Solar Powered Water Desalination, Mauritius

Themes

★ Renewable energy
⁂ Innovative technology applications
❖ Financial mechanisms and private sector involvement
❖ Technical capacity development
✷ Health (MDGs 4-6)

PROJECT DATA

Name: Solar Water Desalination in Coastal Villages
Grantee: Rodrigues Council of Social Services
Location: Rodrigues, Mauritius
SGP contribution: $30,279
Start Date: September 1997

ENERGY OVERVIEW

Energy Resource: solar
Technology: desalination stills
Application: water desalination
Sector: domestic
Cost of equipment: $200-$250 per still
Capacity: produces 3-7 liters of drinkable water per 10 liters of seawater in one day
Number Served: 21 households

BACKGROUND

The island of Rodrigues is located 320 nautical miles from Mauritius. Located along the southern coast of the island are 21 families residing in the village of Cite Patate who have been refugees since the Celine II cyclone. The coastal community is surrounded by seawater, and people make their livings mainly from fishing. Drinking water is difficult to obtain, however. It does not rain often there, but when it does the community catches all the rainwater it can in large tanks. When these tanks are empty, women must generally walk 3-5 hours per day to a natural spring to find and carry home water for their families. However, even the water from the spring is not always potable, and may carry disease.

PROJECT DESCRIPTION

Overview

This project developed locally-constructed solar water desalination units and installed them in the remote community of Cite Patate, providing these households with improved access to drinking water. The project also demonstrated the use of solar energy to desalinate water, an approach that may be usable in other areas of the island nation of Mauritius.

Implementation

The idea for this project emerged from a stakeholder's workshop held by SGP in Mauritius in which a presentation was made by specialist in renewable energy at the University of Mauritius. The president of the Rodrigues Council of Social Services, the grantee NGO, participated in the workshop and proposed this project for using solar energy to desalinate seawater. The technical design and prototype for the desalination stills were prepared by this specialist at the University of Mauritius, who then worked with a local company that manufactures boats using fiberglass to produce 20 replicates of the prototype still that had been shipped to Rodrigues. The stills were then installed in the backyards of the 21 families of Cite Patate. These families contributed to the project by building well for easy access to seawater, which is then placed in the still for desalination. For every 10 liters of seawater, 3-7 liters of drinking water are produced in a day. This water must still be treated with minerals before drinking. In fact it is helpful to add a pinch of salt to the desalinated water!

Solar powered desalination improves local freshwater supplies and reduces the vulnerability of Cite Patate villagers to drought (Island of Rodrigues,Mauritius).

Based on an evaluation of the project after the stills were installed, it appeared that most families used the still as a "survival kit" to get through periods of reduced rainfall. In addition, some families did not perform the required maintenance, which decreased the performance of the stills. It was also reported that some children took the desalinated water to school during drought periods.

A few months after the project started, an international religious NGO made a donation and connection of water pipes to the village of Cite Patate. This proved to be unsuccessful as the water supply is very unpredictable. Thus the most reliable way to get everyday drinking water is by using the stills.

Technology

The solar desalination plant consists of a 1m x 2m reservoir covered with fiberglass. Seawater is placed inside, and the sun causes evaporation. The steam condenses on the inside of the glass cover which is tilted at a certain angle to allow the con-

densed water to drain out of the reservoir into another receptacle. This water, which is approximately half the volume of the original seawater, still must be treated with minerals before drinking. Each of the 21 households has a still in their backyard. In addition, the still must be maintained regularly to ensure this level of performance. The community has built a well out of which seawater can be easily drawn in order to be desalinated. Several keys to success were recorded, including making sure to find paint that sticks properly to fiberglass, ensuring that the glass panes fit tightly with rubber seals, and determining the optimum seawater level in the reservoir (3/4 of an inch in this case).

Environmental Benefits

Global: This project does not directly reduce greenhouse gas emissions, since the water desalinators do not displace fossil fuel use to produce drinking water. However, in the long term, demonstration of this technology may provide global environmental benefits. Future methods to obtain water in Mauritius might involve the use of fossil fuels to obtain additional amounts of drinking water, either through desalination or purification of other water sources. If scaled up, this technology could offer an option for non-fossil fuel dependent water access.

Livelihood Benefits

Health: This project improves access to clean drinking water for this isolated community. The previous drinking water obtained from the natural spring often carried diseases.

Reduced drudgery: The women in these 21 families no longer have to walk 3-5 hours per day to find drinking water.

Adaptation to possible impacts of climate change: By enabling these families to convert seawater into drinking water, the project increases the community's capacity to cope with long periods without rain.

Capacity Development

This project has built local capacity to construct solar water desalinators. A local boat-making company has made them, with technical assistance from engineers at the University of Mauritius. It appears that the project had some shortcomings in its training of users, since maintenance problems did emerge and affected the technology's performance.

Partners

Several key partnerships helped make this project happen. SGP support has not been limited to providing funds for the project; the idea for the project came out of a SGP workshop on renewable energy sources. The president of the Rodrigues Council of Social Service attended the workshop, where Mr. Revin Panray Beeharry, an engineer at the University of Mauritius, gave a presentation. The project then evolved as a partnership between the Rodrigues Council of Social Services and the University of Mauritius, with Mr. Beeharry serving as a technical consultant. Another key partner was the local boat-making business which, with the university's technical guidance, learned to make the solar desalination units. Community participation was also key, since community members provided the labor for digging a well from which to draw seawater to be desalinated.

LESSONS LEARNED

Environmental Management

This project demonstrates an option for small island states to consider in developing better access to drinking water. If solar desalination is effective and not too costly in a small-scale setting like this one, it may be an option for other small island states to improve the diversity of water sources and thereby reduce communities' vulnerability to water shortages.

Barrier Removal

Technical: The project reduces technical barriers to solar water desalination by developing a prototype made by a local boat-making company, and implementing it in a small community. The project offers the opportunity to learn more about the technical issues involved in solar water desalination and to improve the possibility of implementing it more widely.

Scaling Up

The project has potential for scaling up, since there is a need for increased options for drinking water access in Mauritius and in other small island states. According to the SGP National Coordinator in Mauritius, this project has led to the proposal of a larger solar desalination on the island of Rodrigues. The proposal is apparently still under consideration. Similar technology is used in other parts of the world, such as El Paso, Mexico, the Canary Islands, Spain and Porto Santo, Atlantic Ocean.

SOURCES CONSULTED

Project Record MAR/95/G52/I/10, SGP Project Database, http://www.undp.org/sgp

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Rodrigues Council of Social Services and Global Environment Facility Small Grants Programme, UNDP. "Solar Seawater Desalination in Preselected Coastal Villages in Rodrigues." Powerpoint Presentation, April 2000.

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