Off-Grid Rural Electrification in Sri Lanka

PACE Project Meeting – Uganda

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Country Background

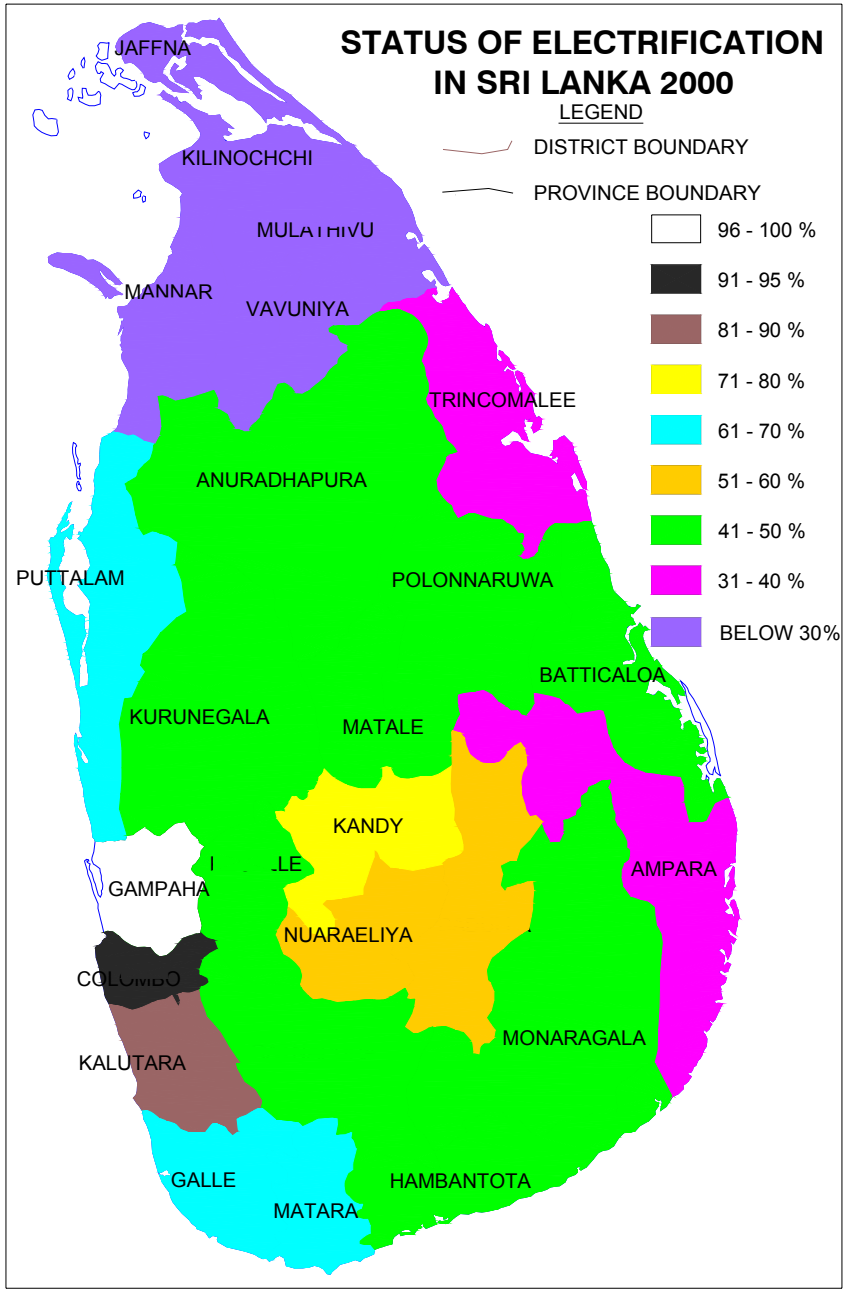
- 19 million people
- 4 million households
- Rural/urban mix – 75/25
- Agribased economy but moving towards export of labour and manufacturing
- GDP – US $ 1,000 per capita
- 20% living below poverty line
- Literacy rate – 95%

