



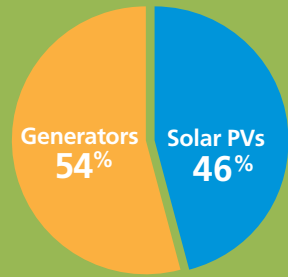
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Alcatraz Solar Photovoltaic Project

Average percentage energy output



System Overview

Solar Photovoltaic Capacity

305 kW

Backup Generator Capacity

500 kW

Battery Storage Capacity

1,920 kWh

Components

PV Modules

959 Sun Power

318 w

Inverters

8 Princeton Power

100 kW

Generators

2MTU Onsite Energy

250 kW

Featured Project

Alcatraz Island Off-Grid Solar Project



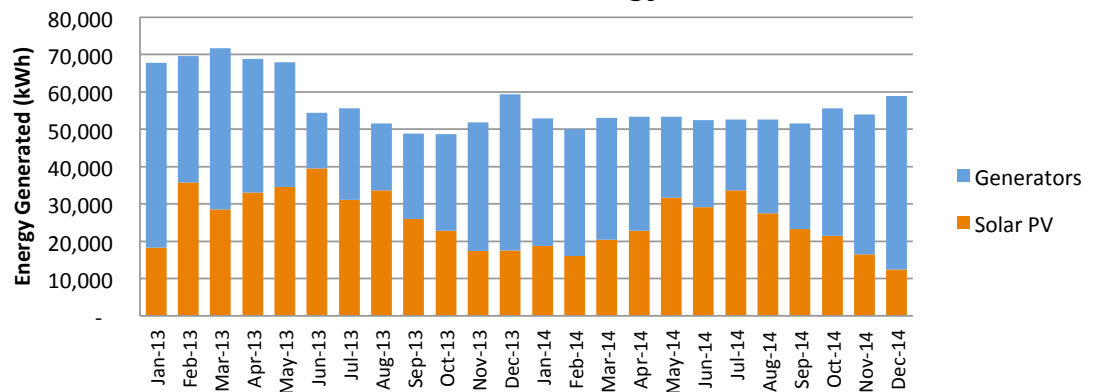
Alcatraz Island, one of the most popular attractions in San Francisco, obtains all of its energy from a hybrid solar micro-grid system. Solar energy accounts for up to 50% of the annual energy used in the buildings on Alcatraz. Excess solar energy is stored in a large battery bank to be used at night or on rainy days. When buildings demand more energy than solar photovoltaic (PV) can

generate and the battery bank is exhausted, a diesel generator kicks in and charges the battery. By combining solar energy, battery storage, and backup diesel generators, Alcatraz Island relies on less fossil fuels than before.

To learn more search **Sustainable Alcatraz**

Alcatraz Off-Grid Solar Photovoltaic Project Monitoring Report

Alcatraz Island Total Energy Production



GGNRA interns spent part of 2014 analyzing two years of data from the photovoltaic (PV) micro-grid. As of December 2014, 53,000 gallons of fuel were offset by solar

energy production, annually saving the park \$200,000 and reducing emission by 325 metric tons of CO₂ equivalent (MTCO₂e).



Featured Project

Crissy Field Center Renewable Energy Features



The Crissy Field Center is an urban environmental education center located in a LEED Platinum building. Renewable systems associated with the building include rainwater catchment, solar hot water heating, a 30-kW solar photovoltaic system, and five vertical-axis wind turbines.

The wind turbines are part of a pilot project sponsored by the **Hawaii Natural Energy Institute** to study the feasibility of urban renewable energy production. Several models of turbines have been installed on site, including one that has already been removed due to mechanical failure. Look for a new set of turbines to be installed in 2015.

- ▶▶ All of the data that is collected can be viewed real-time on the **Crissy Field Center Dashboard**
- ▶▶ For more about Crissy Field Center sustainable features: **Crissy Field Center**

Crissy Field Wind Turbines Wildlife Impact Study

Small vertical axis wind turbines are an emerging technology, and not much is known about their potential impacts on wildlife. As part of the wind turbine pilot project, staff at the Crissy Field Center conducted a wildlife impact study to answer some of these questions. Between 2012 to 2013, staff surveyed the location surrounding the turbines each morning to determine whether any birds or bats had been harmed by the turbines. Over the course of the study, two birds were determined to have been killed due to a turbine strike. To learn more about the study, visit sfnp.org





Energy Required For Same Brightness (1600 lumens)

LEDs



35W

Incandescents



100W

In the Field

LED Streetlights at Fort Mason Save Energy and Money

The Buildings and Utilities Crew, part of the Facilities Management Division at GGNRA, has replaced 20 incandescent streetlights with LED bulbs at Fort Mason. LEDs, or light-emitting diodes, only consume 35W compared to the previous 100W incandescent street lights. This change will save the park 4,745 kWh of energy and \$900 a year. The cost savings will pay for the initial investment within 9 years. Since LED lights are becoming increasingly affordable, we're planning to change more lights to LEDs around the park!



This Just In

More Electric Fleet Charging Stations Installed

A grant from the U.S. Department of Energy's Clean Cities National Parks Initiative has allowed GGNRA to install six electric vehicle charging stations at Fort Mason and purchase five electric vehicles for the park fleet. Park employees who drive these vehicles love them so much, a growing number have purchased or leased one for themselves.

The park also has two locations with fee-free public chargers, with two more locations coming soon. These charging stations were provided by Adopt-a-Charger, a nonprofit organization created to provide sponsored charging in public areas.

For more information see <http://go.usa.gov/3jGzV>



EV Chargers in GGNRA

Fleet Chargers



Public Chargers



Coming Soon!





Future TECH TALKS

- Net-zero Buildings
- Water Conservation
- Biofuels

Sustainability Outreach

TECH TALK Lunches

Let's get together to talk about technologies, techniques and strategies that help us to reduce GGNRA's carbon footprint as well as preserve the park. The GGNRA Green team offers brown bag lunch meetings, "Sustainability Tech Talks" to park employees and partners. With guest speakers, we will discuss various inspirational topics.

For more information
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Park Partner Highlights

Alcatraz Cruises

Alcatraz Cruises operates hybrid ferries from Pier 33 to Alcatraz Island. Alcatraz Cruises' three generations of hybrid ferries - Hornblower Hybrid, Alcatraz Clipper and Alcatraz Flyer - carry GGNRA park visitors from the pier to Alcatraz everyday. The three ferries, which are each equipped with solar panels and wind turbines, provide a combined renewable energy output of 90kW (90 kW is approximately equivalent to the 2015 Mini Cooper Convertible engine). This allows the ferries to use less diesel fuel and emit fewer greenhouse gases and other pollutants. In addition, co-pollutants such as nitrogen oxide, sulfur oxides and particu-

late matter are reduced as much as 80%. Energy-efficiency measures on the boats, such as LED lights, minimize the amount of energy used.

As a result of these efforts, the carbon footprint per ferry passenger has decreased 45% between 2007 to 2014. Thanks to partners such as Alcatraz Cruises, the Golden Gate National Recreation Area can demonstrate the latest in sustainable technology to 1.4 million Alcatraz visitors every year.

To learn more, visit
www.respectourplanet.com



Golden Gate National Recreation Area

Fort Mason Building 101,
 San Francisco

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Photo credit

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