

PH₂O Energy Storage

Introduction

- ✓ PH₂O is an ultra low cost long duration energy storage system
- ✓ Up to 50% round trip efficiency ac-ac
- ✓ 1/10th cost of batteries
- ✓ Losses can be used for district heating raising efficiency to 90%
- ✓ Targeting 20-200 hours of energy storage per plant

Background

- ✓ Pumped Heat was founded in 2017 to develop a power to thermal to power energy storage system using water for thermal storage
- ✓ Key employees each have over a decade of experience in development of energy storage systems
- ✓ Awarded a £725k grant from BEIS (UK Government) for two points below:
 - ✓ *Pre-FEED study for a 5MW (100-200 hours) energy storage system*
 - ✓ *Demonstration of the key technical component at 1/20th commercial scale*

Target Market

- ✓ Energy storage combined with wind farms
- ✓ Sell electricity on demand and heat locally
- ✓ MW scale projects appear to be commercially viable today in the UK with no subsidy
- ✓ Target market is towns that are off gas grid with wind farms located nearby and populations of 2,000 upwards.

How it Works

- ✓ Electricity used to heat/cool two giant insulated pits of water
- ✓ Process reversed to generate electricity returning pits to start condition.
- ✓ Danish companies have developed these insulated pits for district heating applications (see following slides).
- ✓ Machinery to heat/cool the pits is similar to industrial refrigeration equipment
- ✓ Pumped Heat IP is around the system design and integration

65,000 ton storage pit



200,000 ton storage pit



Example of installation with wind farm



Current Status

- ✓ Building demonstrator 2018/19
- ✓ Securing 3-5 initial commercial sites in the UK
- ✓ Seeking strategic partnerships
- ✓ Small equity fund raising in 2018 <£1m
- ✓ Larger equity fund raising of £5m+ in 2019

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