Looking at household energy provision in a new way: the Sustainable Livelihoods approach by Andrew Barnett, Sussex Research Associates Limited, 33 Southdown Avenue, Brighton, BN1 6EH, UK. E-mail Andrew@sussex-research.co.uk Fax +44 (0) 1273 709504

The Sustainable Livelihoods approach is a way of looking at development which is concerned first and foremost with people. It tries to understand people's strengths (their skills, status, and possessions) and how they use these asset s to improve the quality of their lives. No single asset on its own will provide for all the many and varied requirements people seek to make their lives worthwhile.

The following tables show activities within the energy field that can make people less vulnerable. They are based on the Sustainable Livelihoods Guidance Sheets provided by DFID, and The Poverty and Transport Toolkit, produced by Lucia Hanmer , David Booth and Elizabeth Lovell at ODI, June 2000.

This is a different approach from the usual one where the starting point is the type of energy, such as electricity, oil, biomass, and so on. Access to electricity for lighting, radios and television is regarded by many people as crucial to their feeling of inclusion in the modern world; whilst the use of all forms of energy (not just electricity) in productive activities is often crucial to increasing the range, quality and productivity of income-generating production, and for transporting it to a wider market.

Table 1: Linkages between people's assets and energy

This table shows the main assets which people may possess to enable them to access energy

Capital Asset	**Link with energy intervention/improvement**
1. Natural Capital These are natural resources, such as fuelwood, which are useful for livelihoods	o The main natural capital asset of poor people is likely to be biomass for fuel. In some cases hand-dug coal and peat are natural assets for poor people. Access is affected by land ownership, climate etc and sustainability is affected by level of fuel use, changes in land use o Other energy related natural capital assets include falling water, wind, and solar insolation, but these require capital to convert them into useful energy. o Human and draft animal power form a significant 'natural' energy asset.
2. Social Capital Human relationships, belonging to groups etc.	o Networks and social relations often determine individual's access to natural resources - who can collect fuelwood from a particular location? - access to energy conversion technology that is owned by others (grain mills, baking ovens, machines for preparing land, irrigation water pumps) - access to other people's skills (electricians, engine repairers) - information about technical (and managerial) alternatives. As women do most of the fetching and carrying in poor communities their social capital of friendships and networks is likely to be particularly important.
3. Human Capital Skills, knowledge, ability to work, good health etc.	o Employment generation in construction, maintenance and provision of energy services. o Indigenous knowledge of local energy sources o Improved health of women and children from access to improved energy services for cooking which reduce indoor air pollution – one of the biggest causes of death and ill health o Improved healthcare, education, communication as a result of energy for lighting, pumping, communication and transport.
4. Physical Capital Basic infrastructure for energy, shelter, water, transport, production equipment	o Access to energy sources (electricity) and fuels (fossil and biomass fuels) o Access to *end use* technologies such as stoves, lamps, machines, radios, motors and engines etc. o Production technology to reduce human drudgery o Reliable fuels for transport

Capital Asset	Link with energy intervention/improvement
5. Financial Capital Finance to provide savings, credit, pensions etc.	o Many poor people cannot get together enough cash at one time to buy goods which would provide cash savings over the medium term future (kerosene is often bought by the cupful). o Modern renewable energy conversion technologies cost more to buy, though less to run.

Table 2: Linkages between Vulnerability and energy

People live in an environment influenced by *trends, shocks* and *seasonality*, over which they have limited or no control.

- *Trends* are long term changes, such as population, resources, national and international economics etc.
- *Shocks* include ill health, earthquakes, conflicts etc.
- *Seasonality* is the change depending on the season of year, such as prices, production, employment opportunities etc.

Vulnerability	Energy Link
1. Geography	o Amount of available biomass and the availability of falling water, wind, insolation, and other sources of energy (coal, oil, gas, geothermal energy etc). o Infrastructure, such as pipelines, power distribution. o Cost of improving energy infrastructure. o Climate determines the need for heating, and cooling
2. Location	o Remoteness adds to the costs of all energy supply options. o Remoteness may make renewable energy supply more cost effective than other options that require transportation of fuels, but may incur the cost of frequent visits from urban-based maintenance technicians.
3. Seasonality	o The need for energy fluctuates with ambient temperature, agricultural season, availability of raw materials etc. o Transport costs include installing and maintaining infrastructure and delivering fuels, equipment and spare parts, which varies with the season. o Energy supplies dependent on water, biomass, wind also vary by season. o The moisture content of biofuels, and their combustion characteristics are affected by the season
4. Population density	o The unit cost of electricity falls when a lot of people are attached to the grid o Low population density favours options such as photovoltaic systems o Rapid changes in population, eg refugees, puts particularly pressure on the sustainability of biomass and other fuels

Vulnerability	Energy Link
5. Trends in governance (including politics)	o Restructuring of the energy supply is a political process which can affect poor people's access to energy services. Where there are no explicit mechanisms to enable the very poor to gain access to energy services, this can be a major problem. o Political promises of grid electrification may undermine people's willingness to invest in alternative decentralised options.
6. Technological trends	o Massive technical change in recent years has altered people's ideas of what is possible. o Improvements in small scale energy conversion have increased efficiency and reduced costs for many technologies o The use of gas for power generation has meant that electricity can now be generated on a relatively modest scale at costs that are competitive with large coal fired plants, reducing the influence of the large utilities.
7. Shocks	o The major energy related shocks have tended to be associated with the availability and price of oil products. o All energy delivery systems are vulnerable to natural and man made disasters, to war and conflict.

