

Captive Energy Plantation for Renewable Energy in the Sundarbans, West Bengal, India

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ABSTRACT

Sundarbans in the eastern border of India and Bangladesh is the largest mangrove forest in the world. Island villages of the area suffer from lack of electricity. A project was undertaken to provide electricity to 30,000 inhabitants of five villages in an island from off-grid, stand alone, wood-based gasifier power plant. To achieve the objective, a GPS-based land use mapping was undertaken to identify common property resource to raise energy plantation; after testing the soil, selected energy plant species were raised in nursery and transplanted to the identified sites with people's participation. A working plan was drawn to ensure continuous supply of biomass using the same land area. The cost per unit of electricity produced by the method showed to be most effective. The success of the project has led the Ministry of Non-Conventional Energy, Government of India to adapt the same methodology to supply electricity to the villagers of this largest delta in the region. The paper provides details of the project from conceptualization to implementation.

1. INTRODUCTION

Sundarbans is the largest inter-tidal area of the world of approximately 26 000 km² formed by the meeting of two great river systems - Ganga and Brahmaputra with the Bay of Bengal along India and Bangladesh. The Indian part of Sundarbans covers an area of 9630 km², the rest being in Bangladesh. The area consists of a group of islands numbering 102 interspersed by innumerable rivulets, tidal rivers, and creeks. The area was originally covered by thick and impenetrable mangrove forest, which was gradually cleared from eighteenth century onward for habitation and settlement. At present 5430 km² of the area is inhabited.

Sundarbans in West Bengal is considered as a World Heritage Site besides being declared a Biosphere Reserve, Tiger Reserve (partly) and Bird Sanctuary (partly). However, the human society in the island groups still remains out of mainstream due to lack of transportation and telecommunications facilities. Furthermore, a vast area of Sundarbans still remains without electric power. Lack of educational facilities, health care, safe drinking water and sanitation continue to put hurdles to human development.

Sundarbans Biosphere Reserve has the largest human population among all biosphere reserves. Indian Sundarbans supports a population of 3.7 million, the overwhelming majority of which (94.6%) depends on agriculture while the rest depends on fishing and collection of forest produce. About 54.2% of the agrarian population is landless and 85.2% of the land owning families are small/marginal with an average land holding of 0.82 ha per family. Of the total 1060 villages in the region, at least 156 villages are likely to remain deprived of power from the main grid in the foreseeable future. They can only depend on alternative energy sources like solar energy, tidal energy, wind energy and biomass energy. To provide power at the most affordable cost, the West Bengal Renewable Energy Development Agency (WBREDA) has initiated a wood-based gasifier power project of 500 kW capacity in the

