

BORNHOLM

Recycling treated wastewater for hydrogen production

Interreg
Baltic Sea Region



Co-funded by
the European Union

SUSTAINABLE WATERS
WaterMan

Type of pilot measure:

Feasibility study

Location:

Bornholm island (Denmark)

Water source:

Treated municipal wastewater

Type of treatment:

Membrane-based technologies such as reverse osmosis (RO)

Target water quality:

Ultrapure water (UPW)

Utilisation:

Hydrogen production by electrolysis

Return to natural cycle:

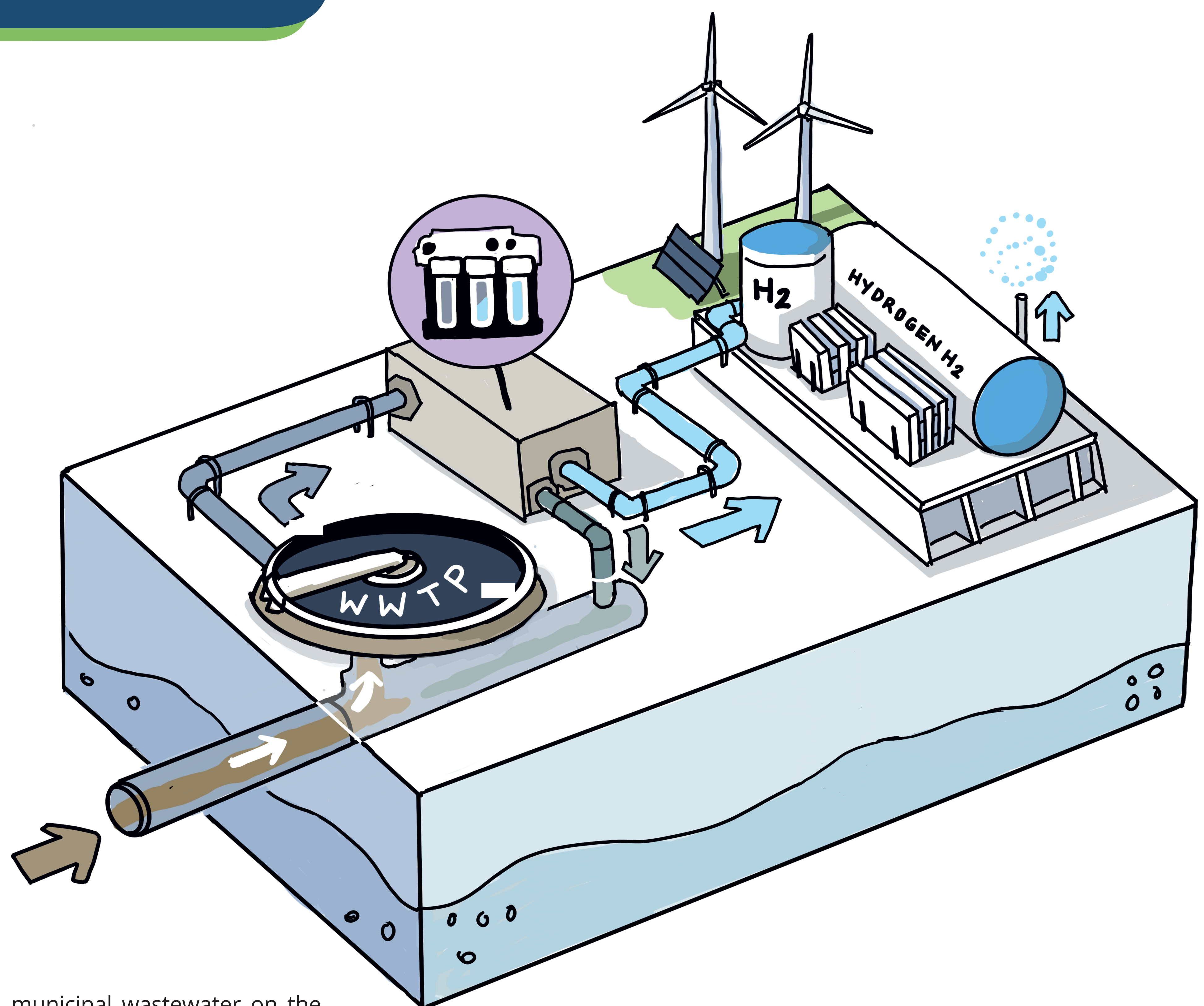
WWTP recirculation, environmental discharge (diffusion systems) or Zero Liquid Discharge (resource recovery)

Responsible:

