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The next generation of green and sustainable energy will come from the sea

Danfoss, DTU Kemiteknik, and SaltPower™ have teamed up to develop the next generation of high-pressure pumps, energy recovery devices, and osmotic membrane equipment to produce sustainable green energy from saltwater. Innovation Fund Denmark will support the project under their Grand Solutions investment program.

A sustainable green society needs to invest in new technologies that support the green transition. Denmark is a global leader in water technology and we can convert this know-how into a new model for energy production. Danfoss, DTU Kemiteknik, and SaltPower™ will join forces to develop further new high-pressure equipment and osmotic membrane systems based on commercial membranes under the "Hi-PreM" (**H**igh **P**ressure **M**embranes) project to pave the way for the next generation of green energy based on sustainable water technology.

The ambition is to leverage the next generation of high-pressure pumps and state-of-the-art osmotic membrane systems to push the maximum operating pressure for osmotic technology to 200 bar, which is the optimum level to produce with osmosis. The higher pressure, the higher energy production. With this, the cost of energy production from Pressure Retarded Osmosis (PRO) can be reduced by 60%, representing a disruptive reduction in energy cost.

The project aims to increase energy efficiency by using PRO technology and components developed specifically for osmotic energy generation. In contrast, we use components today that are developed for desalination requiring a lower osmotic pressure. The potential for CO₂-free osmotic energy generation is not only huge, it is also sustainable power production.

"Innovation, research, and demonstration facilities will drive the development and commercialization of the next generation of green power, and osmotic energy generation has the potential to play an important role as Denmark strives to reach its ambitious climate goals. Due to the funding by Innovation Fund Denmark, we will be able to modify existing components to further develop and test the commercial perspectives for generating sustainable energy from salt water," said Lars Storm Pedersen, CEO SaltPower™.

The project will run until 2024. The three parties Danfoss, DTU Kemiteknik, and SaltPower™, will work together to realize the joint ambition for the project in which existing components will be modified for the intended use. The technology will be further developed, tested, and deployed in a Hi-PreM demonstration facility.

About the parties:

SaltPower has developed a new sustainable and CO₂-free energy source that can supply electricity at a fraction of the cost compared to other energy sources. The technology is based on osmosis using highly concentrated saltwater to produce electricity. The power production increases with pressure and means resources are better utilized as a part of osmotic energy generation. SaltPower solutions offer higher electricity production at lower costs.

Danfoss is leading within high-pressure pumps and energy recovery devices to produce drinking water by using membranes (PRO) and treatment of wastewater (Zero Liquid Discharge). As part of the Hi-PreM project, Danfoss will develop the next generation of the existing components to enable higher operating pressures to at least 200 bar for increased energy efficiency.

DTU Kemiteknik (DTU Chemical Engineering) is leading internationally within membrane science and mathematical modeling. Under the project, they will research to develop state-of-the-art membrane systems for dedicated use in the Hi-PreM project.