



Coast Guard Sector Northern New England

259 High St, South Portland, Maine 04106



COAST GUARD PURSUING GREEN INITIATIVES IN NORTHERN NEW ENGLAND

Summary

The Coast Guard in Northern New England endeavors to be a leader in conservation and renewable energy for the Coast Guard and federal government. The success to date can be attributed to the intense collaboration of several USCG entities; including the Research and Development Center (RDC), the Innovation Council, Station Eastport and various support elements. The USCG has been involved with renewable energy for some time through the Aids to Navigation (ATON) mission and we continue to build on partnerships with citizens and agencies that ultimately have similar renewable energy vision and expertise.

Background

- In Northern New England we are challenged by a harsh winter climate, severe coastal winds and tides, and corresponding high utility costs for homes, buildings, and facilities. For example, an average Coast Guard owned duplex housing unit uses approximately \$10,500 in electricity and heating oil every year.
- The Coast Guard in Maine is uniquely geographically poised to take advantage of several major renewable energy resources; wind, sun, wood-waste, and water. In most duty locations, we have immediate access to all four sources of energy.
- We are striving to harness the power of the renewable energy sources to identify options that will help fill our energy requirements and reduce the energy cost burden on American tax-payers. Initial efforts have been focused in Eastport, ME, where the incredible tidal ranges at the Station are a compelling reminder of the power, and potential, of Mother Nature. Several initiatives are also underway in Southwest Harbor, ME, where the collocation of five Coast Guard units provides a manageable opportunity to model multiple forms of renewable energy.

Tidal Energy:

Time lapse video of Eastport tidal ranges: 1:45min http://cgvi.uscg.mil/media/main.php?g2_itemId=831317

Tidal Energy Generator in Operation: 1:30min http://www.oceanrenewablepower.com/orpc_video/startup.swf

Coast Guard Station Eastport is adjacent to one of the most robust tidal current velocity locations in North America where currents can run up to six knots. In July 2009, SNNE and the RDC combined forces to integrate the Station into a developing tidal energy generation project led by Ocean Renewable Power Company (ORPC) in nearby Cobscook Bay. ORPC was designing, building, and testing the largest ocean energy power system ever deployed in United States waters; a 60kW underwater turbine generator unit (TGU) deployed off a world-class research vessel named *Energy Tide 2*. RDC provided a \$100,000 grant to help ORPC refine the product for commercial application. In March 2010, the TGU was officially launched to begin the Coast Guard test project, where the prototype turbine would be monitored and tweaked, with the goal of harvesting clean, grid-compatible energy that would power the shore tie for Station Eastport's 41-foot Search and Rescue (SAR) boat. The 41' requires considerable shore power to be available for start up at a moment's notice for SAR response, especially during the winter months.

After several engineering and design upgrades, the TGU was re-launched with *Energy Tide 2* in early August, with the goal of producing grid-compatible electricity, and ultimately conveying that electricity for use to the Station's boat. The first energy transfer was successfully achieved on 18 August 2010!

The electricity generated by the TGU charges battery modules housed on *Energy Tide 2*. Once charged, the batteries are transported to the station's pier where the electricity is converted in an inverter and transferred to the shore-tie box for the 41'. The electricity is predicted to meet 4 hours of demand per day for the 41-foot boat with the trial extending for a 60 day contract period.

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This project is first-ever federal application of electricity derived from tidal energy, and places the United States Coast Guard at the leading edge of the ultimate realization of grid-compatible, clean, reliable tidal energy. An event to highlight the project's success will take place on Tuesday, August 24, 2010, at Station Eastport and will be co-hosted by Governor Baldacci, Congressman Michaud, Senator Raye, Captain McPherson (USCG Sector Northern New England), and ORPC.

Terrestrial Renewable Energy

USCG Video link terrestrial energy efforts: (2mins) http://cgvi.uscg.mil/media/main.php?g2_itemId=837903

In Southwest Harbor, ME, the co-location of 5 Coast Guard units translates into the need for a 20-home CG Housing area, which is very expensive to heat and light throughout the year as a result of the age and inefficiency of the homes and the high cost of utilities. Therefore, we sought to apply several forms of renewable energy that would work in combination to sever our dependence from fuel oil, supplement electricity consumption, and likewise demonstrate the full spectrum of green energy resources immediately available. In parallel, USCG Civil Engineering Unit Providence is conducting a project that will utilize American Recovery and Reinvestment Act (ARRA) funding to completely renovate the entire housing complex, wherein the insulation in all homes will be vastly improved, plumbing and other failing systems will be replaced, and the functionality of square footage will be increased (scheduled to break ground in October 2010). The ultimate goal is to establish net-zero homes that are proven quality living environments for our Coast Guard families.

1. Wood Pellets

Wood pellets are an emerging alternative energy industry, and function as carbon-neutral, non-toxic fuel source. Through funding from the USCG Innovation Council, the Coast Guard in Southwest Harbor, ME purchased and installed a biosolar (biosol) wood pellet boiler/burner to replace the legacy heating system for a duplex housing unit in Coast Guard Housing in Southwest Harbor, ME, in November 2009. The pellet burner is 90% efficient, compared to approximately 82% for the oil burner. The price per million BTU of wood pellets is nearly half that of #2 heating oil using local prices (\$11.11 vs. \$26.32). This system has completely severed the duplex from fuel oil as a heating source, burning pellets in the place of what would otherwise have been 1900 gallons of fuel oil a year. As pellets are extracted from wood waste, the industry represents a viable avenue for energy independence, especially in the forests of the Northeast. Several local organizations are using commercial-scale applications of pellet boilers, and increasing the local demand and infrastructure for wood pellets. So far, the positive community rapport associated with this project has been overwhelming; the Coast Guard has hosted several classes of students ranging from local colleges to middle school on site to observe and collaborate on a functional residential pellet boiler system. Our intent is to continue to replace legacy fuel oil systems with pellet systems, with the next endeavor targeted for late FY10.

2. Sun Energy

The biosol system is integrated with solar thermal tubes (hence "biosolar"), which were installed in the same duplex home using the organic expertise of Coast Guard electronics and construction personnel and purchased through Innovation Council funding. The solar-thermal tubes are rated to produce 80 gallons of domestic hot water daily. We have also installed a 3.2kW array of Photo Voltaic (PV) panels on the roof of the structure. The PV panels have steadily produced between 16 and 25kWH a day since April 2010; enough to offset nearly 100% of the electricity consumption for an average household at 500-600kWH/month.

3. Wind Energy

A 2.4kW "skystream" residential wind turbine is also being installed in an open space on the Southwest Harbor housing property; with a "raising date" of August 27, 2010. The turbine head will be elevated on a 70-foot guyed tower, and integrated to offset the electricity demand of an adjacent housing duplex unit. The Skystream will leverage the robust local wind resources, especially during the winter months, and is projected to save more than \$1,200 in electricity expenses per year. Future initiatives to place solar resources on this same unit are in the works. Integrated wind/solar energy resources provides the opportunity to adjust to seasonal realities in Northern Maine.