

# How to generate electricity from Underwater Turbine

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**ABSTRACT:** One the greatest untapped energy resources in the world are the motion of the ocean. And while floating wind turbines and wave-powered generators are being explored throughout the world, there still remains one largely untapped power source, the underwater ocean currents. Using this method we can generate electricity by it by the passing of ocean currents in the turbine. In the world there are many plants which pollute the environment hence degrading it and we can see the results too. By this method we can generate more and more electricity and use it and can reduce the use of thermal power plants.

**Keyword:** Energy, Resources, Environment, Ocean



Marina Beach is located in the heart of Chennai city and is surrounded by major roads that house both residential and commercial establishment. It is nearly about 6.5 km throughout making it one of the longest beaches in the world. To generate more electricity we have to cover around 11km below the surface to start with the plan.

## INTRODUCTION:

To overcome the problem of the consumption of electricity due to which power failures are there many times in summer season in Chennai and also in many parts of Tamil nadu. To overcome this problem of overloading in this state we can go for underwater Turbine which can produce electricity at an extent about 30MW of energy per 10hour. They are essentially windmills installed onto an ocean floor or river bed. The underwater current produced by the tides spins blades arranged like an airplane propeller. These turbines are attached to a gear box, which is connected to an electrical generator. This produces the electricity that is carried by cable to shore. Once it's plugged into an electrical grid, the electricity can be distributed.

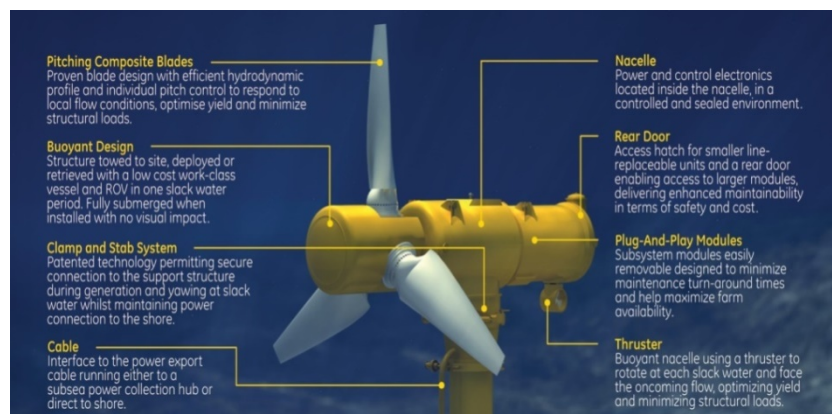


Fig1. Shows Propeller

### **Underwater Turbine used In following Countries:**

1. Australia
2. New Zealand
3. Japan
4. Korea
5. China
6. South America
7. Canada
8. France
9. U.K.

### **Factors affecting underwater turbine System:**

- Avoidance of cavitation's (bubble formation)
- Prevention of marine growth buildup
- Corrosion resistance.

### **How can be ocean Currents be used to generate electricity:**

Ocean waters are constantly on the move. Ocean currents flow in complex patterns affected by wind, water salinity, temperature, topography of the ocean floor, and the earth's rotation. Most ocean currents are driven by wind and solar heating of surface waters near the equator, while some currents result from density and salinity variations of the water column. Ocean currents are relatively constant and flow in one direction, in contrast to tidal currents along the shore.

While ocean currents move slowly relative to typical wind speeds, they carry a great deal of energy because of the density of water. Water is more than 800 times denser than air. So for the same surface area, water moving 12 miles per hour exerts the same amount of force as a constant 110 mph wind. Because of this physical property, ocean currents contain an enormous amount of energy that can be captured and converted to a usable form.

