

Renewable Energy for Rural Development in the Mekong Region

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ABSTRACT

Majority of the poor people in the Mekong region lives in rural areas where agriculture is the main provider of income and employment. Intensifying agricultural productivity and promoting non-farm livelihood activities through small and medium-scale enterprises or SMEs is key to achieving rural development and poverty alleviation. However, rural development should integrate energy development as one of its vital components.

Energy is needed in agriculture for land preparation, cultivation, irrigation, harvesting, operation of livestock and aquatic farms, and post-harvest processing. Post-harvest processing includes milling operations, various heating applications and other processes that transform agricultural products into commodities. Energy is also needed for storage and refrigeration of agricultural products, and transport of agricultural inputs and outputs. There is also 'indirect' energy needs in the form of fertilizers, herbicides, pesticides and insecticides. Energy is also needed for heating, mechanical energy and electrical energy applications by rural-based SMEs.

Rural development also means improving rural living standards. This means not only having better lighting facilities, but also having adequate social and commercial services (e.g., health, education, information, communication, entertainment, public transportation, retailing and others).

Keywords : *Renewable Energy, Rural Development, Mekong Region.*

1. PATTERN OF RURAL ENERGY USE AND SUPPLY

Energy needs in rural areas – Improving energy services to satisfy rural demand has involved mostly grid-based rural electrification focusing mostly on households and irrigation needs; and limited subsidy programmes for petroleum products to allow market penetration in rural areas. However, renewable energy systems are increasingly being proven to be a more efficient, cost effective and economic alternative to supply energy needs in rural areas. Renewable energy systems are most appropriate for sustainable and environmentally desirable rural development.

Mechanical energy needs of agriculture, post harvest processes, and non-farm based rural livelihood activities are provided mainly by human and animal power. The conventional energy supply alternatives are diesel and electric-driven engines. For electric-driven engines, electricity is obtained from the grid or from diesel generators. Renewable energy options include improved early types of

renewable technologies such as ‘waterwheels’ and ‘windmills’. Another option is the use of ‘biomass derived liquid fuels’ (e.g., vegetable oils and alcohol fuels) in retrofitted engines.

Lighting in rural areas is provided by mainly by kerosene lamps and grid-based electricity or diesel generator sets. Lighting and other small electrical energy needs are also provided by storage batteries that require periodic transportation for re-charging where facilities are available. ‘Solar photovoltaic (PV) systems’ is an option for these *small electrical applications*. Small PV systems can provide power for household and office appliances, telecommunication and medical equipment, and various DC motor applications. PVs can supply electricity needed for community and social services that can significantly help improve rural living standards.

Larger electricity demands in rural areas now supplied by the grid or diesel generator sets, could be supplied instead by decentralized community-size power plants based on renewable energy sources such as ‘hydro’, ‘wind’, ‘biomass’ ‘geothermal’ or a combination or ‘hybrid’ of two or more of these energy resources. Small-hydropower plants are already significantly used for decentralized power generation in many parts of the world. Community-size PV power plants could also be feasible.

Heating is supplied mainly by *woodfuels*, but animal dung and crop wastes are also used. Fossil fuels are the conventional alternative fuels. Cooking is the biggest heating need in rural areas. Space heating is significant in cold climates. Heating is also needed for drying, smoking, boiling, and steaming in post-harvest processing and other rural enterprises. Use of biomass will continue to be significant into the foreseeable future particularly with the application of improved and modern technologies. Use of solar energy by traditional direct sun drying is also significant, and new solar thermal devices (e.g., cookers, dryers, and collectors for heating water and air) developed for more efficient, faster and hygienic applications would also ensure further solar heating uses in the future.

Agriculture as a renewable energy source – In areas of favourable ecological conditions, ‘production forests’, ‘agroforestry systems’ and ‘fuelwood lots’ can provide renewable woody biomass through sustainable harvesting and tree management practices, making agriculture and forestry a source of sustainable energy. Agriculture plays further this role with the use of crop residues, animal dung and ‘energy crops’ as fuel. If food crop production is intensified, lands with low agricultural productivity may be freed to produce energy crops. Improved and modern technologies can convert biomass efficiently to heat, liquid fuels, mechanical energy and electricity not only for rural but also urban and industrial applications. This can make biomass production a source of income and employment to rural people and help alleviate rural poverty.

Scenario for renewable energy development in rural areas – At present, agricultural-based communities use biomass (mostly fuelwood) and human and animate power with rudimentary technologies to supply their energy needs. In the medium-term, use of secondary solid biomass fuels with improved end-use technologies and community-size decentralized small-scale renewable energy systems, together with more efficient conventional systems would be prevalent. In the long-term, use of liquid biomass fuels and larger renewable energy systems capable of serving several communities would also become viable (Figure 1).

2. RENEWABLE ENERGY FOR DEVELOPMENT OF RURAL MEKONG AREAS

Regional approach to commercializing renewable energy in the Mekong - The Mekong River as a major means for water transport has allowed communication, trade and commerce in the region. Through centuries, the river has fostered economic linkages among the countries leading to development of commercial hubs along its bank. Today, efforts are being undertaken to increase and link more the economies of these countries, promoting greater communication, trade and commerce.

These efforts are boosted by the on-going liberalization of economies of these countries, providing an impetus to the commercialization of agriculture and other rural production activities. This implies greater agriculture production and post harvest processing activities and increase operations of farm-related SMEs - all leading to expansion of energy needs in rural areas. This could also mean that energy users in rural areas could be in position to pay for the modern energy services they need as they are getting into more monetized rural economic activities. These trends should favor the commercialization of renewable energy since commercial energy demand in rural areas is increasing.