Energy Situation

- Ceylon Electricity Board is the government owned utility
- Generation capacity – 1,700 MW (60% Hydro)
- 10% annum demand growth for electricity
- Grid Electricity – 53% of households
- Off-Grid Electricity – 28,000 households (25,000 Solar PV Systems, 3,000 Micro Hydro) – Private Sector and CBO driven

More on Energy Situation

- 500,000 automotive batteries used for lighting and entertainment (TV/radio)
- 90% of rural households use biomass for cooking
- Off-grid households spend on average over 40% of their income on energy (for kerosene, dry cell batteries, battery charging etc.) as opposed to less than 10% in urban areas.


STATUS OF ELECTRIFICATION
IN SRI LANKA 2000
LEGEND
DISTRICT BOUNDARY
PROVINCE BOUNDARY
96 - 100 %
91 - 95 %
81 - 90 %
71 - 80 %
61 - 70 %
51 - 60 %
41 - 50 %
31 - 40 %
BELOW 30%
JAFFNA
KILINOCHCHI
MULATHIVU
MANNAR
VAVUNIYA
TRINCOMALEE
ANURADHAPURA
PUTTALAM
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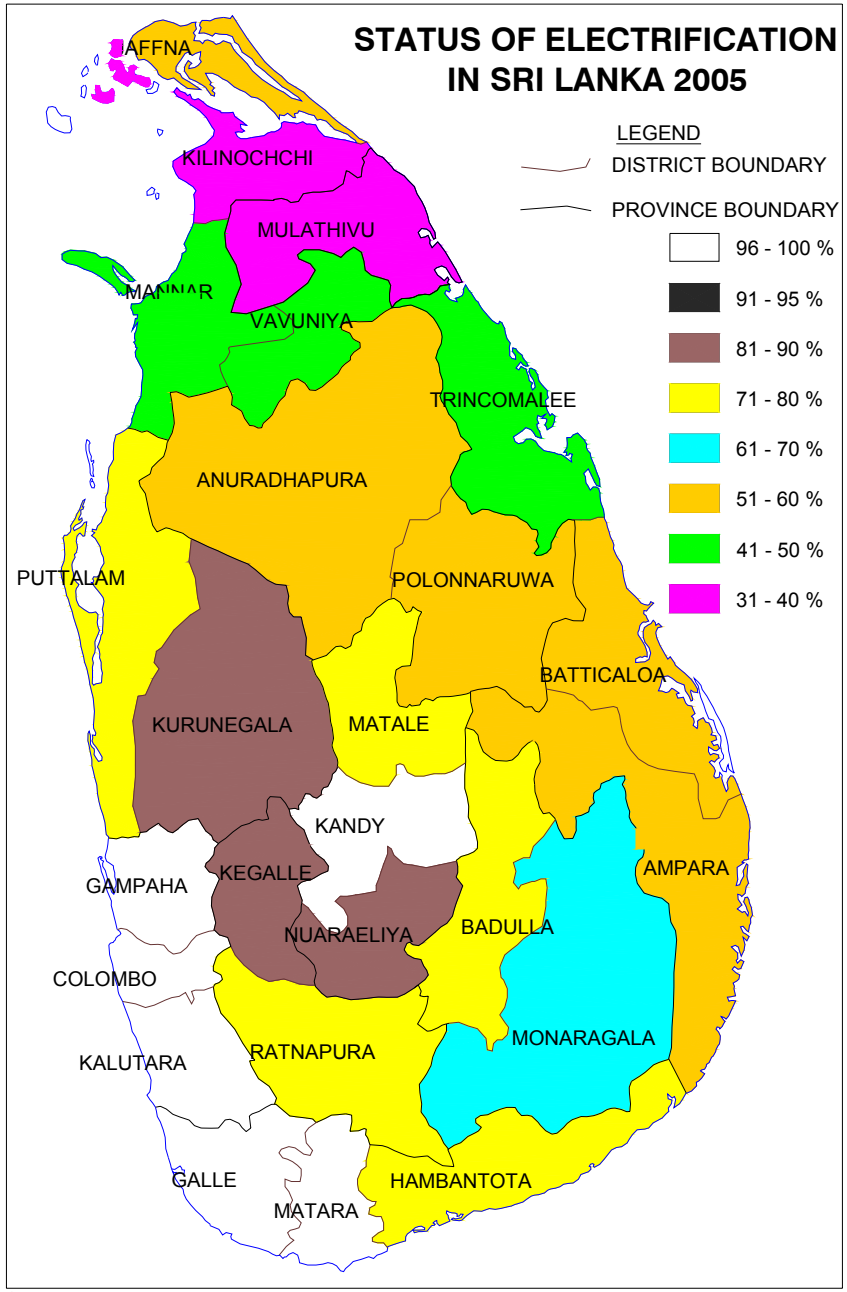
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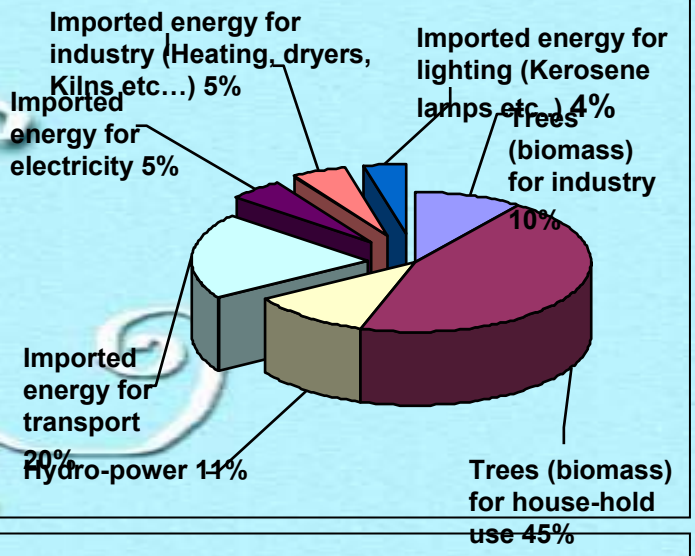
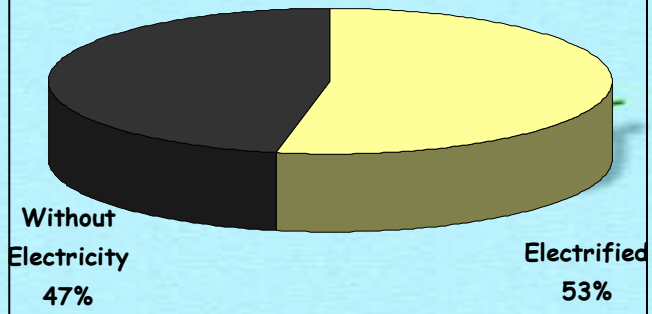
The Energy Situation in Sri Lanka