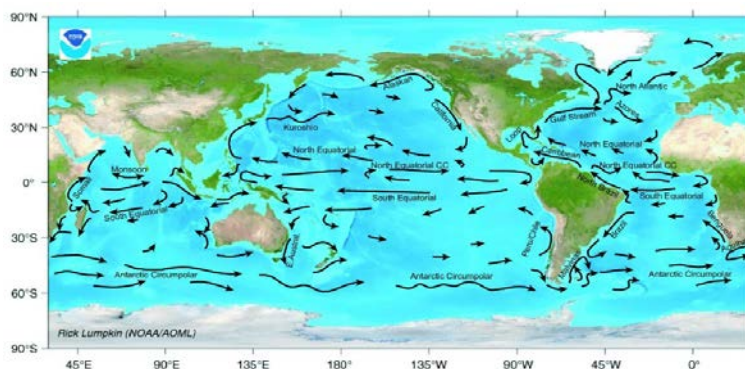


Fig 1.2 Ocean Surface Currents

These parts of the machine which is below the water level i.e. on the sea bed. It can be fixed on the sea bed. The generator is connected to the 3 blades which will rotate when the ocean currents are flowing through the sea.

One reason some fear we may jump into tidal turbine energy production too quickly is that the technology is attractive. Underwater turbines produce no CO<sub>2</sub> emissions. And the technology is benign: Turbine energy production is passive, simply capturing some of the kinetic energy found in the tidal movement and transforming it into electricity.

Hence this method is very effective for the production of electricity for small area and we can use it in large area also. And we can provide to other states (i.e. if we setup plant in Tamil Nadu we can supply power to the nearby states like Kerala, Andhra Pradesh etc.)

#### WORKING OF TURBINE:

Tidal turbines are very much like underwater windmills except the rotors are driven by consistent, fast-moving currents. The submerged rotors harness the power of the marine currents to drive generators, which in turn produce electricity. Water is 832 times denser than air and consequently tidal turbine rotors can be much smaller than wind turbine rotors thus they can be deployed much closer together and still generate equivalent amounts of electricity

Devices that harness marine current energy present a unique set of engineering challenges in terms of design, installation and maintenance.

The unique design of SeaGen allows capture of the maximum amount of tidal energy whilst keeping maintenance and connectivity costs low.

Example: During operation, the force of the tidal flow in Strangford Lough is equivalent to a 345 mph wind generating 100 tonnes of thrust on the rotors. Hence if we can use it in India hence it can be successful if we start it, it can produce huge amount of energy.



Fig 1.3 shows the setup of the underwater Turbine

Table 1.0 Comparison between different types of Power Sources (Power produced, Cost Estimation etc.)

S.No.	Energy Source	Power	Cost Estimation	Maintenance
1.	Solar Energy	200kwh in single unit	1.2lakh- 1.8 for single unit	Low
2.	Wind turbine	2.5-3 Mw	1.3M\$-2.2M\$ per mega watt	High
3.	Hydro Power plant	Depends on size of dam	25kw- 16900 Euro	Very High
4.	OTEC	88000Twh\yr. (Twh- Terawatt hour)	3-8Million	High
5.	Underwater Turbine	700,000 kilowatt hours one single turbine	10 Million	Medium

#### INSPECTION WORK:

The vast majority of offshore wind turbines stand on monopile foundations below the sea’s surface, and these foundations demand significant maintenance. But those of us who work with this area often feel the maintenance task isn’t really given enough attention – right from early planning phases through to the operational phase. For this I have planned to have the inspection should be done 2 times in first month and then monthly check in order to be any failure in the turbine or any machinery parts i.e. (Rotor, Propellers). They can also install Cameras in the sea bed in order to check the parts faults or any other problems regarding it.

#### CONCLUSION:

Ocean energy can play a significant role in our nation’s renewable energy portfolio. With the right support, the ocean energy industry can be competitive internationally. With the right encouragement, ocean renewable energy technologies can help us reduce our reliance on foreign oil – fossil fuels, in general – and provide clean energy alternatives to conventional

power generating systems. And with the right public awareness, our coastline communities can use ocean renewables as a springboard for coastal planning that reflects the principles of marine biodiversity.

In conclusion, i believe that the intense and predictable marine current resource offers the possibility of clean energy at a cost that will ultimately be competitive not only with the other renewables, but in the long run we believe we can compete head on with most forms of fossil fuelled power generation at present-day costs. We think that, given appropriate government support to help the technology through its early and immature stages, it can play a significant role in producing clean energy. Tidal energy has potential to become a viable option for large scale, base load generation in Scotland. Tidal Streams are the most attractive method, having reduced environmental and ecological impacts and being cheaper and quicker installed.

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