Ocean-front Geothermal

An Intro to Ocean-front Geothermal Systems

There is a vast quantity of free, clean, and renewable energy in our ponds, oceans, and the waters that surround the Vineyard. Through the use of geothermal heat pumps, we can collect and concentrate this low grade stored solar energy into high grade energy to heat and cool our buildings. This energy is available 24 hours a day all year long.

Because the Sun is storing this energy for free, a geothermal heat pump can typically collect 2 to 4 units of free energy for every unit of energy put into the heat pump. The end result is an efficiency ranging from 300 to 500%! In comparison, boilers and furnaces are fast approaching their limit of efficiency (currently some of them have 98% efficiency) of 100%.

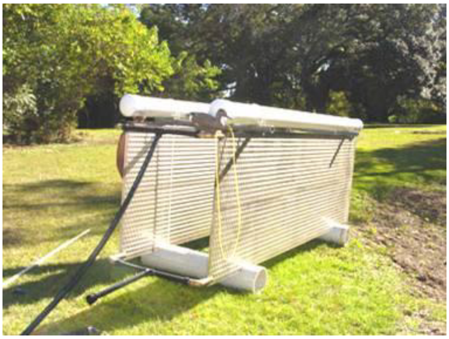
Because geothermal systems are 3 to 5 times more efficient than the best fossil fuel systems, their operating costs are about half. In other words, the annual cost for electricity to run a geothermal system is **half the annual cost of propane or fuel oil to run a furnace or boiler**.

We proposed our ocean based geothermal system in **November 2006,** and our pond based approach in **September 2007**. The following sections will have additional details about the ocean and pond approaches as well as an introduction to some ecological and permitting issues.

This presentation describes the application of a system already in use around the world to reduce heating and cooling costs by up to 50% for buildings on or near the shore. This system uses the amazing power of the Sun and has no adverse environmental impact.

The Concept of Ocean-front Geothermal

Ocean Front Geothermal is our application of the geothermal system in a new and innovative way. We propose the use of a titanium plate heat exchanger, suspended below a dock or pier, to extract the immense stored solar energy in the ocean to provide the heating, cooling, and hot water for any size building on or near the shore – a single family home, a restaurant, a hotel, a hospital, or a downtown center.



This system will reduce operating costs up to 50% compared to a 95% efficient fossil fuel system. Perhaps the best illustration of a pond or ocean based geothermal system in operation is the Coast Guard Chicago Marine Safety Station.

Located at the mouth of the Chicago River on Lake Michigan, this structure was built in 1935 and used until the late 80s when it was boarded up. In 2005, the City of Chicago and the Coast Guard decided to renovate it and make it into an extremely efficient “green” building. The Army Corps of Engineers determined that the most green and cost effective heating and cooling system would be a 32 ton SlimJim heat exchanger suspended under the pier in front of the Station. This plate heat exchanger uses stored solar energy in Lake Michigan to provide all of the heating and cooling for the 12,000 square foot structure.

In February 2006, during a very cold winter, the Coast Guard icebreaker Mackinaw was plowing through the two foot thick layer of ice in front of the Coast Guard Station. Even though the Lake water was barely above 37 F, the geothermal system worked flawlessly and the officers on duty were warm and toasty. The Army Corps of Engineers, the Coast Guard, and the City of Chicago agree there is no adverse environmental impact on the Lake from this installation.

Now that the Coast Guard has proven that this technology is safe, dependable, and really performs throughout the brutal Chicago winter and summer weather, we feel comfortable introducing the idea of Ocean Front Geothermal to Martha’s Vineyard and Nantucket.

Any structure near the shore can have their total heating and cooling loads easily met by a plate heat exchanger submerged in the water and supply and return pipes connecting to the heat exchanger to inside heat pumps.

Because this system is scalable, it is completely realistic to serve an entire downtown with a municipal geothermal system – providing stored solar energy from the ocean to area businesses and residences – reducing fossil fuel use (and potential carbon dioxide generation) by 50%, reducing the operating costs for homes and businesses, and providing an additional “green” revenue stream for the municipality.

The Amazing Potential of Stored Solar Energy:

We are surrounded by both water and a nearly unlimited source of energy – the Sun stores 500 times more energy in the Earth and oceans than mankind uses every year. This energy is available to us day and night, summer and winter, anytime we need it. We can use this stored solar energy to heat and cool buildings, heat pools and spas, and make domestic hot water.

Because the geothermal process involves moving stored solar energy, not making it, typical efficiencies are between 300 and 500%. This is possible because the Sun gives us most of this energy for free – we just have to move it into a building with a heat pump.

This level of efficiency means that geothermal systems save at up to 50% when compared to conventional fossil fuel systems (such as a 98% efficient Viessmann boiler) – so payback periods can be as short as 5 years.

The Big Picture: Both Sunshine and Stored Solar Energy

We have been focused on using the Sun when it shines (or using the wind when it blows) to make electricity. It is counterintuitive to imagine that there is more that the Sun could give us besides sunshine.

But the reality is that we are inundated with free energy from the Sun all year long – it just gets stored invisibly in the Earth, ponds, lakes, and oceans where it awaits our use.

In the past, there was no realistic way to access this stored solar energy in the ocean so we didn’t even consider it as a source.

This meant that we had no easy way to deal with at least half of our problem (in terms of global warming, carbon dioxide generation, and fuel use) – the heating and cooling of buildings.

But with the innovation of the SlimJim stainless steel or titanium plate heat exchanger, we now have an easy, affordable, environmentally sound, and money saving way to extract that immense source of stored solar energy in the ocean – and finally tackle the issue of heating and cooling buildings.

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