

HARNESSING THE POWER OF TIDAL CURRENTS

EEL Energy is aptly named: designed without a turbine or propellers, the machines feature a fiberglass or polymer membrane that, like an eel, undulate under the water with the tidal current.

Several models are under development in different shapes or adapted to a specific aquatic environment. In the marine version, the power generators are located on the membrane. The river version has a mast that triggers a generator outside the water. Compared with other sources of renewable energy such as wind and solar power, this solution offers greater predictability. EEL Energy is developing and testing its river prototypes in the reservoirs of the Ifremer oceanographic research institute, and its tidal prototypes off the coast of Brest in northwestern France, with the support of Dassault Systèmes. Digital simulation is used to avoid errors, reduce testing costs and optimize design. The membrane is submerged virtually to measure performance, practicality and profitability before it is physically produced. Thousands of variations of virtual prototypes can be tested on a computer in the time it would take to build just one physical prototype.

RESPECTING THE ECOSYSTEM

Different models of membranes are available, ranging in size from 0.8 m for test prototypes to 1.6 m and 2.6 m for small 2-3 kW retail models, and up to 5 m for a 30 kW version developed and tested in late 2018. A 10 m, 100 kW model is being developed for 2020, and after that, possibly a 16 m, 500 kW machine. Admittedly, this is far below the power output of traditional energy generation methods, but the membrane is not meant to compete with tidal turbines, which need stronger and faster currents to operate. However, the solution is perfectly suited to places with weaker currents. Another advantage of EEL Energy's models is that they respect ecosystems. As they are underwater, there is no visual pollution. Also, tidal turbines take up a lot of space, like a dam, and have the same drawbacks. The membrane, in contrast, does not interfere with the movement of



“Tidal currents have been studied for centuries. We know when and how much clean energy we can produce, and the energy is predictable. That’s not the case with solar power at night or when it’s cloudy, or with wind power when it’s nice out and there’s no wind!”

—Franck Sylvain, CEO of EEL Energy

underwater life. “During one of our ocean trials, a dolphin came to play with the membrane,” Franck Sylvain says. “The system is very gentle and not aggressive.” To promote new forms of renewable energy, the production of which is by nature irregular and unpredictable, we need to have better control over its distribution. Stationary batteries can play a key role in stabilizing grid generation and energy distribution. Storing and releasing power as needed, these batteries balance out peaks in supply and demand.

For More Information

<https://3dexperienclab.3ds.com/en/projects/city/eel-energy>

