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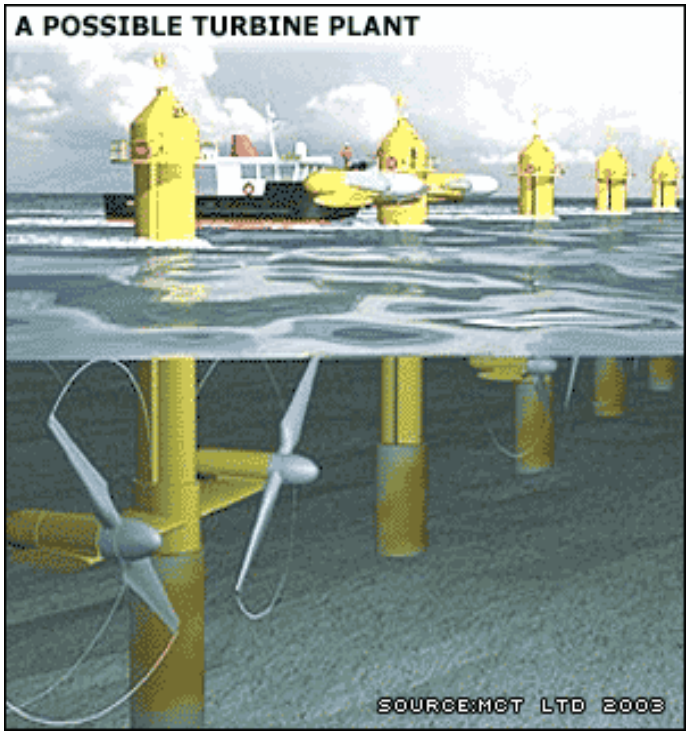
The Tides of Change



Do you know where *your* electricity is coming from? Did you know that our local utility district purchases 85-90% of the power we depend on every day from the Bonneville Power Administration (BPA)? This means that over 320,000 people North of Seattle are getting their energy delivered from a company in Portland, Oregon. Recently passed into law, Local Initiative 937 requires Snohomish Public Utility District (SnoPUD) to supply customers with 15% renewable technology in their energy portfolio by 2020. Though hydropower is often thought to be a renewable resource, the recent debate over environmental impacts of river obstruction through damming have led to the realization that this can no longer safely be considered a sustainable energy source.

While wind and solar alternatives have been utilized in other parts of the country, we too have a local source of potentially tapped energy. In the Pacific Northwest tidal power has significant advantages over other renewable sources. It is more economically competitive than solar in our area, and more predictable than wind. Predictability is a key component for utilities seeking to transform into a carbon free facility.

"85 to 90% of the power we get comes from BPA."

Currently in the Puget Sound multiple projects are underway to discern the possible amount of harvestable energy lurking in the waters. The most notable of these is a pilot project occurring in the Tacoma Narrows near Point Evans. Point Evans experiences the strongest tidal flows in the region, making this an ideal location. Another benefit of the area is that it is located near preexisting electrical infrastructure necessary for transmission. This makes the entire project more cost effective and more viable.

