

# Solar Power Backup For Water Treatment Plants: An Innovative Water Reservoir Treatment Process

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## *Disclaimer*

The Pennsylvania Department of Environmental Protection does not endorse or recommend any of the technologies described herein. **The technical articles are provided for informational purposes only.** Persons seeking additional information about the described technologies should contact the parties listed in the article.

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## Overview

Solar panels use photovoltaic cells to capture energy from the sun and turn it into electric current. This electric current can be used to treat water or wastewater. Most water and wastewater treatment plants consume large quantities of electrical energy in order to operate and the use of photovoltaic cells can alleviate some of this demand at no cost over the capital cost of the equipment and minor O&M costs. This reduces operation costs and pollution, and also adds the built in security of a back up power source to allow the plant to continue to operate in the event of a power outage.

## How It Works

On a bright sunny day the sun shines about 1000 watts of energy per square meter on the earth's surface and some of that energy can be captured through the use of photovoltaic cells. Photovoltaic or solar cells are made of a semi-conductor material, the most common being silicon. Solar cells use two different types of silicon, which are not pure but instead have controlled amounts of phosphorus and boron added to them. Silicon that is manufactured like this is referred to as N-type and P-type respectively. The two types of silicon are joined in such a way that when sunlight shines on them they produce an electric current that can be captured and used to do work.

Although the sun shines about 1000 watts of energy per square meter, only about 15% of it can be turned into electrical energy in most photovoltaic cells. There are many places energy is lost throughout the system including reflection off of the solar panels and current resistance losses in the silicon wafers. While it was once only used in outer space, many technological advancements in recent years have increased the efficiency of solar power technology while simultaneously reducing equipment cost enough to make it a viable power supplement for most water or wastewater treatment plants.

## **Reported Advantages Over Conventional Technology**

- The solar panels can be used as a backup power source to allow continued operation through a power outage.
- Reduced demand of fossil fuel produced energy, which reduces pollution and energy costs.
- No moving parts allow for long life (20-25 years) with little maintenance.

## **Potential Disadvantages/Concerns**

- Only provides supplemental power and requires a large footprint to provide any significant power generation (~1-2 acres for 500kW system)
- Typical payback period of over 7 years

## **Technology Verification and Usage**

New Jersey American Water will install a ground mounted solar electric system at its Canal Road water treatment plant in Somerset, New Jersey. The 500 kilowatt system will be designed and built by Dome-Tech Solar and will include 2800 solar panels. It is estimated that it will be able to provide approximately 15% of the systems peak energy usage and save the plant approximately \$125,000 in annual energy costs. New Jersey American Water will receive a rebate from the New Jersey Energy Program for using a 'green' technology, which will reduce the payoff period to 7 years. After the pay off period is over New Jersey American Water anticipates being able to pass the savings onto their customers.

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**Additional Information** about Solar energy is available at [www.dometechsolar.com](http://www.dometechsolar.com), and [www.rweschottsolar.com](http://www.rweschottsolar.com).