

# Increasing the supply of potable water using renewable energy in Jamaica

## Project Description

The Jamaica Maritime Institute Trust Fund (JMIF) sourced funding to enhance the technical capability of the Caribbean Maritime Institute (CMI) in the use of renewable energy and the production of low cost potable water. The CMI developed a plan to establish a supplemental water efficiency system using reverse osmosis technology to provide potable water from the sea and brackish water for the local school using renewable energy sources.

The GEF Small Grants Programme (SGP), implemented by UNDP, and the Environmental Foundation of Jamaica (EFJ) provided technical and financial support to the project with the objective to provide 500 gallons of potable water per day for over 1000 people at the Caribbean Maritime Institute and surrounding communities.

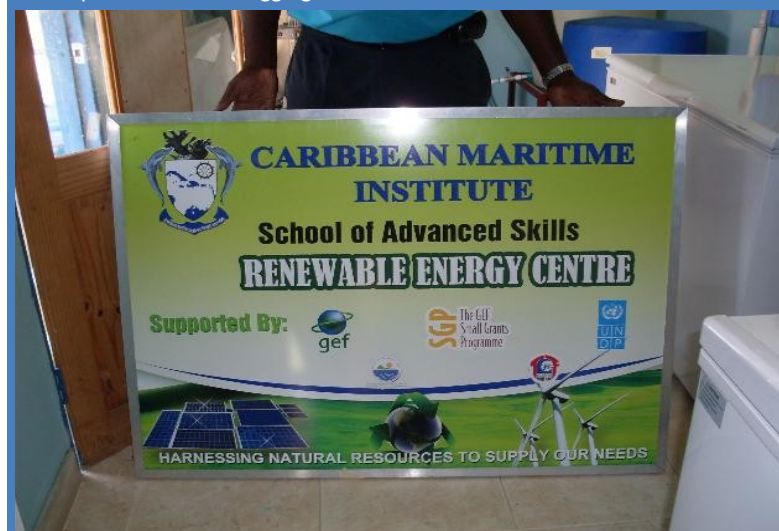
## Background

Jamaica faces two major challenges within the context of climate change: the cost of energy and an inadequate water supply. Annual spending on fossil fuel is estimated at US\$ 4 billion, which translates into energy costs of approximately US\$ 0.40 per kW. This compares to Trinidad at US\$0.04 per kW and the rest of the region at about US\$0.22 per kW on average.

To address these challenges, the JMIF decided to take the lead in finding affordable solutions through applied energy research and education -while utilizing appropriate technology- with the objective of creating renewable energy solutions for disenfranchised and marginalized communities. The CMI aims to produce qualified graduates that are ready to provide solutions to the many challenges faced by the country, given that the CMI is the only training facility of this kind in the English speaking Caribbean countries.



Solar-powered water bagging machine



**Implementing Organization:** Jamaica Maritime Institute Trust Fund (JMITF)

**Location:** Kingston, Jamaica

**Duration:** August 2010 - October 2011

**Number of Beneficiaries:** 1000 people

**SGP Contribution:** US\$ 40,000

**Cash and in-kind co-financing:** US\$ 71,173

## Implementation

The project encompassed a technical and an educational component. On the educational front, the project provided trainings and workshops on wind and solar energy at the CMI, a teaching and learning institution well known as a hub for innovation, creativity, and community service. In particular, the CMI serves as a center for community learning and exchange for a wide audience, including inner city youths and vulnerable communities.

The objective of the JMITF was not only to pilot this technology but to establish a national renewable energy centre with a focus on continuous research, development, training and certification of the CMI under the ISO 9001:2008 quality status, thus contributing to national growth and development. Other activities included educational tours, the development of an operational manual and marketing of the technology on special events such as the Maritime Week.



Wind turbine produced from recycled oil barrels

For the technical component, two wind turbines, as well as a solar and Reverse Osmosis (RO) systems were assembled. The wind generator was constructed using local materials, some of which were recycled materials including used 45-gallon metal drums and PVC pipes. The project provided a Reverse Osmosis (RO) system to treat and purify sea and harvested rain water to potable water on-site, using wind power.

The project also intended to create a system that is easy to replicate, build local capacity and empower the community to manufacture, sale and maintain the unit.

## Environmental Impact

Before project implementation, the operation of the center would incur approximately US\$ 277 (J\$ 25,000) of electricity costs per month. Currently, the center is saving an average of US\$ 160 per month in electricity costs by producing renewable energy.

As a result, the project has successfully reduced the use of fossil fuel sourced electricity and associated high energy costs.

The wind turbines produce energy of 0.5kW per hour at a rate of US\$ 0.40. The energy produced by the solar photovoltaic (PV) panels is 1.8kW per hour. Hence, the total amount of energy produced per day from renewable and emission free resources is 13.8kW per hour, with an average energy production of 400kW per month. Through this initiative, the CMI is well positioned to become a fully green Institute in the near future.

