



# Dennis Union Church: ENERGY STAR® Certification, Renovation, and Expansion

Dennis Union Church (DUC) is a United Church of Christ congregation located on Cape Cod, Massachusetts. In the fall of 2003, the church embarked on an ambitious renovation and expansion program to strengthen the underpinnings of its landmark 1838 sanctuary, add approximately 5,000 square feet of new program space, and upgrade all utilities, including—for the first time—central air conditioning.

## DUC's Energy Action Plan

DUC created a building committee to plan and oversee the renovation and expansion. Early in the design process, the DUC building committee created an Energy Action Plan in consultation with the Cape Light Compact, a regional energy services organization. The Action Plan leveraged information from the ENERGY STAR® website and the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) guidelines. A six-part Energy Action Plan (see insert) was developed and implemented.

Several parts of the Energy Action Plan met with some resistance from congregants. The refrigerators scheduled to be removed had been donated and some members wanted to keep them. Only after analysis showed how much energy the refrigerators consumed did everyone realize the high expense of these “free” units. Another issue that divided the congregation was air conditioning. Many members of DUC's congregation wanted to air condition the facility while others were adamantly opposed to needlessly contributing to climate change. Part 6 of DUC's Energy Action Plan addressed this divide: installation of a photovoltaic array, sized to completely offset additional energy usage of air conditioning, made everyone happy and creatively solved the problem. A rebate from the Massachusetts Technology Council for the photovoltaic array covered about 30% of its cost.

**The Challenge:** Dennis Union Church aimed to renovate and improve the energy efficiency of their 19<sup>th</sup> century sanctuary while maintaining the original design.

**The Solution:** Create an Action Plan to guide in the renovation utilizing ENERGY STAR® products and resources.



## Dennis Union Church's 6-Part Energy Action Plan

1. Retrofit and install new ENERGY STAR certified lighting and controls.
2. Replace obsolete gas furnaces with ENERGY STAR certified, high-efficiency condensing units.
3. Make envelope improvements to doors, windows, and insulation.
4. Replace two large tank water heaters with a central tankless unit.
5. Decommission two underutilized refrigerators and two electric dehumidifiers.
6. Install a photovoltaic array.



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## ENERGY STAR Resources and Products

DUC is an ENERGY STAR partner and DUC's Building Committee used ENERGY STAR partner resources to implement their Energy Action Plan. The ENERGY STAR Congregations Guide: Putting Energy into Stewardship provided a plan outline. The facility benchmarked using ENERGY STAR Portfolio Manager®. Portfolio Manager helped the building committee track energy usage before and after renovations. The ENERGY STAR website provided additional resources to research building methods and products. The website showed ENERGY STAR certified product listings and studies, particularly for gas HVAC equipment and tankless water heaters. In addition to the HVAC and tankless water heater, ENERGY STAR certified equipment installed at DUC includes occupancy sensors, condensing gas furnaces, air conditioning condensing units, windows, light fixtures, and thermostats.

## Key Efficiency Measures

Energy efficiency measures were taken for both the space added in the expansion and existing space overhauled in the renovation. Areas of new construction have steel constructed doors with interior airlocks and double-pane windows. In the renovated space, ten large double-hung windows were replaced with double-pane sashes. Insulation used in construction exceeds Massachusetts energy code requirements as the original walls of the church were not insulated. These walls were retrofit with blown-in cellulose and the ceilings were re-insulated to meet Massachusetts energy codes.

## Lessons Learned

- Dennis Union's energy efficiency upgrades were much more cost-effective than the solar installation, with an average payback of less than one year.
- The local utility, Cape Light Compact, had an energy efficiency subsidy program that paid for the energy audit and covered 80% of the cost of the energy efficiency measures installed!

## Communications

The expansion project at DUC added approximately 40% more square footage to the worship facility. Despite this increase in size, their energy savings from 2006 (preconstruction) to 2008 (post construction) was 2.7%. Tours of the building during its opening weekend highlighted energy efficiency measures. An article about DUC was the lead story in the Earth Day edition of the Register, which is the local weekly news publication and the Massachusetts conference of the United Church of Christ has recognized DUC for its environmental leadership. DUC earned the ENERGY STAR, EPA's mark of superior energy performance in 2011—using EPA's Portfolio Manager energy benchmarking software to track energy use. Since 2011, DUC replaced their timer-based irrigation system with a unit controlled by a remote weather station.