



Zero Net Energy Project Profile Museum



Photos: Exploratorium

OVERVIEW

Site Details

Building Size: 330,000 SF
Location: San Francisco, California
Construction Type: Major renovation
Construction Year: 2013, 1914
Building Type: Public Assembly - other
CA Climate Zone: 3

Predicted Energy Stats

$$16 - 8 = 8$$

BUILDING'S TOTAL EUI RENEWABLE PRODUCTION EUI BUILDING'S NET EUI

Site Energy Use Index (EUI) kBtu/SF/year

The Energy Equation: **the building predicted energy use minus the predicted renewables production equals the predicted net energy of the building.** Buildings may be 'Getting to Zero' and have a net EUI above zero. If renewable production exceeds energy use its net EUI is below zero (negative) and it is creating surplus energy.



For more information:
newbuildings.org/zero-energy

EXPLORATORIUM

When the Exploratorium outgrew its old location at the Palace of Fine Arts, the City of San Francisco offered to provide Piers 15 and 17 on its historic waterfront as a larger relocation option for the science museum. After structurally shoring up the historic piers, the design team embarked on transforming the 9-acre site into the Exploratorium's campus. This included retrofitting the massive Pier 15 shed and constructing a small new structure to house a café and bay observation deck at the end of the pier. The retrofitted shed houses the exhibition spaces as well as a mezzanine level for classrooms, conference rooms and office space.

Planning & Design Approach

Overarching projects goals:

- Recreate the interactive and explorative nature of the exhibition spaces that were so successful at the museum's former location
- Use the zero net energy goal as an educational tool that is highlighted throughout the exhibition spaces
- Maintain and meet the historical requirements of both protected structures
- Utilize the building's unique location and orientation for energy reducing design strategies

Energy Efficiency Strategies and Features

Radiant Heating and Cooling: Heating and cooling is provided to the building through a radiant concrete slab that conditions the space where the building occupants are. A four-pipe system provides either heated or chilled water to a 200,000-foot network of tubing imbedded in the concrete slab.

Efficient HVAC: The building uses its location above San Francisco Bay and its relatively constant temperature as a heat source or a heat sink depending, on climatic conditions. Water-to-water heat pumps heat or cool the Bay water to meet the required load. Ventilation is provided by a separate dedicated outdoor air system (DOAS).



Photos: Exploratorium

Team/Owner Details

Owner: Exploratorium

Architect: EHDD

Mechanical Engineer: Integral Group

Structural Engineer:
Rutherford and Chekene

Electrical Engineer:
Cammisa and Wipf

Civil Engineer: Kennedy/Jenks

Geotechnical Engineer:
Treadwell and Rollo

Construction Managers:
Wilson Meany Sullivan

General Contractor: Nibbi Brothers
General Contractors

Landscape Architect:
GLS Landscape Architecture

Lighting Designer:
David Nelson & Associates

Historical Preservation:
Page & Turnbull

Financing & Cost

Total Construction Cost: \$28 million

Awards

Targeting LEED® Gold

Daylighting: The long narrow piers extend almost 800 feet into the Bay and have a primary East/West orientation which is ideal for daylighting. The existing sheds included clerestory windows which are used to light a majority of the spaces. Additional skylights were strategically located to light the exhibition spaces.

Renewables: The horizontal nature of the piers, ample roof space on the sheds and the lack of adjacent tall buildings are ideal for installation of photovoltaic solar panels. The design team specified a massive 1.3-megawatt roof-mounted photovoltaic system that occupies 78,800 SF to offset the energy load of this all-electric building.

Lessons Learned

- The design team learned from the experience gained in another mechanical system installation at Pier 1. That system, installed in 2001, provided a good example of some of the potential pitfalls associated with using water from the Bay for space conditioning. Pier 1 eventually had to add cooling due to complications that were unknown during its design.
- A critical modeling exercise involved logging the temperature of the water beneath Pier 15 for a full year. This information verified that the heating and cooling load could be met by the specified system no matter the season. It also educated designers on the amount of heat that would be lost by locating the radiant slab over water.

For More Information

Exploratorium Press Kit: <http://goo.gl/ecxWYh>



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