Given the project's objective to enhance the technical capability of the CMI in the use of renewable energy and the production of low cost potable water, the expected outputs are having far reaching benefits to the Institute and the wider public.

Some of these outputs include inexpensive and renewable water supply, increased public awareness, well-trained graduates, use of indigenous technology in the production of renewable energy to operate the system, reduction of waterborne diseases, manufacturing of low cost wind generators using mainly recycled materials, creation of a new industry, reduction of plastic bottle use, reduction of greenhouse gas emissions and energy savings, among others.



Wind-powered Reverse Osmosis (RO) machine to purify water

## Socio-Economic Impact

The project has successfully contributed to the training of inner city youths, equipping them with entrepreneurial skills and associated opportunities. Currently, there are 28 students from the inner city pursuing a course in renewable energy through the CMI's School of Advanced Skills. This cohort is due to graduate in July 2013 and will support the renewable energy sector in Jamaica.

Income from the bagging of water is expected to be high. The bagging machine will produce 35 to 40 8oz/250L bags per minute at a cost of US\$ 0.05 (J\$ 4.50) and with a retail price of US\$ 0.11 (J\$ 10 ). Given that the cost of bottled water is US\$ 0.28 (J\$ 25.00) per 8oz/250ml bottle, this bagged water production will not only bring income to the institute but also reduce water costs for consumers by 60% - a significant amount.

Greater public awareness has been created by giving educational tours on all aspects of the project to schools and youth groups drawn from the 14 parishes in Jamaica, including community members and the media, hopefully contributing towards further adoption of renewable energy technologies.

## Policy Impact

The project has successfully influenced the national energy policy, as it establishes that the CMI will provide training in their technologies and manufacture more equipment for local communities who are unable to access electricity.

At the project launch, the Energy Minister highlighted new policy initiatives that the CMI could be a part of, like a new Ministry award for innovation and potential renewable energy changes in the Ministry office (such as switching to LED lighting, changing A/C units, office wear, etc.), in an effort to reduce energy costs and emissions. The Minister also indicated that the Institute could start supplying bagged water at special government events rather than using bottled water.

Furthermore, the government is now recognizing the role and partnership of CSO/NGO contribution to development initiatives, especially in environmental management. Particularly, the government expressed its willingness to work more closely with these organizations and recognized that bottom-up approaches, where communities bring solutions to the table, can be most effective in many cases.

Currently, only about 60% of the country has access to potable water. Over the last 5 years, the government has provided licenses to private operators and community groups to source and provide their own water supply. This project underlines those development objectives.

## Sustainability

The system is designed to produce potable water from rain, brackish and sea water that will be purified on-site to minimize distribution losses and increase the efficiency of the water resource system. Additionally, renewable energy sources will be used to run the reverse osmosis devices for producing the potable water. This will create savings from reduced electricity and water costs for the school community, with only minimal maintenance costs for the equipment.



The project was intended to test and demonstrate the system, with the aim to replicate and up-scale it, build local capacity and empower the community in the manufacturing, sales and maintenance of the unit. This will be achieved through training and inclusion in the school curriculum. The CMI will also serve as a demonstration site for other communities, decision makers, and the private sector, among others.

Several organisations from the private and public sector, such as the National Commercial Bank and the Digicel Foundation, have expressed interest in partnering with the CMI to further improve project sustainability. However, continuous research on affordable renewable energy innovations such as manufacture of LED lights, training, and local and regional replication will be necessary to make the project more sustainable.

## Replication and Upscaling

The system has been replicated on a Jamaica Defense Force base in the Pedro Cays, funded by the Canadian International Development Agency and can be easily replicated in other schools, households and communities, as replication was one of the main objectives of the project. Through workshops and training, this cost-efficient technology is expected to be replicated throughout the island and region - thus enabling Jamaica's less fortunate citizens to reduce their dependency on expensive power supply and decrease their high energy costs.

This model has already been shared with other communities – nationally and regionally. The JMIF is currently in discussions with NGOs in Barbados to replicate the training and production component of project. In this context, training and certification in renewable energy will be conducted in Barbados, where the CMI currently conducts some of its short-term courses.



For future replication of the project, it is advisable to get the government and other policy makers, involved at an early stage. The establishment of partnerships with key players, and in particular, with those that will benefit from the impact of the project, right from the beginning is key in the success and reach of the project.

Peer-to-peer knowledge exchange can also result in funding opportunities, new innovations and synergetic partnerships. To facilitate knowledge exchange, the CMI utilized several vehicles such as tours, public awareness sessions, print and electronic media, national exhibitions and collaboration with academia.

In fact most people who came in contact with the project so far embraced and supported the initiative. For example, after a knowledge exchange on the technology, the Prime Minister of Jamaica and her husband contributed a wind turbine to the Institute.



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