Table 3: Linkages between structures, institutions, processes and energy

The importance of institutions, organisations, policies and legislation cannot be over-emphasised. They operate at all levels, from the household to the international arena, and in all spheres, from the most private to the most public - these are known as the *structures* within the framework.

Processes can be thought of as the way in which *structures* – and individuals – operate and interact. They are both crucial and complex: not only are there many types of processes operating at a variety of different levels, but there is also overlap and conflict between them.

Institution/Process	Energy Link
1. National government	o Often responsible for the supply of electricity and for the regulation of all the energy supply industries o Responsible for enabling efficient public and private sector development to take place in energy service industries. o The main source of subsidies for energy related services, energy price control and for energy taxes
2. Local government	o Often responsible for smaller scale energy infrastructure at district/local level o Responsible also for transport infrastructure o Responsible for regulation and permits associated with small scale energy retail businesses (eg electricity supply to rural bazaars, the production and sale of charcoal)

3. Community-level institutions	o Often crucially important in the mobilisation, regulation, and running of schemes to introduce decentralised energy supplies (diesel mini-grids, micro-hydro etc.)
4. Firms	o Providers of energy services and, often in partnership with government, suppliers of energy related infrastructure. o Small and micro firms are likely to be the main actors in the supply and use of improved energy services that are used by poor people (e.g.sellers of kerosene, candles and charcoal)
5. NGOs	o Can play important role in interventions to improve energy services at the local level o Represent an important source of technical and other information. o Sometimes restricted by funding, inclination or expertise to a limited range of technical options (eg specific renewables).
6. Laws	o Regulate the provision of energy services, including public health and safety. o Regulate contract procedures for infrastructure construction o Determine the monopoly powers of the state and utilities in the supply of energy services.
7. Gender relations	o Women are the main users and suppliers of energy at the household level in poor communities. The impact on poverty of energy related interventions will be largely determined by the end-use technologies that are adopted. The gender impact will thus depend on the extent to which women are involved in decision-making.
8. Other Power Relations	o Village hierarchies, caste, belief systems play important roles (access to common property resources for fuel wood collection; access to credit; access to information; the 'rights' to set up retail outlets, etc) o Religious beliefs are particularly significant in determining cooking practices, and the use of certain types of fuel (pig waste, human waste etc)

Table 4. Energy related Livelihood Strategies

The Sustainable Livelihoods approach seeks to promote choice, opportunity and diversity to enable people to achieve their livelihood goals, including productive activities, investment strategies etc.

1. Gaining additional income by selling energy	o Fuels (wood, charcoal, dung, crop residues, kerosene, LPG) o Conversion Technology (stoves, lamps, batteries, motors, Photovoltaic systems
2. Gaining access to improved household energy services or fuel switching	o Improved biomass stoves o Improved lighting (from candles to kerosene to electricity initially from batteries)

3. Gaining access to improved energy services, by increasing production efficiency	o Improved energy services result in increased productivity (eg through mechanisation), which in turn results in a greater ability to pay for improved energy services.
4. Grouping with others to obtain access to improved energy services.	o Community based activities enable labour to be converted into capital (eg through civil works); cheaper connection to the grid (through group purchase of transformers and distribution systems); installing micro hydro generators, and acquiring mechanised transport services etc. Also groups can provide political or commercial pressure to gain access to energy services.

Table 5. The benefits which can be achieved

This part of the livelihood strategy reminds us that we, as outsiders, should investigate, observe and listen, rather than jumping to quick conclusions or making hasty judgements about the exact nature of the outcomes that people pursue. In particular, we should not assume that people are entirely dedicated to maximising their income, but rather, that we should recognise and seek to understand the richness of people's goals. This, in turn, will help us to understand people's priorities, why they do what they do, and where the major constraints lie.

1. More Income	o Income from: - the sale of energy services - increased productivity through improved energy provision - doing things that are impossible using only 'person-power' - extending the working day through improved lighting. - better access to fuel based transport
2. Increased well-being	o Improved household and street lighting o Reduction of indoor air pollution (improved fuels or improved stoves) o Reduced burden from fuel collection and processing o Reduced drudgery by replacing human energy with other forms of energy o Increased education as a result of better lighting in schools o Better health from health services that have access to improved lighting, cold chain storage (for vaccines), and communication o Improved access to information through radio, television and other information technology. o Sense of inclusion in the 'modern' electrified world.

3. Reduced Vulnerability	o More secure water supply from pumped irrigation o Better security lighting o More secure fuel supplies o Production based on a wider range of raw materials
4. Improved Food Security	o Improved agricultural output from energy-based mechanisation, and pumped irrigation o Improved post harvest processing and storage o Improved fuel based transport
5. More Sustainable Use of Natural Resources	o More efficient and / or sustainable use of biomass fuels, o Replacement of 'mined' biomass with more convenient, 'efficient' fuels and / or renewable fuels
6. Improving the position of women	o Reduced indoor air pollution o Reduction of time consuming tasks (fuel and water collection, milling, grinding, food preparation, and other productive tasks). o Safer night time environment due to improved lighting o Access to the outside world through radio and other information and communication technology o Better light for reading and other night time tasks. o Less frequent pregnancy (reflecting the high correlation of electric light with reduction in birth rates)

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