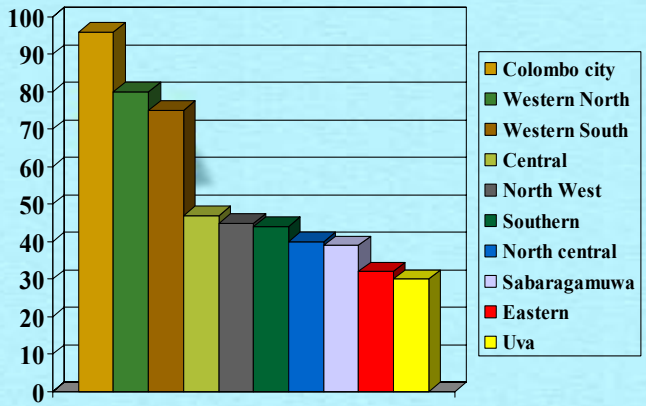
Total Energy Usage in Sri Lanka



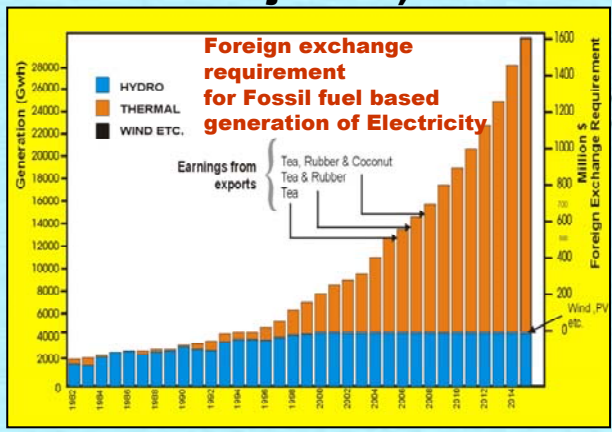
47% of the Sri Lankan Population do not have Access to National Grid



Electrification rate at Provincial level



Total Electricity Usage (Past & Projected)



Government's Motivation to Electrify Rural Areas

- Health, Education, and other Infrastructure facilities have contributed towards a comparatively high quality of life when considered in relation to the per capita income.

- The Human Development Index (HDI) for Sri Lanka is substantially above the average HDI value for developing countries.

- To maintain this trend electricity is considered an important facility.

CEB's STRATEGY FOR RURAL ELECTRIFICATION IN SRI LANKA

- Identify the electrified and unelectrified villages in rural areas
- Assess socio-economic situation of the villages
- Identify prospective developments of the village
- Define the selection criteria (based on a 12% IRR)
- Identify villages for grid extension based on a feasibility study
- Extend power lines to the village

The CEB has projected that 80% of households will get the grid 2010

Government Initiatives on Off-Grid Energy

- Government has played a pivotal role in introducing technologies such as solar PV, wind power, biogas and efficient cookstoves
- This enabled private sector and NGOs (with micro financing) to drive the commercial solar PV market in rural areas, for instance
- Sri Lankan government, World Bank, GEF project – Energy Services Delivery Project has catalyzed off-grid and renewable energy developments from 1997 (US $ 53 million)

Energy Services Delivery Project (1997-2002)

- Provide financing through private banks to companies marketing solar PV systems, developers of off-grid micro hydro systems and grid connected mini hydro
- Off-grid projects have a GEF grant of US $ 100 per solar PV system and US $ 400 per kW for micro hydro project
- Has catalyzed private public partnerships in rural electrification –
- New project Renewable Energy for Rural Economic Development (RERED) commenced in July 2002

Community Electrification Programmes

- Micro Hydro (also known as Village Hydro) programme was initiated by ITDG by mobilizing village communities and introducing simple technology
- Over 130 such projects exists operated through an Electricity Consumer Society (ECS)
- Last 20 projects have been commercially funded through the ESD project

Micro (Village) Hydro Projects

- These are essentially private/public/community partnerships
- Project is owned by the community (ECS), funded by the commercial banks, subsidized by government (provincial council), supported by a private consulting company (technical, business feasibilities and bankable proposals), approvals from district/divisional secretariats (for land use, environmental clearances)

Solar PV Market Initiatives

- Private sector driven
- Has sold and installed about 28,000 systems to off-grid households using dealers and retail sales centers since 1988
- Currently 5 commercial companies (Shell, Selco, Alpha Thermal, Access, Energyworks) have 50 sales centers
- Sarvodaya SEEDS and one commercial bank (Bank of Ceylon) offers micro financing in partnership with vendors

Solar PV System Projects

- New initiative from Uva Provincial Council to subsidize solar PV systems for off-grid homes in the province with Rs. 10,000 (US $ 100)
- Subsidy is given to the vendor once proof of sale (with the discount) and installation is provided to the provincial government
- This partnership is complemented by NGOs providing micro financing

Barriers to Development

Ten years of off-grid energy market development has created much awareness of the role of technologies such as solar PV and micro hydro…..However:

- There are yet some general barriers at the government level where off-grid energy is not incorporated into mainstream energy policy, which only focuses on large scale generation and grid extension – *Politicians yet offer grid extension for votes*

Barriers continued….

