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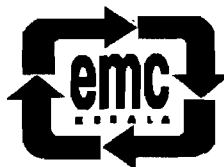
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Setting up a Community Development Centre
Powered by Hybrid Renewable Energy sources in Maldives



**UNIDO Contract No. 16001153 Project No. TF/MDV/04/001
(Fainu)**

FINAL REPORT



ENERGY MANAGEMENT CENTRE – KERALA
Sreekariyam P.O, Thiruvananthapuram
Kerala, India

Provision of services for setting up a CDC
Powered by Hybrid Renewable Energy sources In Maldives

1. Background

Maldives, small island developing country is highly vulnerable to the impacts of global warming and associated sea level rise. The rise in sea level would lead to, or exacerbate, land loss through coastal erosion and inundation and also damage human settlements and vital infrastructure. Some of the recent regional climate change has predicted that by the end of this century the temperature could increase by 2.0 - 3.8 °C and sea level rise could be between 48 cm to 95 cm. Such sea level rise poses grave danger to Maldives where over 80% of the land area is less than 1 m above mean sea level. About half of the inhabited islands and the resorts in Maldives already suffer from varying degrees of coastal zone erosion. It is expected that a 1 m rise in sea level would devastate the whole land area of Maldives. Maldives consists of 8,920 Sq Km of reef area, which represents 3.14% of the total reef area of the world. These coral reefs not only provide protection for the islands, but form the centre-piece of it's major economic drivers- tourism and fisheries. Studies show that the corals are very sensitive to changes in sea surface temperature. Unusually high sea surface temperatures in 1998 caused mass bleaching of coral reefs in the central regions of the Maldives during which the monthly mean sea surface temperature was 1.2 - 4.0 °C above

The main source of energy used for power generation in Maldives is through combustion of imported fossil fuels, mainly diesel oil. Gasoline is used to fuel automobiles and marine outboard engines providing transportation. In 2000, only 79 of the islands had electricity for 24

hours, accounting for 65% of the population. The remaining 119 islands have 5 to 12 hours of power leaving only 4 inhabited islands without any electricity. There is an imbalance in the usage of electricity between Male' and the Atolls of the Maldives. In 2002, Male' consumed around 24 million litres of diesel to produce 93 million kWh of electricity, where as in atolls 36 million kWh of electricity was generated consuming 10 million litres of diesel. The Maldivian energy sector which is almost fully dependent on imported fossil fuel sources is not consistent with the need to protect it's natural ecosystems which are it's major economic drivers.

The groundwater resources are insufficient and the small land area offers limited scope to rainwater harvesting. The use of solar distillation could provide an option to meet a national priority while providing a technology option which is environmentally sound and economically viable. Renewable energy based cogeneration of electricity and desalinated water could also promote setting up of hydroponics facility to allow women to be involved in setting up income generating activities, which is otherwise unfeasible in the island context.

2. Justification.

The energy economy of Maldives is dependent on imported fossil fuels which contribute to almost all of it's GHG emissions. Maldives being located in the equator receives over 5.5 kWh/day of solar insolation and has good wind resources due to it's geographical features. Use of solar and wind electric generation systems in a hybrid mode with or without diesel back-up provides an environmentally friendlier option that is economically competitive. This would be a departure from the earlier attempts which were either fully based on diesel or renewables and not

hybrid options. The energy generated from the renewable energy hybrid systems will be used for powering Information Communication Technology (ICT) systems in Community Development Centres (CDCs) which could provide information services leading to social and economic development.

Apart from the removal of barriers for renewable energy integration in the energy system and providing community development through information services, the project will provide a model for hybrid renewables based ICT systems to be established on focussed islands to encourage migration and population consolidation. Such migration to focussed islands will provide the scale economies for infrastructural and business/industrial investments from the public and private sector.

