

Income Generation

Dendro power, by its very nature, has the capability of cogeneration. Utilizing dendro power purely for power generation is inefficient as the thermal power produced is released to the environment as waste heat. Additionally the plant factor of off-grid schemes is very low as the power consumption is often limited to four hours a day (between 6.30 p.m. - 10.30 p.m.). This low plant factor affects the rate of return on the investment.

The solution to this would be introducing an income generating activity into the village dendro schemes to tap the thermal power and electrical power that can be generated during the daytime. It will ease the burden to the off-grid dendro power consumer and integrates rural energy supply with the rural economic development .



Capacity Building

The local manufacturers and suppliers have been consulted to find out suitable solutions to reduce the equipment capital cost. The optimal system sizes and capacities have been developed and tested. Most of the stakeholders of the rural energy services have given their concerns in developing sustainable financing mechanisms for the VDS sector. Possible grant and subsidy facilities were identified. Essential beneficiary contributions, commitments and affordability of the consumers for obtaining loan facilities for their own project were tested. Project implementing procedures and cash flow arrangements were practiced with the trained project developers at regional level for smooth administration and monitoring purposes. Possible linkages between the public-private-civil society partnerships have been defined to ensure a better environment for investing in the VDS sector. In

addition, potential international donor funding facilities for green energy and plantation are expected to dramatically increase.

The main goal was to make VDS attractive as a mainstream off-grid renewable technology option by building partnerships, promoting, developing and establishing visible results through several pilot projects which have electrified a number of off-grid villages. The day to day management of each and every project regulated by electricity consumer societies has built the capacity of trained operators from the beneficiary community in a sustainable manner. Further, based on these experiences, the Energy Forum will be looking to scale up the concept through exploring opportunities for the community based grid connected projects for heat and power requirements meeting with cross-sectoral applications and productive usage of energy.



Energy Forum

The Energy Forum is an NGO working as a network of private, public and civil society organisations in Sri Lanka to create an environment that enables the promotion and adoption of renewable and distribution energy, energy efficiency and integrated sustainable resource management mechanisms to alleviate poverty, to address energy capacity deficiencies, and to protect the environment.

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Community leads for growing their own energy



Energy Forum - Sri Lanka

Dendro Power Technology



In the socio-economic context, integrating fuel-wood as a farm-crop with a guaranteed market in the energy industry has the potential to boost the peasant agricultural economy in most developing countries in the tropics.

Producer gas can be used effectively in several applications. One application is to fuel internal combustion (IC) engines to produce shaft power for generation of electricity, water pumping, grain milling, sawing of timber, and so on. In such applications, the gasification systems are called power gasifiers. Alternatively, producer gas can be used to fuel external burners to produce heat for boilers, dryers, ovens, or kilns. In such applications, the gasifier systems are referred to as heat gasifiers.

Dendro power generation process:

1. Growing of dedicated forests with fast growing tree species having high energy yield.
2. Regular harvesting of biomass from the forest using coppicing technique – i.e. the tree as a whole is not cut down, but is only being pruned systematically.
3. Biomass cut from the forest is transported and fed into the furnace of the conventional steam turbine/generator or fed into a “gasifier” to produce a combustible gas that could be burnt in a diesel engine coupled to an electrical generator.



Energy Application in Sri Lankan Context

Growing of fuel-wood as a farm-crop and using it in thermal electricity generating plants is gaining popularity in some countries in the western world. With a year -long growing season, trees grow very much faster in the Tropics than in temperate climates. Biomass gasification is a process in which solid biomass fuels are broken down by the use of heat in an oxygen-starved environment to produce a combustible gas. Biomass fuels conducive to gasification include dry materials such as wood, charcoal, rice husks, and coconut shells. Thus, the concept of biomass based electricity generation (commonly referred to as Dendro Power) holds much promise for tropical countries.

Main advantages of this concept are that it offers energy supply security for the country, and from an environmental point of view, the process is carbon neutral, i.e. after the plantation has been established for a six month period, trees absorb CO₂ during growth and release the same amount while burning.



Fuel wood Plantation

Sustainably Grown Fuel-wood – (SGF) are varieties that can be productively converted into other forms of energy whilst ensuring that the environment is secured and without depleting the sources of supply. There are many varieties of trees that fall into this category. Some of them are Ginisiria (Gliricidia), Kaha Kona (Cassia siamea), Ipil Ipil (Leuceana Leucocephala), Kalapu Andara - Mestique (Prosopis), Casuarina, Acacia, Erythrena, Felicipium, Calliandra, Adathoda, Grevillia, Paulownia, and Cinnamon.

The main variety identified among them is Ginisiriya – (Gliricidia Sepium) .Ginisiriya is widely available in Sri Lanka particularly in the rural countryside as well as in Tea and Coconut Plantations. It is mostly used as boundary fences. It is a legume that can greatly enrich the soil. It provides shade and hence is widely applied in the Tea Plantations. It is used as supports for vegetable cultivation as well as for pepper vines. Its green matter forms an ideal base for organic fertilizer. Its leaves are an attractive fodder for goats and cattle. It is a fast growing tree that can survive the most adverse of weather conditions. It can grow in varying soil conditions and it is free from disease and pests.



Due to demographics and geographical constraints, the electricity requirement of 20% of the Sri Lankan population (i.e., 1 to 1.5 million households) will never be met by the national electricity grid. The Village Hydropower Schemes (VHS) a popular and low cost off-grid energy technology available for off-grid communities are limited to hilly areas. The potential for VHS is estimated at 1,000 villages covering about 30,000 households. Another proven off-grid technology, solar PV home systems (SHS), due to their expense can reach only about 200,000 off-grid households. Given this scenario, the proven off-grid energy technologies (i.e., solar and village hydro) have the potential to cater to only about 15-25 % of the off-grid population.

Village dendro power (bio-mass) schemes (VDS) can be constructed to serve off-grid communities that do not have the hydro potential and are unable to afford solar. However, all off-grid villages in Sri Lanka have enough barren land to establish fuel wood plantations in order to generate electricity throughout the year from Village Dendro power Schemes (VDS). Off-grid dendro power (Biomass) bereted and structured, dendro power can easily reach off-grid communities that cannot afford solar. Furthermore, dendro power is a community-based electricity generating technology that includes all households in a village irrespective of their income level.