BEOF – Bornholm's Energy & Utility Co. A/S

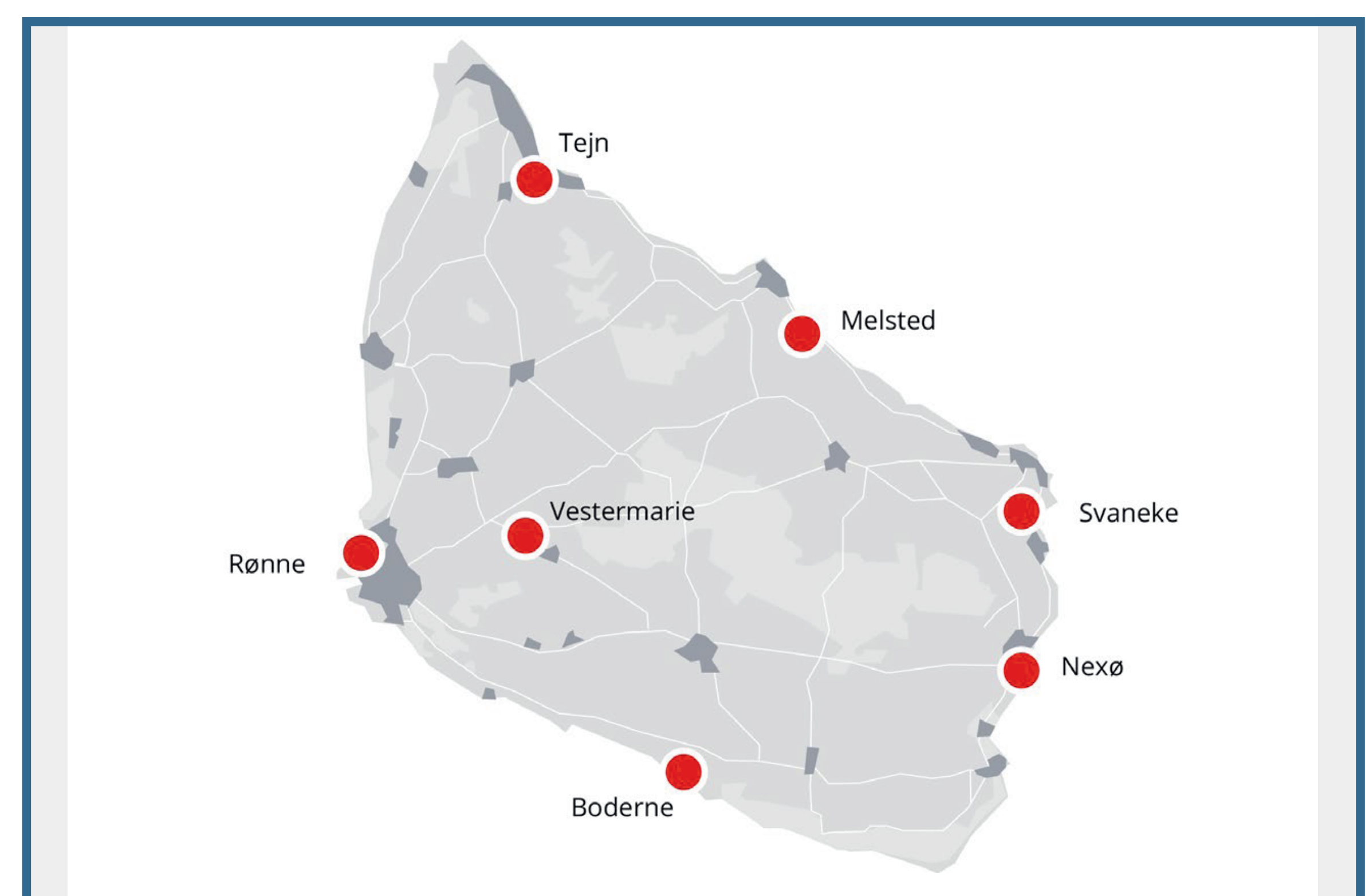
Completion of the study:

November 2025



This feasibility study investigates whether treated municipal wastewater on the island of Bornholm can be further purified to ultra-pure water (UPW) for hydrogen production by electrolysis (PtX), and whether this can serve as a viable alternative to seawater desalination. To meet the required water quality, membrane-based technologies such as reverse osmosis (RO) are used to further purify the treated effluent.

The study proves that the island's twelve existing wastewater treatment plants, or an envisioned centralised one, can provide the necessary water volumes for both a 25 MW electrolyser and a large-scale 800 MW PtX scenario. It also demonstrates that treated wastewater can be a significantly more cost-effective and energy-efficient option than seawater desalination: according to the life-cycle analysis, using treated wastewater can reduce energy consumption and the CO₂ footprint by up to 44 percent, provided wind power is used for purification – a synergy that exists on Bornholm. The study further confirms a central strategic insight: groundwater-based drinking water could be reserved for the population, if industry is supplied with fit-for-purpose water from alternative sources such as recycled wastewater.



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