



Energy access and human development

Srinivasan Iyer

Energy Access for Sustainable
Human Development

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Human Development and energy access

Human Development indicators

- Life expectancy at birth
- Mean (and expected) years of schooling
- Per capital income at PPP

Energy access indicators:

- Access to clean cooking fuels
- Access to electricity

Is there a clear relationship between Access to Energy and Human Development



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Does energy access contribute to Human Development

- Analysis of HDI (2011) and UNDP-WHO data on energy access (2009)
- There is generally a good fit between HDI and energy access (household electrification and access to clean cooking fuels)
- But the correlation is less strong when one compares energy access with mean years of schooling and life expectancy at birth, particularly in the lower end of MICs;
- While better HDI is associated with higher levels of electricity access, there is variation in HDI among countries scoring the same in energy access:
 - Zimbabwe at very low levels of income, have high levels of energy access
 - Madagascar has a high life expectancy despite low energy access
 - Botswana has low energy access despite high per capita income



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India: energy sector

- India recognises energy as a major driver of growth and development; governments fall if they fail on the energy agenda
- Energy consumption is likely to grow at 6% to support 8% growth
- Rapid and significant policy reform in the past 15 years
- Substantial private sector investment in power generation, now 1/3rd of installed capacity
- Installed capacity is 225 GW; 12% renewables; 4.5% of power generated is through renewables
- more than 95% of villages have been electrified
- New power plants adopt highly efficient technology
- National biomass cookstoves initiative, solar mission
- Significant investment in wind power
- Energy efficiency mission



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India: macro-constraints to energy

- Chronic shortage of electricity (the peak deficit between April–December in 2010 was 10 %)
- Energy security (total extractable coal reserves in India will be exhausted within 45 years, 75% of crude oil is imported)
- The environment: electricity generation accounted for 38 % of India's greenhouse gas (GHG) emissions in 2007
- Efficiency: more than 30% of electricity generated lost in transmission and distribution
- Investment gap: private sector investment, opening financial markets to international investors, expanding bond markets for power financing (current banking crisis)
- Limited energy access

Health and access to energy



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- Life expectancy at birth
 - Immunisation
 - Cold chains: One of the key challenges to India's immunisation programme (USD 500m per year to cover 27m infants and 30m mothers every year) is the lack of power for the cold chain
 - 'safe delivery'
 - Electricity needed for health centres where 'institutional' deliveries take place
 - Drinking water
 - Energy for pumping water: one factor for local governments being unable to provide drinking water was interrupted power supply and high cost (40% of their annual budgets in Karnataka)
 - Indoor pollution
 - cooking can represent around 80% of a poor household's energy use and because poor quality, polluting indoor stoves lead to severe respiratory-related illnesses which directly cause around 3.5 million deaths globally each year
 - Improved cookstoves can raise thermal efficiency to 25% from the base of 8%, reducing fuel needs by more than half and saving one working hour per day per household
 - Globally, two million deaths and 40 million disability-adjusted life years attributable to solid fuel use



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Education and access to energy

- Mean (and expected) years of schooling
- Educational attainments
 - Domestic lighting: the number of hours that children can devote to study
 - Lighting in public spaces:
 - Time-leisure allocation: this determines parental time devoted to children's education, which is acknowledged as having high impact on school attendance and educational attainments



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Access to energy and incomes

Irrigation

10 m of India's 35m pumpsets for lifting water are diesel driven, inefficient and polluting

Post-harvest processing

Across the country, very large numbers of farmers rely on tractor-driven threshing machines; tractors of 35-45 HP capacity driving machines that require under 10 HP motors

Processing of non-timber forest produce

275m Indians harvest and process forest produce

Storage of agricultural produce

- the cost of energy through diesel gensets reduces the thin profit margins by half for milk cooperatives
- USD2 b worth fruits and vegetables wasted every year due to lack of cold storage; need to double the country's storage capacity to 61m tonnes

Motors for artisanal work



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Energy access options in India

- Grid expansion
 - Meets development aspirations and is politically viable
 - Enables easy upward mobility on the access ladder for households
 - Challenges:
 - Fiscal burden (2009-10, cost-under-recoveries by 89 major power utilities in India was USD 13billion)
 - Reliance on fossil fuels (recent estimate: generation cost of electricity based on land cost of coal was INR 3.3 per kWh, while that of renewables ranged from two to three times as much)
 - Energy security (import of fossil fuels)



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Energy access options in India

- Off-grid or parallel grid options (Pico/micro/minigrids; off-grid renewables for thermal applications)
 - High unit cost (ranging from INR 20-40 per kWh)
 - In the medium run, when grid expansion is in the offing, this cannot compete with the grid
- Provide lighting/clean cooking devices
 - Limited impact
 - 'Inferior' or 'temporary' solution
 - Challenges to implement and sustain services
 - Of the 1.3 million solar home system units set up globally by 2007, 0.5 to 1 m are operational; India's cookstoves



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Energy access elsewhere

- China: local governments, decentralised generation and distribution, linked with productive uses
- Phillipines: electricity distribution through cooperatives; market-based mechanisms for household electrification; universal service charge (cross-subsidy)
- Vietnam: created demand for electricity from dispersed small enterprises
- South Africa: electricity as basic social right; INEP grid extension, solar home systems and LPG/paraffin for off-grid



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Successes in energy access

Human beings are agents of development and must define 'energy access' goals

- Political commitment to energy access and HD
- Voice to the poor: they should help set the macro energy agenda (e.g. farmers in India?)
- generating and rationalising demand for energy: specific forms/sources/uses

Instruments that society must define to deliver on human choices on energy access

- Institutional: roles for the private sector, cross sectoral involvement (e.g. the health department) and local governments
- Capacities of state and private institutions
- Technology: agnostic: the cat that catches mice; technologies that do not lock communities on low pathways
- Markets to be designed to allocate resources and generate competitive returns to investment