

Ocean Power: A New Era in Energy

The month of June marks World Environment Day and World Ocean Day, two environmentally conscious days whose main purpose is to spread awareness of environmental issues taking place in today's world. However, a black cloud hangs over this year's events as 42,000 gallons of oil a dayⁱ gushes into the Gulf of Mexico after the *Deep Horizon* oilrig exploded and sank on April 20, 2010. This oil spill is one of, if not the biggest natural disaster that America has had to deal with and it shows that the time is now to invest, innovate, and utilize specific renewable energy technologies that can reduce our dependency on oil consumption and preserve our environment.



In 1999, assessmentsⁱⁱ showed that Americans consumed 25 percent of the world's oil production, but held less than 3 percent. In 2009, statistics showed that Americans consumed approximately 23% of the world oil production. It is hard to believe that with all of the new changes in energy efficiency and renewable energy technology that has been created and recognized over the last decade that more significant changes in oil dependency has not been achieved. Without more policy that demands the utilization of innovative renewable energy technology and the implementation of energy conservation measures, the country will not be able to steer itself away from oil dependency. This means continued relationships with unreliable foreign sources of oil (threatening our national security), more drilling along our coasts, (threatening our natural habitats and wildlife), and more chances for disasters to occur like the one currently in the Gulf, (ultimately threatening our economy and our way of life).

Ironically, the reduction of oil dependency and enhanced protection of the world's oceans is vital not only to the sustainability of the planet, but also for the preservation of one of our greatest resources of renewable energy that could help solve the energy problem. In essence, we must utilize the very thing we are destroying in order to save ourselves. More specifically, in order to avoid disasters like the Gulf oil spill and save our oceans we must harness the renewable power of...our oceans. (This reminds me of the 1997 quote by our worry free friend Austin Powers, "Allow myself to introduce... myself". If only we had listened then, perhaps we'd be singing a different tune now.)

On a positive note, today there are some organizations and initiatives that target oceanic and marine wildlife preservation. One organization that is trying to connect different groups under the banner of oceanic renewable energy is the [Ocean Renewable Energy Coalition](#). The OREC is a national trade association that is "dedicated to promoting marine and hydrokinetic energy technologies from clean, renewable ocean resources." They incorporate over 40 members, all of

which work towards these same goals by coming up with ideas and innovations that help build these technologies and put them to realistic use. In fact, some of these organizations are literally "turning the tide" when it comes to renewable energy by using the known green technique of harnessing ocean waves and currents to produce energy:

- [Ocean Power Technologies \(OPT\)](#) is a group that was founded in order to find solutions that could harness the energy that comes from the world's oceans. One way that OPT is doing this is via their PowerBuoy 40ⁱⁱⁱ that acts as a "wave energy converter" while submerged. As it bobs in the ocean it works a hydraulic pump that drives a generator that produces up to 40 kilowatts of electricity, which then can be sent to shore via an underwater cable. The electricity that comes from just one clean and safe PowerBuoy 40 has the capability to produce enough power for 20 to 25 homes.



- [The Ocean Renewable Power Company \(ORPC\)](#) works on breakthrough technologies and environmentally safe projects that use the ocean to produce renewable and clean energy. One of these projects is installing power systems all along the Gulf Stream's ocean currents (which has 21,000 times the energy of Niagara Falls). With the constant flow of the Gulf Stream, if ORPC harnesses just 1/1000 of the Gulf's renewable energy that would still be enough to power up to 7 million homes.

Wave power technology, while underused, has been a known technology, for years. However, a future green application that can boost renewable energy is not the ocean itself, but rather something that can be found within the ocean. Algae sources are considerably new renewable energy options within the ocean that have many believing them to be "the ultimate in renewable energy"^{iv}.



Half of algae's weight is based off of oil, which can be made into bio-fuel that could be used on anything from cars to airplanes. Considering that there over 65,000 known algae species this could potentially be a big time future energy source.

Yet, renewable energy from the ocean is only one step towards sustainability. Energy must be used more efficiently. Individual behavior needs to change and become more environmentally

conscious. Overconsumption is becoming a big problem in the United States and the unwillingness to give up that way of life is feeding our current dependency on crude oil. Specifically, opting for bigger and better in the auto industry means big engines, lots of horse power and less fuel economy. Recently, we've seen a larger effort by auto manufacturers to deliver hybrid and fully electric vehicles. It is up to the consumer to make the decision to purchase these vehicles and drive demand, pushing manufacturers to produce, compete, and continuously innovate.

