

*Project Profile*

# A Zero-Net Energy Building



Photo courtesy of William Sheftall, UF Extension Leon County

## Overview

### Site Details

- Building Size:** 13,000 SF
- Location:** Tallahassee, Florida
- Construction Type:** Retrofit
- Construction Year:** 1960, 2001, 2012
- Building Type:** Office
- Climate Zone:** 2A

### Measured Energy Stats

19	-	19	=	0
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.

## LEON COUNTY COOPERATIVE EXTENSION OFFICE BUILDING

The mission of the Leon County Cooperative Extension is to educate the community about research performed at the University of Florida through interactive opportunities and demonstration sites. A recent retrofit of their 13,000 SF office was the perfect opportunity to inform the community about cost-effective energy savings opportunities and net zero energy.

### Planning & Design Approach

In 2007, the Leon County Board of County Commissioners formalized their priority on reducing greenhouse gas emissions from county buildings. A combination of in-house expertise and consultants helped the Cooperative Extension office develop this demonstration project with. Saving taxpayer's money, stewardship of the environment and improving the quality of life in Leon County were the primary reasons for pursuing net zero energy goals. Special attention was paid to minimizing peak demand and associated utility costs. The net zero approach also serves to protect the county from risk associated with increasing energy costs and utility bills.

### Energy Efficiency Strategies and Features

**High Efficiency HVAC** - A closed-loop geothermal well field of 60 vertical wells 90 feet deep are divided into three loops that combine into a single loop into the building. This allows for the repair of a single loop without disabling the entire system. The stable ground temperature serves to moderate water temperature, allowing the system to either dump or recover heat, depending on the season. Inside the building,

*over*

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## ***Project Team***

**Owner:** Leon County

**Architect:** Barnett Fronczak  
Barlowe Architects

**Engineer:** H2 Engineering

## ***Financing & Cost***

**Geothermal Retrofit:** \$186,000

**Photovoltaic System:** \$91,000

## ***For more information:***

**Leon County Extension Office brochures:** <http://goo.gl/ZadUKY>

**Energy Dashboard:**  
<http://goo.gl/cGF112>

this water flows through a “water jacket” around the refrigerant coil to exchange heat, passively conditioning refrigerant and reducing the work required of the air handler. This allows for a downsized compressor and provides for a 40% energy savings.

**Renewables** - The 60 kW array consists of 253 panels that can each produce up to 240 Watts of electricity. The array is mounted on steel beam structure and doubles as a canopy for the parking lot. These allow the building to generate approximately 79,000 kWh of AC electricity annually. Through a net metering arrangement with the City of Tallahassee Utilities, this saves the county approximately \$5220/year.

**Domestic Hot Water** - Instead of a conventional hot water heater, waste heat from the geothermal system is used to heat hot water used in the kitchen.

## **Lessons Learned**

- Energy efficiency strategies helped reduce the number and cost of solar panels.
- The weight of the 6,120 SF solar array prevented it from being mounted on the roof.
- Micro-inverters on each of the 253 solar helps to prevent a situation where a malfunction on a single panel takes the entire system offline.
- Leon County aimed to reduce peak demand during any utility billing period to below 25 kWh in order to eliminate peak demand charges. While typically, solar installations typically shift peak demand to nighttime, in the first year, the peak happened during a Monday morning start up operations. This keeps the building of being a “peak demand customer” for at least another 12 months.

## ***New Buildings Institute***

New Buildings Institute (NBI) is a nonprofit organization working collaboratively with commercial building professionals and the energy industry to improve the energy performance of commercial buildings.