESTIONS

- Do elitist sources/devices preempt the possibility of dissemination of affordable sources/devices for rural poor
- Do they hijack capital that would otherwise be used for poverty alleviation?

IMPORTANT QUESTIONS

- **Do they divert resources that would be used for rural poor? [Household- size biogas plants use up the dung that could be used by community-scale plant]**
- **Is there a level playing field for elitist sources/devices and devices for rural poor?**
- **Are banks biased towards elitist sources/devices?**

PROJECT-LEVEL IMPLEMENTATION (1)

- **HARDWARE + SOFTWARE IMPLEMENTATION PACKAGES (IMPACKS)**
- **PEOPLE'S PARTICIPATION (AS INDIVIDUALS, HOUSEHOLDS AND/OR COMMUNITIES)**
- **KEY ROLE FOR WOMEN AS USERS, OPERATORS AND ENTREPRENEURS**

WOMEN AND ENERGY

- **WORK LONGER HOURS**
- **PERFORM THE BACK-BREAKING TASKS**
- **ARE DISPLACED BY AGRICULTURAL MECHANIZATION**
- **INTAKE LESS FOOD**
- **SUFFER HEALTH HAZARDS OF TRADITIONAL BIOMASS-BASED COOKING**
- **SUFFER HEALTH EFFECTS OF ENERGY SCARCITY**

SOCIAL & GENDER IMPACT OF SCARCITY OF ENERGY SERVICES

- **LACK OF SATISFACTION OF BASIC NEEDS AGGRAVATES WOMEN'S POWERLESSNESS & DISADVANTAGES**
- **LOW LEVELS OF ENERGY SERVICES ARE MAJOR BARRIER TO RAISING STATUS OF WOMEN**
- **APPROPRIATE ENERGY TECHNOLOGIES --> PRE-CONDITION FOR RAISING LIVING STANDARDS**

ENGENDERING ENERGY SERVICES

- **ENERGY FOR**
  - **SAFE AND SUFFICIENT WATER**
  - **COOKING**
  - **RELIEVING CHILDREN FROM WORKING AND FACILITATING SCHOOLING**
  - **EMPLOYMENT**

EMPOWERING WOMEN THRU ENERGY ENTREPRENEURSHIP

- **WOMEN PLAY A CRUCIAL ROLE IN MANAGEMENT OF ENERGY RESOURCES (BIOMASS)**
- **WOMEN AS PRIME BENEFICIARIES ARE BEGINNING TO PLAY A KEY ROLE IN REWSUs**
- **WOMEN ARE POTENTIALLY THE BEST MANAGERS OF ENERGY ENTERPRISES**

WOMEN ENERGY ENTREPRENEURS

- **PLAY A CRUCIAL ROLE IN MICRO-ENTERPRISES**
- **EXCELLENT RECORD OF LOAN REPAYMENTS & WISE USE OF LOANS**
- **BETTER INVESTORS AND PLANNERS**
- **SEEM TO THINK IN TERMS OF STEPS AND CONSENSUS**
- **THINK OF THE LONG-TERM & NEXT GENERATION (LOWER DISCOUNT RATE)**

PROJECT-LEVEL IMPLEMENTATION (2)

- **LEAST-COST MIX OF SOURCE-DEVICE PACKAGES**
- **COMMUNITY-BASED SUPPLY OF SOURCES (IF COST OF SOURCES FOR N HOUSEHOLDS + COST OF DISTRIBUTION NETWORK < COST OF N HOUSEHOLD-LEVEL SOURCES)**

PROJECT-LEVEL IMPLEMENTATION (3)

- **LEVEL PLAYING FIELD FOR CENTRALIZED AND DECENTRALIZED SUPPLY**
- **LEVEL PLAYING FIELD FOR SUPPLY EXPANSION AND END-USE DEVICES**

PROJECT-LEVEL IMPLEMENTATION (4)

- **ELECTRIFICATION OF HOMES**
- **GASEOUS FUEL (FOR COOKING & HEATING) HOMES**

PROGRAM-LEVEL LARGE-SCALE REPLICATION

- **“CONCESSION” APPROACH TO REPLICATION**
- **PRE-CONSTRUCTION AWARENESS-BUILDING & MOTIVATION PHASE**
- **CONSTRUCTION PHASE**
- **OPERATION AND MAINTENANCE PHASE**

REQUIRED --> A VISION

- **VISION =**
- **PARADIGM**
- **+ REALISTIC MEASURES**
- **(PROJECTS AND PROGRAMS)**