Currently the United States receives less than 7% of its power from renewable hydroelectric sources. In an effort to increase this percentage, the potential of oceanic tidal power is being evaluated. Tidal power is an enormous source of renewable energy, and the capacity to serve as both an abundant and relatively inexpensive source for electricity generation that could forever alter and improve the way in which the U.S. continues to subsist and develop. The potential energy held by tidal power has been far ignored as a reliable energy process, and is only now in the earliest stages of being utilized. However, due to current research and development, several processes for effectively harnessing tidal power have given the process enough of a competitive edge both economically and in terms of reliability that real, fully functioning projects are now beginning. Many coastal areas would be in one way or another benefit from the implementation of tidal power, as it is both a perpetual and predictable source of clean energy. If enough interest and financial backing for further tidal power research continues to remain strong, then the US may after all find a long term solution to the growing issue of sustainable development.

When considering a location for potential tidal power generation, a short list of physical factors ultimately determine whether or not the site is viable. These factors include the area of the waterway and how strong the tidal flow is. An ideal location is one with the greatest concentration of volumetric flow per area. This concept of flow density translates directly into energy density, and ultimately determines how economical it is to generate power from a given site. There are certainly many locations along the United States coast with a large volume of tidal flow. However, the low speed of these tides would require a very large area to be used in order to generate significant amounts of power. This factor ultimately results in tidal power generation being impractical and economically unfquire for most coastal areas.

The number of locations in the US which meet the “energy density” criteria described above is relatively limited. However, even among the ideal sites, there is yet another factor which again reduces their viability for power generation. This factor is location itself. Unlike traditional power plants, which can be constructed in strategic locations, usually near major population centers, tidal power must be generated at the location of the tidal flow. Since some of the best potential locations are in remote coastal areas, with no significant local population, investing in tidal power for these areas is simply not economically viable. Therefore the ideal site for tidal power generation is a New York City.

Located at the junction of the Hudson River, the East River, and the narrow western end of Long Island Sound, New York City combines both concentrated tidal flows and a very large population center. Directly along the eastern shore of Manhattan lies the East River. It serves as an important transportation and shipping route to and from the New York City area. The section best suited for tidal power use is the 10 km stretch between Wards Island and the tip of Manhattan. In this area, the river width narrows to an average of 0.5 km, while the flow rate increases to over 5 knots during peak times. Currently, the East River is the site of extensive testing for one of the nations first grid connected tidal power turbines. The Roosevelt Island Tidal Energy project, led by Virginia based Verdant Power Inc., began in 2002 with extensive environmental analysis and permitting along with prototyping and site overview. December 2006 marked a monumental step, with the installation of the first of six fully functioning turbines. These preliminary units feature an axial flow rotor with 5 meter diameter blades. So far, they have been outputting approximately 35 kW of power each.

San Francisco Bay has a unique geography that makes it an ideal location for tidal power. The bay, connected to the ocean, experiences water level changes due to the tides. All the water that floods in and out of this 450 square mile bay, 400 billion gallons every day, travels through one narrow entrance and can be harnessed by tidal generators. The situation is not perfect, however, as the Golden Gate entrance is used as a major shipping lane for container ships. Even with this difficulty, smaller generators at the bottom of the entrance could produce massive amounts of power because of the fast flow rates. Horizontal axis turbines, with their circular sweep area and possibility of being shoaled, are best suited to the local conditions. Although only a fraction of the bay’s tidal power could be harnessed, a project in this area is certainly viable and would contribute enormous renewable energy gains.

The Florida Current is a perfect candidate for tidal power. Fast water speeds and a continuous flow make it ideal for horizontal axis turbines. The large sweep area can gather more energy than other designs. However, many problems arise when considering the Florida Current as a possible plant site. Problems include the depth of the water, boat traffic, and laws regarding the use of national and international waters. If these problems can be resolved, this project has the potential to produce a substantial amount of power for the Florida peninsula. Many small generator farms combined could easily contribute significant amounts of power to cities such as Miami. If proper research is done, generators could become more efficient and produce more power with smaller blade diameters. With the fast moving water and the amount of area in the Florida current, immense amounts of energy can be produced.