



## Zero Net Energy Project Profile

Small Office Retrofit



Photos: ARCHITECTS hannah gabriel wells

### OVERVIEW

#### Site Details

- Building Size:** 4,500 SF
- Location:** San Diego, California
- Construction Type:** Retrofit
- Construction Year:** 1955, 2009
- Building Type:** Small Office
- CA Climate Zone:** 7

#### Measured Energy Stats

$$13 - 22 = -9$$

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

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

The Energy Equation: **the building energy use minus the renewables production equals the 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.

### BACON STREET OFFICES

The Bacon Street Office project is a 4,500 SF retrofit of a single-story, 1950's-era auto repair shop into a high performance office for the firm ARCHITECTS hannah gabriel wells. Through creative design strategies, renewable energy generation and with support from local utilities, including the Savings by Design program, the project has achieved zero net energy goals. In fact, this project is so energy efficient it returns power to the grid.

#### Planning & Design Approach

The project demonstrates the difference between typical projects and ZNE projects. The following steps were critical to success:

- Start early and use an integrated design process
- Outline goals and benefits
- Structure fees to provide more research and design iterations
- Stay flexible and inclusive with the design process

#### Energy Efficiency Strategies and Features

**Daylighting:** A wall of windows along the public street side of the building provides daylight and views of a new landscaped parking court with native vegetation and canopy trees. This light is balanced with toplighting from diffuse skylights at the back of the space. Illuminating walls, ceilings and balancing daylight across the space increases the occupants' perception of brightness.

**Advanced Lighting System with Controls:** The lighting system maintains a high quality lighting design that meets the function and aesthetic needs of the occupants. The design relies first on daylighting, then layers ambient light with advanced controls that turn off electric lights when not needed. Users have control of LED task lights, should more light be desired. The lighting system performs at about 0.4 W/SF.

**Natural Ventilation:** The building takes advantage of prevailing coastal breezes to draw cool air across the building's thermal mass and exhaust warm air through skylights to naturally ventilate the building.



For more information:  
[newbuildings.org/zero-energy](http://newbuildings.org/zero-energy)



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### Team/Owner Details

**Owner:** OBRA, LLC

**Architect:**

ARCHITECTS hanna gabriel wells

**Engineer:** KPFF Consulting Engineers

**Landscape:** Nowell and Associates

**Contractor:** RGB Group, Inc.

**Energy Consultant:**

Brummitt Engineering

**Plumbing & Electrical:**

McParlane and Associates

**Electrical & Lighting:**

ILA + Zammitt / Illumia Design Studio

**Geotechnical:** Geotechnics, Inc.

### Awards

LEED® Gold

Savings by Design Honor Award

**Energy Monitoring:** The building has an energy monitoring and dashboard control system that helps manage energy use and evaluate ongoing measured performance.

**Renewables:** The 16.4 kW AC photovoltaic solar system produces about 19,600 kWh/year capable of offsetting more than 100% of the 26,400 kWh/year of energy that was expected to be consumed during the design process.

### Lessons Learned

- Small, abandoned and degraded structures can be repaired and re-used instead of demolished and replaced. Even 50 years of grease in an auto body shop can be scraped off and renovated into a net zero energy office.
- Aggressively reduce, then produce. Once the team minimized energy demand, they began looking at methods to off-set the remaining energy use with clean fuel alternatives.
- Individually monitoring each lighting zone enables more effective system commissioning and measurement. Also, having a lighting designer involved in locating the photocells would have been helpful.
- The thermal mass strategy used to cool the building in the summer compromises the ability to stay warm in the coldest months. Heating strategies need to be more carefully considered in order to optimize the whole system.
- The project received a \$14,650 incentive and design assistance from San Diego Gas & Electric

### For More Information

**Savings by Design Award:** <http://goo.gl/I2DH1Y>



Administered by California utilities, Savings By Design encourages high-performance, non-residential building design and construction, and a variety of solutions to building owners and design teams. More information at: [savingsbydesign.com](http://savingsbydesign.com).



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