In 2007, the U.S. depended on crude oil to meet 39% of the total energy demand with the majority of it (45%) feeding the transportation sector in the form of finished motor gasoline^v. It is frustrating to see that with new technology coming out all the time, that as of 2010, approximately 46% (nearly the same amount) of U.S. petroleum consumption is used for finished motor gasoline. If we eliminate the use of petroleum based vehicles and get them running on renewable energy, we could curb nearly half of our petroleum demand. In order to do so, we would need to generate 20% of our total energy demand from other sources (more, actually, because all renewable energy sources are not strictly dedicated to supplying the transportation sector).

In 2007, hydroelectric power supplied only 2.5% of our energy demand^{vi}. Renewable sources combined provided only 6.7%. As of July 2009, approximately half the states in the U.S. still had no electric vehicle charging stations^{vii}. The other half had less than 10 throughout the entire state with the exception of California, which has become a pioneer in electric vehicle support, supplying over 400 charging stations. Oregon is the runner up with less than 50 (big gap). Therefore, an infrastructure made up of [fully electric vehicles](#)^{viii} recharged by electricity that comes from renewable sources will require a complete overhaul of consumer behavior/demand, manufacturer supply, and energy policy.



Building structures that would also use the oceans (amongst others) renewable energy must be built properly in order to not be wasteful. If buildings are not consciously created to maintain energy and preserve resources then utilizing renewable sources from the ocean becomes a redundant endeavor (as old buildings become less efficient, we waste more energy, etc). This is why it's important that buildings and neighborhoods are developed around the LEED (Leadership in Energy and Environmental Design) Green Building Rating System^{ix}.

According to [US Green Building Council](#), 39% of energy use comes from buildings in the United States alone, but with LEED certified buildings these numbers can allow renewable energy from the ocean to actually have a chance of succeeding and being applicable in the real world. This is

why so many companies like *Globetrotters Engineering Corporation*^x (a Chicago based architecture company founded by [Niranjan Shah](#)^{xi} known for building many LEED certified buildings), [Wells Fargo](#) (which built an office tower that is not only LEED approved but saves up to 5 million kWh a year), and [Kubala-Washatko Architects](#) & [Boldt Construction](#) (which actually built the first ever LEED-platinum certified, carbon neutral building^{xii}) all incorporate LEED standards into their designs.



Since the inception of LEED certification, it took several years for the first building to reach platinum certification. Now, it is something that architects strive for. For many projects government incentives are available for businesses that reach LEED certification. [Niranjan Shah](#)^{xiii}, realized that the LEED benchmark is the future of architecture and that creating structures that benefit from renewable energy just makes common sense. Hopefully, in upcoming years we'll see LEED platinum certification become the standard.

After the oil spill in the Gulf it's clear to see that now, more than ever, protecting our oceans stands for something much greater. By saving our oceans, we are making a commitment to the preservation of our natural resources, our wildlife, and our humanity. Through the promise and development of a sustainable, renewable energy future, we can follow a new path which will redefine the meaning of life, liberty and the pursuit of happiness.

Written by Marcus Reyes

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- i [42,000 gallons a day](#) - Estimated on April 26, 2010.
- ii [Natural Resources Defense Council](#) - Quoting the Energy Information Administration 1999 Annual Report
- iii [PowerBuoy 40](#) - CNN Editorial Feb 26, 2010
- iv [Algae: "The ultimate in renewable energy"](#) - CNN Tech Editorial
- v [Finished Motor Gasoline](#) - EIA Stats from 2010
- vi [Hydroelectric Resource](#) - EIA statistics from 2007 report
- vii [Map of Charging Stations](#) - Alternative & Advanced Fuels
- viii [Fully Electric Vehicle](#) - Nissan Leaf
- ix [LEED Certification](#) - NRDC Smartgrowth Editorial
- x [Globetrotters Engineering Corporation](#)
- xi [Niranjan Shah](#) - GEC CEO Niranjan Shah Twitter Feed
- xii [First LEED Platinum Certified Carbon Neutral Building](#)
- xiii [Niranjan Shah](#) - Live Journal