There are definite concerns on whether current efforts to develop and link further the economies in the Mekong Region are being undertaken in a sustainable manner and are not causing harm to the environment. The commercialization of renewable energy systems to provide for increasing energy needs of rural areas of the Mekong region provides one sustainable path to development. The commercialization of renewable energy for sustainable rural development in the Mekong Region could be more efficiently achieved and could attain more success if targeted at the regional level.

The integration of the local economies along the Mekong River means that markets are getting contiguous and larger. Links among urban centres found on the riverbanks are strengthened, providing more opportunities for communication, trade and commerce among the Mekong countries including rural-urban linkages; fostering further rural development in the sub-region. This provides a viable business environment for the development of SMEs that provide renewable energy services. This could also make viable local manufacturing of many renewable energy equipment and devices for the region. In fact, this is already happening if one looks at on-going trade of fuelwood and charcoal in the region. These developments provide another impetus for a sub-regional approach to a program for commercialising renewable energy supplies in the Mekong.

Barriers to renewable energy applications – There are however barriers to commercialisation of renewable energy applications as enumerated below.

- Inadequate understanding of potential use of renewable energy for rural development
- Inadequate data for characterizing and projecting energy demand for rural development
- Lack of data on renewable energy resources, particularly local-level data
- Inadequate renewable energy information available in local languages
- Lack of capabilities for formulating national and local renewable energy programmes
- Inadequate local experts for the management of field programmes
- High investment cost of renewable energy systems and the lack of financing mechanisms

- Conservative attitude of financing institutions towards funding renewable energy projects
- Institutional and policy biases towards renewable energy use such as direct and indirect subsidies on fossil fuels.

The success of the commercialisation of renewable energy for development of rural areas of the Mekong region lies in an effective regional cooperation programme that addresses these barriers.

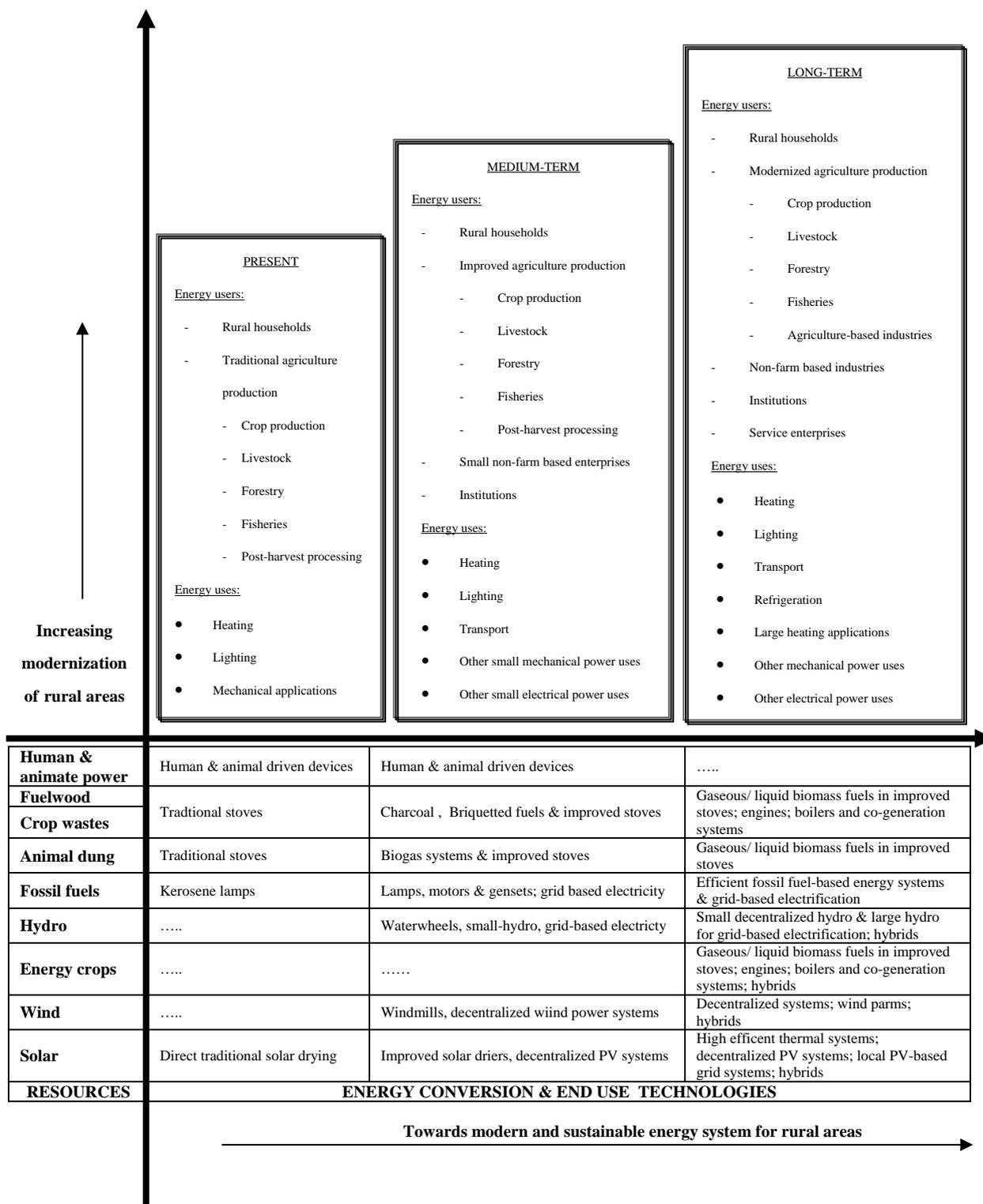


Fig. 1 Renewable energy for rural development

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