HORIZON 2020

Competitive and CO2 Free Energy from Osmotic Power – Large Scale Deployment

Results in Brief

Salt: a sustainable non-intermittent renewable energy source

The world's first industrial plant producing clean energy from salt paves the way to market for osmotic power units targeting salt mining and gas storage sectors.

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Salt is much more than a seasoning for the foods we cook. It is a feedstock for more than 50 % of chemical products and is used in thousands of commodities including glass, paper, rubber and textiles as well as for de-icing and water softening.

Every year, around 110 million tonnes of salt in solution is mined around the world, producing saturated brine in the process. Brine is also generated by solution mining to create caverns for large-scale gas storage.

The Danish SME SaltKraft, now called SaltPower, has developed patented SaltPower technology to harness brine, turning salt into CO2-free energy via simple osmosis. EU funding of the SaltPower project supported construction of the world's first industrial energy production plant based on osmotic energy.

SaltPower – clean energy technology based on osmosis

Osmosis is the movement of a solvent (in this case, water) through a semi-permeable membrane. Salt triggers osmosis because salt attracts water. The SaltPower technology leverages pressure retarded osmosis, using salt to draw water into a pressurised stream (from low pressure to high pressure) from which the water at high pressure is used to generate energy.

Two key markets: salt mining and hydrogen storage

“For salt producers, we have 100 kW osmotic power units and are working on units up to 1 MW. The SaltPower technology generates energy while brine is being produced and can be used to power the processes, making salt mining energy-neutral in most cases,” explains Jesper Culmsee, sales director at SaltPower. SaltPower estimates that the brine in salt production has the potential to generate a minimum 650 GWh of energy annually.

The caverns remaining when the salt mines are no longer useful (typically after about 20-30 years) are often used for gas storage. Caverns are also created for the sole purpose of gas storage and the brine produced is discharged, sometimes to the sea. In this case, the salt content must typically be diluted. “SaltPower technology can be used to reduce the energy used to create gas storage caverns and dilute the brine. Excess energy can be injected into the grid as electricity,” Culmsee adds.

A world first and a new chapter in clean energy production

“The SaltPower technology has a very important feature that distinguishes it from other renewable technologies that are, by their nature, intermittent. The SaltPower system supplies baseload power 24/7,” emphasises Culmsee. This means that an industrial user of SaltPower technology gets CO2-free energy without power purchase agreements (to buy renewable electricity at a fixed price over an extended time). These agreements often require purchase of energy attribute certificates such as the Guarantees of Origin document in Europe.

SaltPower has already identified many customers, especially in Europe and the United States, and estimates the sales potential as hundreds and maybe thousands of times the capacity of the plant that the project built.

“While osmotic energy will not solve all our energy needs, it is an untapped resource. Our technology fits into existing industrial production, does not consume any additional resources and does not produce any emissions. Osmotic energy opens a completely new chapter in the book of energy production,” concludes Culmsee.

Keywords

SaltPower, energy, salt, brine, gas storage, osmosis, salt mining, osmotic power, solution mining, hydrogen storage, pressure retarded osmosis

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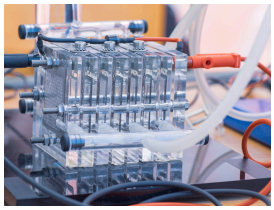

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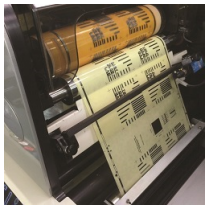

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Project Information

SaltPower

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Project website

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Project closed

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