Harnessing the power of salt, Norway tries osmotic power

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Handout picture shows workers at the Statkraft Osmotic power plant prototype in Tofte, south of Oslo, in October 2009. After wind, sun, currents and tides, a company is preparing to make clean electricity by harnessing another natural phenomenon, the energy-unleashing encounter of freshwater and seawater.

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Taking a step further in the planet's hunt for clean power, Norway is to unveil on Tuesday the world's first prototype of an osmotic power plant on the banks of the Oslo fjord.

The project is small-scale but could prove the great potential of osmotic energy.

"It is a form of renewable energy which, unlike solar or wind power, produces a predictable and stable amount of energy regardless of the weather," explained Stein Erik Skilhagen, in charge of the project at state-owned Statkraft, which specialises in renewable energies.

Osmotic energy is based on the principle that nature is constantly seeking balance, and plays on the different concentration levels of liquids.

When freshwater and seawater meet on either side of a membrane -- a thin layer that retains salt but lets water pass -- freshwater is drawn towards the seawater side. The flow puts pressure on the seawater side, and that pressure can be used to drive a turbine, producing electricity.

The phenomenon of osmosis is widespread in nature, permitting plants to drink through their leaves, and is used by industry to desalinate seawater. But the Norwegian experiment, a prototype that will produce just enough electricity to power a coffee-maker, will be the first time osmosis is used to make power.

"What's important for now is to test and validate the technology, not to produce a lot" of electricity, Skilhagen said of the two to four kilowatts (KW) the plant will likely produce at first.

And Statkraft's aspirations for osmotic power go far beyond the prototype, set up in a former chlorine factory in Hurum, about 60 kilometers (37 miles) south of Oslo.

The company hopes to have a commercial-size plant up and running by 2015, producing about 25 megawatts (MW) of electricity, or enough for 10,000 homes.

And it says osmotic power has a global potential of 1,700 terawatt hour

(TWh) annually, equivalent to half the current power production in Europe or China's total energy consumption for 2002.

Statkraft itself admits there is still a long way to go, starting with finding how to make more energy-efficient membranes.

The ones tested at the Hurum plant will have an efficiency level of less than 1 watt per square metre. The company says it plans to install membranes that can deliver 2-3 watts per square meter after some time, but an efficiency level of 5 watts per square meter is needed to make osmotic power profitable.

"It is definitely a point to work on," said Gerald Pourcelly of the European Membrane Institute, adding that time could bring the efficiency level of membranes to 5 or 6 watts per square meter.

Nevertheless, "everything that contributes to the development of renewable energy sources is positive," the scientist stressed, "considering the progression of carbon dioxide emissions and dwindling fossil fuel reserves."

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