



Narmada Canal

Producing Solar Energy While Saving Water

Solar Panels, “Floating Windbreakers” Prevent Evaporation
and Protect Drinking Water

Challenge: Delivering Power While Protecting Water

Populations need two basic things to be prosperous and healthy: reliable access to safe water and electricity. Delivering both to rural populations is a challenge the State Government of Gujarat often faces.

In India, there is an acute water shortage and over 60% of illness is attributed to unsafe drinking water. In fact, obtaining drinking water can be a 5 KM walk. Though the rural economy is based on agriculture, many people rely on rain to irrigate their crops. The limited supply of water reduces crop yield and leads to hunger. The Narmada Canal is designed to relieve these conditions for the residents of Gujarat.

When the man-made Narmada Canal was developed, the people of Gujarat finally had reliable access to water, but Chief Minister Modi wanted more; he wanted to deliver reliable power to the people while conserving water by preventing evaporation. In December 2010, he challenged SunEdison’s leadership to develop a solution that would deliver renewable electricity and water. He asked the company to do something that had never been done before, and we enthusiastically accepted.

“SunEdison is proud to be involved with this innovative project in India that combines solar power generation with water conservation. Through innovation, we strive to continuously exceed expectations, while making solar power an affordable reality for customers around the world.”

» Pashupathy Gopalan, Managing Director South Asia and Sub-Saharan Operations, SunEdison

Summary



Location

Chandrasan, India

Installation

Narmada Canal in cooperation with Gujarat State Electricity Corporation

Installation Size

1 MW

Installation Type

Suspended

Challenge

Construct a solar power plant spanning the Narmada canal to simultaneously generate power and save water in a region plagued by extreme heat and dry conditions

Solution

First-ever solar power plant spanning a canal which provides 1 MW of renewable energy and features “floating windbreakers” to conserve drinking water and prevent algae growth

Impact

Residents now have access to 1 MW of renewable energy and save up to seven million liters of drinkable water per year

Solution: Solar Power Plant Built Over the Narmada Canal

The design challenge presented to the SunEdison team was unique. Their first thought was to model the project after an existing floating solar farm in California’s Napa Valley (US) where moored panels float on pontoons. But as vital as water is to the people who live and farm along the canal and its 19,000 km of branches, the authorities did not want to risk the panels disrupting water flow and rejected that idea. They need a power plant that spanned the canal but did not touch the water.

Site selection was a critical aspect. The main canal is too wide to build a spanning plant, so the engineering team looked at the narrower branches of the canal for possibilities. They also wanted a location near a city with reliable roads, access to a grid (to evacuate the power) and a north-to-south orientation (to ensure the best sunlight exposure). After presenting three options to the Minister, the current site near Sanad was selected.

What was originally a 250 kW pilot project became a 1MW project because the Minister was so confident in the design and the benefits it would deliver. Unlike ground-mounted systems where there is one support in place every three meters, the 16-meter spans of the Narmada Solar Energy Plant have one center support and connect to the canal banks.

The spans are built in sections referred to as blocks. There are eight blocks in total and 226 MEMC 280 W Silvantis™ Solar Modules covering nearly 1 KM of canal. In the center of the span there is an opening to allow maintenance access to the canal. The blocks are designed with walkways and 15 meters of separation to allow workers access to clean the panels.

The construction of the plant involved the efforts of civil engineers to design the support system, electrical engineers to design the power plant, a manufacturing firm to build the supports and a construction firm to build the structure. SunEdison managed this and delivered the first phase in X months.

Impact: Saving Water and Reducing Maintenance Costs

Hot, sunny and windy environmental conditions in Gujarat cause water evaporation and promote algae growth, two major challenges to the farmers and people who rely on the water for survival. Algae clogs irrigation pumps, increasing maintenance costs and lowering productivity. Evaporation reduces the availability of water for everyone.

Evaporation is a two-stage process; heat turns water to vapor, but the wind carries it away. To keep the wind from blowing water away, SunEdison engineers created an innovative new design they refer to as “floating windbreakers.” The solution is comprised of a thick panel assembly that hangs vertically from the first and last row of the structures, connected to free-floating barrels at the bottom. When water levels increase, the barrels float upward, moving the panels above water level (so they don’t interfere with the water flow), blocking the wind and keeping the water in the canal. It is estimated that this will save seven million liters of water annually.

Sunlight hitting the water supply promotes the growth of algae; the more algae, the less potable the water is and the more likely it is to clog pumps. Because the panels prevent sunlight from entering the water under the power plant, they also reduce harmful algae from growing. As a result, locals can now use that water for drinking and worry less about clogged pumps.

An added benefit of the design is that the water keeps the panels cooler, which has been known to improve their efficiency.

For More Information

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