Renewable energy sources are more sustainable and environmentally friendly than fossil fuels. According to the USAID-funded study of Maldives, Solar and wind power – and wind power in particular – have promising futures as sources renewable energy for the Maldives. Over time, the study has found, wind power could substantially increase current clean energy production capabilities.

The study's wind map suggests that the highest resources are located in the north central part of the Maldives, just north of Malé. The region includes North Maalhusmadulu, South Maalhusmadulu, South Miladhunmadulu, and Faadippolhu Atolls. Solar resource maps show ample resources throughout the year for virtually all locations in the Maldives.

This pilot project in the two atoll islands in Maldives uses the information in this study to demonstrate that appropriate decisions

about the application of solar and wind technologies would lead Maldives to better, bigger, and more sustainable sources of energy.

3. Services Completed -

3.1 Facilitating the setting up and implementation of Hybrid Solar PV – Wind turbine generator to produce up to 10 kW of power as per specifications and schema attached as annex.

The work was allotted to TATA BP Solar, Bangalore and the system was installed in Fainu Island. The system comprises of a 5.12kWp Solar PV system and 3.3 kW wind hybrid system. The energy generated from the systems stores in a battery and used for running the computer center and for general lighting.

3.2 Solar powered desalination for pure drinking water

The work was awarded to M/s M/s Vaigunth Entertek Pvt Ltd, Chennai for the supply of Solar Desalination Plants. The work took quite long time because of the technology change. The capacity of the system is 500 lit./day. On repeated remainders, the goods were supplied by M/s Vaigunth and the installation party left from Trivandrum on 16/2/2010 and returned on 24-02-2010. The Plants were installed in Fainu and after testing handed over to the Island People.

3.3 Implementation of raised bed cultivation

Poor soil and scarce arable land have historically limited agriculture to a few subsistence crops, such as coconut, banana, breadfruit, papayas, mangoes, taro, betel, chilies, sweet potatoes, and onions. Agriculture provides about 6% of GDP. Because of the very poor soil condition,

people are reluctant to cultivate any vegetables in the island. UNIDO's intervention in this area has changed the mindset of the local people.

Raised beds made of a mixture of sand and soil are laid on a plastic film. All the soil related limiting factors (wrong pH, soil compaction, salinity, nutrient deficiency, poor aeration, weeds, pathogens etc.) are eliminated in this system, so that plants respond well to fertilizers. Using three times the recommended dose of fertilizers, along with the necessary micronutrients, we get three times the yield in most crop species. The technology consists of making sand on the thick plastic sheet, spread on the ground having a gradient of slope to let the extra water flow out of the bed, so that good aeration and moisture status is made available to the roots of the crops. This automatically results into efficient uptake of nutrients by the plants resulting into increased disease resistance and healthy growth of plants. This is reflected into many fold increase in the yield for which appropriate doses of water and nutrients are provided to the beds. Everyday sufficient water is supplied to replace the quantity of water evaporated during the previous day. This was implemented in Fainu and also proper training was given to the local people.

3.4 Setting up of Bio-gas plant

At present the local communities are using petroleum based fuel for their cooking purpose. Since, it has to be brought from long distance and spillover of petroleum fuel bleaches the coral reef, UNIDO has thought of introducing bio-gas plant in Fainu Island. There are enough food and fish waste are available in the islands. If all the households are using bio-gas plant, the use of other fuel can be stopped.

As a demonstration projects, two pre-fabricated 1 cubic metre capacity bio-gas plant was installed in the island. Initially the bio-gas plant was charged with cow-dung and then filled with the kitchen waste and fish

waste. Proper training were given to the local people for better management. Also instructions were given to feed only bio-degradable materials and not to feed materials like cloth, plastic etc.

3.5 Networked PCs & Internet Connectivity:

With the availability of power supply from the RE Sources, an overriding condition for ICT operation, information services through networked PCs and internet connectivity has provided. But the internet connectivity is yet to be provided by the local internet service provider. Now the systems are installed at the space provided at the Island Office of Fainu. The long term sustainability of the operation is to be ensured through charging a fee from users as well as subsidies for rural development afforded by local government.