- The Electricity Act allows only the CEB to generate and sell electricity to consumers. As such, the micro hydro projects are not legal. They operate as independent cooperatives and charge a membership fee from consumers.
- Standards for technical equipment, safety cannot be enforced within the law for these projects

Barriers continued….

- Funding will be a problem once the World Bank projects end (The ESD and the new RERED project has technical assistance funds for a project facilitator to assist the community from the start to commissioning)

Public Private Partnerships

It is accepted that the private sector or CBOs alone cannot reach the entire market and also have an impact on rural livelihoods. So, Public/Private Partnerships are essential.

- Micro (village) hydro projects are good examples to work with to further develop the area so they become independent of the donor aid programmes
- The Uva province solar PV project is a good example of private/public/MFI partnerships

How Have All These Initiatives Effected Poverty ?

- There is a common notion that electrification brings economic benefits
  - Productivity growth in Industries
  - Substantial savings in fuel & maintenance costs
  - Able to engage in more productive hours
- In reality this not the case in the short-term even in areas where the CEB grid has been extended to

Effect on Poverty

- **However, there are localized benefits to households**
  - **Improvement in quality of life**
  - **Better health from improved indoor air quality**
  - **Children can study longer hours resulting in better performance**
  - **Access to information and entertainment (TV/Radio)**
  - **Security**
- **These would bring about longer term benefits to the community leading to future economic growth**

Off-Grid Technologies & Poverty

- Solar PV provides for basic requirement only, but could extend the hours for a village grocer or a sewing business
- Micro Hydro has potential for community based income generation activities such operating a rice mill, battery charging center
- New technologies such as biomass based dendro power has potential for out growers to provide fuelwood to gasifier

A Matrix for Assessing Effect on Poverty

Source: MEND Project funded by UK-DFID (Ghana, Bangladesh, Columbia, Sri Lanka) – June 2002

Criteria	**Solar PV Household**	**Micro Hydro**	**Grid**
Income	X	XX	XXX
Water			XX
Transport			
Employment	X	X	XX
Energy provision	XX	XX	XX

A Matrix for Assessing Effect on Poverty

Source: MEND Project funded by DFID (Ghana, Bangladesh, Columbia, Sri Lanka) – June 2002

Criteria	**Solar PV Household**	**Micro Hydro**	**Grid**
Education	X	X	X
Food Security		X	XX
Health	XX	XX	XX
Housing			

A Matrix for Assessing Effect on Poverty

Source: MEND Project funded by DFID (Ghana, Bangladesh, Columbia, Sri Lanka) – June 2002

Criteria	**Solar PV Household**	**Micro Hydro**	**Grid**
Crime/ Security/ Peace	X	X	XX
Sanitation			XX
Social Exclusion	X	X	XX

Effects on Poverty – Some Findings

- Energy alone does not contribute to poverty alleviation
- The macro economic situation in the country has to be sound
- There must be a need and a market for rural produce/services
- There must be access (roads, telecommunications)

Therefore, energy is only one contributor to enhance rural livelihoods, but it does improve the quality of life.

The Renewable Energy for Rural Economic Development – addressing energy and livelihoods

- Sri Lankan Government, World Bank and GEF project as a continuation of the ESD project established to improve quality of life in rural areas by providing electricity access to remote communities through off-grid renewable energy technologies through private sector participation.

The RERED Project Goal

- Provide electricity access to 100,000 households and 1,000 rural small and medium enterprises and public institutions directly through off-grid solar, community hydro and biomass systems, leading to measurable increases in household income and quality of life.

This 5 year US $ 133 million project commenced in July 2002 as the ESD project ended

The RERED Project

- The RERED project will be a real test in the linkage between poverty and rural electrification
- This project can be successful only through genuine public/private/financing/NGO/CBO/donor agency partnerships

In Conclusion

- There is a new paradigm in energy supply with off-grid technologies where the private sector and NGOs and not government utilities alone are playing a role
- There is decentralization and more end-user participation in the process
- Improving of rural livelihoods will also require creative thinking to break old ways of doing things and involving the stakeholders to participate and make decisions – *governments have to play the role of facilitator and promoter to enable this*