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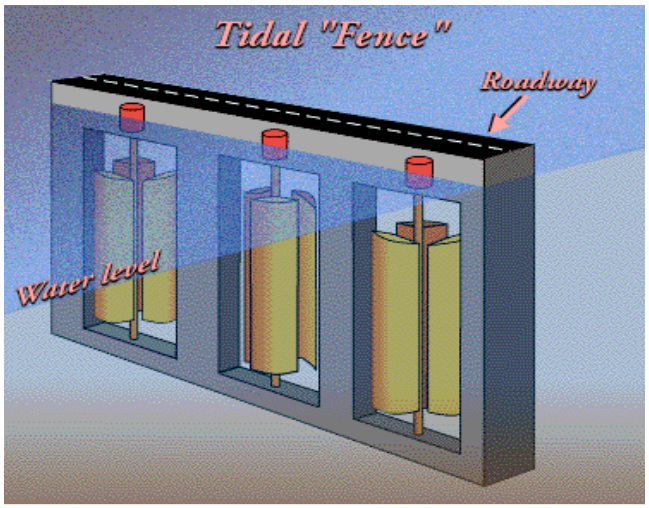
The pilot plant is projected to cost $4.2 million although don't expect any of your energy to be coming from this source. The goal of the pilot plant is not to provide cost efficient energy yet. Its purpose is to see whether or not tidal technology is economically, and ecologically viable as a renewable alternative energy. Ideally, the pilot should demonstrate reliability, minimal maintenance, and non-existent environmental impacts. If so, this new technology may be eligible for renewable production credits and incentives from the government, similar to those provided to innovations in wind and solar technology. Without the assistance of such governmental cooperation, the project would not prove to be cost effective. The Federal Government has already provided $10 million in grants however much more will be needed to get this project off the ground, or into the water, so to speak. If all goes well, the plan is to construct a commercially sized array of 64 submerged turbines powerful enough to supply energy to around 11,000 homes with clean energy.



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So far the results from this project have looked promising, and researchers estimate that total local potential of the Puget Sound is upwards of 9 Gigawatts (almost 5% of the total US residential energy requirements). However, this is only one small nook of the greater Pacific Northwest, and although tidal power might be a good investment here in Snohomish that does not necessarily mean it is suitable to all other areas. According to the Electric Power Research Institute (EPRI), "Oregon and Washington have the strongest wave energy resource in the lower 48 states" and so many coastal locations in these two states are good possible sites for future ocean-based power generating technologies.

This is a booming industry with countless new ideas popping up left and right. There is currently no standard for tidal energy in terms of a consistently used turbine model largely because the technology is still in its infancy relative to technologies such as wind and solar. Due to this fact, it is unwise to attempt any full-scale projects until we have further developed through the diversity of innovation. Several such examples of interesting technologies include ideas like the tidal lagoon. In principal, it is a sunken box on the shore into which tides flow during high tide. The water then drains back into the ocean through a turbine creating electricity. Another proposed suggestion is a tidal fence (Left) in which multiple turbines harness the power of the incoming and outgoing tides.

Major opposition to tidal energy is public misinformation. There is a common misconception that local marine wildlife such as whales and fish will be negatively impacted by these underwater arrays. Such public outcry is prevalent yet studies so far show that such concerns are unfounded. Most believe that underwater infrastructure and the marine ecosystem are inherently incompatible. The common notion is that just as these structures will prove detrimental to the environment, so too the environment will cause destruction requiring expensive maintenance and even system failure. Although as noted, in the Tacoma Narrows pilot project no ecological problems have been experienced over three years of operation. One such example is the fear that colonies of barnacles will attach themselves to underwater units causing structural damage. Above is a picture of a buoy overwhelmed by barnacles. However, this problem can easily be avoided by glass-based paints on the exteriors of the structures.

This can go to show that one of the big obstacles – public opposition, is based on generalized erroneous assumptions. Right now this is the largest barrier keeping tidal technology at bay, however it is not even one of the real downfalls. Currently one of the major drawbacks to many of the models that are out there is that they are so material intensive. One such example is that a state of the art 1.5 MW Tidal Energy Turbine requires the same amount of material to build eight 1.5 MW Wind Turbines. However because water has a higher power density 800 times than that of air, much of this difference is made up. Tidal energy has a yet another leg up on wind power in that it does not require the use of a gearbox, which is the component most prone to failure in a wind farm. One more factor that benefits tidal energy is the ability to place turbines more closely together, therefore increasing the amount of energy per square mile. Although water turbines clearly require much more material than some alternatives it compensates for this fault through predictability, minimal ecological footprint, and an increased level of output. Overall, tidal energy is worth pursuing in the Pacific Northwest given necessary governmental backing to make it a cost effective alternative to non-renewable and other renewable energy sources. ■