3.6 Community TV and DTH Receiver

For community viewing purpose, UNIDO has provided a LCD TV with Direct to home receiver and antenna. Since the penetration of TV in these Islands is minimal, most of the people are using this facility during leisure hours.

3.7 Refrigeration facility for Cold Storage:

This will provide refrigeration facility to preserve medicines and vaccines. Such facilities have been absent in the island atolls due to lack of electricity. Vaccines and other medicines which can be preserved only by refrigeration can thus be made available at these local health care centres, avoiding unnecessary trauma by traveling long distances for emergency medical care. The sustainability of these centres are ensured through community participation and local government subsidies. Because of absence of space, the equipments are now kept at the Island Office.

3.8 Setting up Common Facility Centres:

EMC has requested the atoll chief to set up Common facility centres. The basic design for a Common Facility Centre is a single floor building with a built up area between 150 – 200 Sq. metres, with reinforced concrete, tiled or thatched roofing. The space available will be subdivided into different halls. These centres would be mostly extensions of existing structures owned and maintained by the community and under the jurisdiction of the local government authorities. In areas where such structures are not available, such facilities will be provided through local government. The overall space available would be converted to large rooms to house various utilities such as networked PCs with internet connections, phone, fax facilities, refrigeration facilities, and ICT based education facilities. But still they have not found any financial support from any agencies for setting up the common facility Centres.

Sustainability of units.

The sustainability of any projects rests in the commitment of the local people. Most of the youngsters are working in the tourism sector and in Hotels. The support of the Island chief and local people are highly necessary. For computer education, they have to charge some amount for running the centre. Even for the bio-gas plant, the savings in fuel can be used for other development purpose.

The project has been completed successfully covering all the deliverables.

Fainu, Maldives
12 February 2010

RECEIPT

Received the solar desalination plant from UNIDO Regional Centre, Trivandrum, India for implementation as part of the UNIDO project in Fainu, Maldives. The systems are installed and are in working condition.

Signature



Name IBRAHIM HUSAM

Designation

Fainu Island chief.



Office seal



Checking the Solar desalination plant components



Unloading the Solar desalination plant components



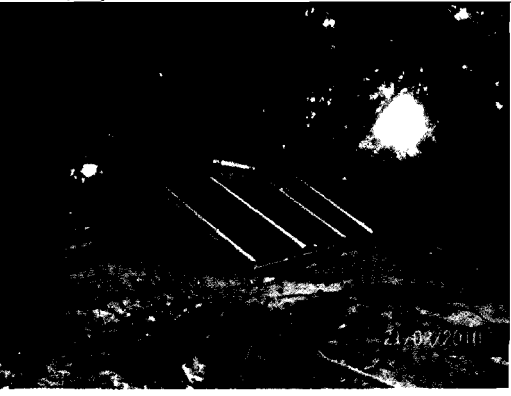
Loading to small boats very carefully



Small discussion with local people and Island Chief on site of the project



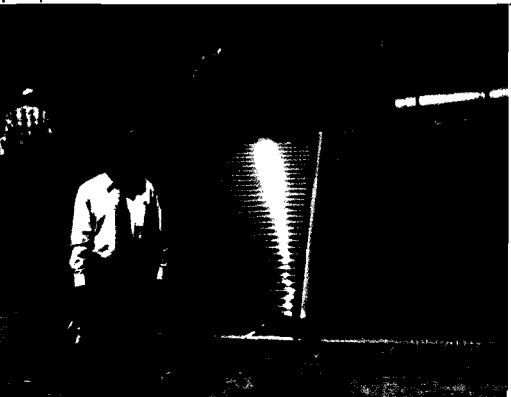
Assembling the parts in the early morning



Sun peeps in



Shifted for more sunlights , work in progress



Ready – Fainu Island Chief