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Let's tap the power of the sea for our electricity

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In the late 19th century, French scientist James Arsene D'Arsonval proposed using the difference between cold deep-seawater and surface-level seawater to generate electricity, something known as Ocean Thermal Energy Conversion (OTEC).

During the 1970s energy crisis, the US, Japan and France initiated a decade-long OTEC research project that produced many results, in particular concerning power generators, which almost advanced to a commercially viable level. It is estimated that a flow of 3m3 of deep-seawater and the same volume of surface water will generate 10 megawatts of electricity, without using fuel or producing any carbon dioxide.

At the time, the US government was preparing to help companies build a pilot plant on a commercial scale. This plan was unexpectedly laid to rest when the Reagan administration moved into the White House. Looking at the decision now, it was probably a result of US energy policies which focused on controlling cheap Middle East oil. Now, however, that has become the source of the current global unrest.

There are reportedly two ways to develop thermal energy. The first is to build a power plant on the shore or on the continental shelf. Such thermal power plants are very suitable for the east coast of Taiwan. There are few suitable locations along the shoreline, but many on the continental shelf. It has been estimated that 5 gigawatts could potentially be produced.

Technically, the only remaining problem is cold-water pipelines on the seafloor. Fixed surface platforms, submarine power cables and underwater tanks are all existing technology.

The second way to develop thermal energy is to use movable, floating power plants, which are suitable for locations in the large, common sea areas along the lower latitudes where typhoons are rare. This was also the main point that the US was pushing for in the 1970s.

Planned and feasible solutions include obtaining hydrogen through water electrolysis and then producing ammonia by adding nitrogen to the hydrogen, or producing methyl alcohol by adding carbon to the hydrogen. Both ammonia and methyl alcohol are clean fuels that could be used as replacement for gasoline. If all suitable sea areas around the world could be used without destroying the environment, it would be possible to produce more energy than the total current global need, which shows the potential of this approach.

The technologies required by ocean thermal energy conversion already exist, and they only have to be adopted for ocean use. The ocean environment, however, is special, and research power plants are small in scale, so the cost of current facilities remains far higher than for other types of power plants.

OTEC power plants, however, do not require fuel, nor do they produce pollution. In a long term perspective, fuel prices are bound to go up and environmental pressures will also increase. If the

technology involved is improved, commercial OTEC power plants will become the trend of the future; but only by commercialization will OTEC succeed.

Preliminarily, the government could provide appropriate funds which businesses could apply for by submitting plans to develop and introduce individual essential technologies, while pilot plants only would be built when the time is ripe. Businesses would be guaranteed their operational rights. Because auxiliary funds would be required, businesses should make cautious estimates and do everything they can to overcome any problems.

As a maritime nation, Taiwan should emphasize the development of marine resources and jump at this great opportunity.

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Translated by Perry Svensson