



ENERGY AND POVERTY ALLEVIATION

Amulya K.N. Reddy
International Energy Initiative



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 rural 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**



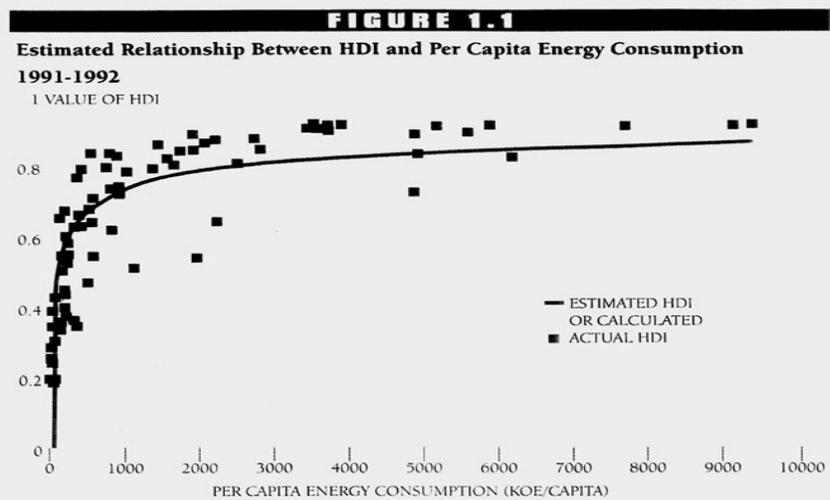
For an energy system to be in the interests of the rural poor, it must qualify from three points of view



- 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



Note: Data for 100 developed and developing countries.

Source: Author's calculations based on data in United Nations Development Program, *Human Development Report*, 1992, 1993, 1994 editions (New York: Oxford University Press).



- 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

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

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

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

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



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)



All these primary sources, end-uses and devices have an impact on the HDI



Assessment of Rural Energy Systems

- Attention must be focussed on
 - both the Supply and Demand aspects of the energy system (not only on the supply aspects)
 - the **whole “fuel” cycle** from Energy Source to Energy Service via Fuels/Electricity, end-use device, etc.



Assessment of Rural Energy Systems

- There must be an emphasis on Energy **Sources** (Fuels and/or Electricity) and Efficient **End-use Devices**



Criteria for the choice of energy sources (Fuels and/or Electricity)

- **Decentralized/Locally** available sources (to strengthen self-reliance and to empower people/communities)
- **Renewable** sources to promote environmental soundness



Criteria for the choice of energy sources (continued)

- Sources that are **compatible with high-efficiency end-use devices**
- 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).

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

- costly sources restrict access
- cheap sources facilitate widespread penetration

iei

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

iei 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)?

iei Criteria for the choice of End-
use Devices (continued)

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



- 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?**



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