



Vorarlberger Illwerke AG

Financing a pumped storage power station

Case study Obervermuntwerk II





- » Strategic business units
 - Peak load and balancing energy
 - Energy sales in Austria and Germany
 - Grid operation in Vorarlberg

- » Peak load and balancing energy part of German control block

- » 100 % state ownership (Province of Vorarlberg)

- » Balance sheet total 1.646 Mio. EUR
- » Turnover 665 Mio. EUR
- » Excellent capitalization – equity ratio > 80 %
- » Employees 1.334



Vorarlberger Illwerke AG

Existing power station group Obere Ill-Lünersee



- » 9 hydropower stations, 4 of these pumped storage
- » Max. capacity in turbine mode 1.727 MW
- » Max. power input in pump mode 1.039 MW
- » Standard capacity 2.530 Mio. kWh
- » Usable reservoir capacity 171 Mio. m³
(large reservoirs at 2000 m altitude)



Vorarlberger Illwerke AG

Project Obervermuntwerk II



Vorarlberger Illwerke AG

Project-costs: approx. 475 Mio. EUR

- Timetable:**
- March 2011: Start of preliminary Environmental Impact Assessment (EIA) processes
 - December 2013: End of EIA processes
 - January 2014: Decision to construct in supervisory board
 - May 2014: Start of construction works
 - 2014 – 2018: Construction works
 - End of 2018: Commissioning

Technical Data: Power output/turbine: $2 \times 180 \text{ MW} = 360 \text{ MW}$
Power output/storage pump: $2 \times 180 \text{ MW} = 360 \text{ MW}$



Vorarlberger Illwerke AG

Project Obervermuntwerk II



Vorarlberger Illwerke AG

Advantages in comparison to other projects:

- » Existing **infrastructure (Upper and lower reservoir)** leads to advantages concerning procedures and costs
- » Synergies with existing power station (no renewal of penstock)
- » Low specific costs of expansion 1.100 EUR/kW
- » Unproblematic environmental effects (plant components entirely underground – cavern power station)
- » Added value due to integration into existing power station group with other storage and pumped storage power stations
- » Highly flexible (changing from turbine to pump mode in seconds)



Financing:

- » approx. 50 % equity
- » approx. 50 % borrowing
- » Risk-averse financing strategy
- » Evaluated forms of outside capital: bank loan, bond, promissory note loans, loan from the European Investment Bank
- » Favorable financing: European Investment Bank
(conditions, partner with sufficient capital) – fixed interest rate agreement in EUR
 - Contribution in tranches 2015 – 2018
 - Repayment 2019 – 2025

Market situation:

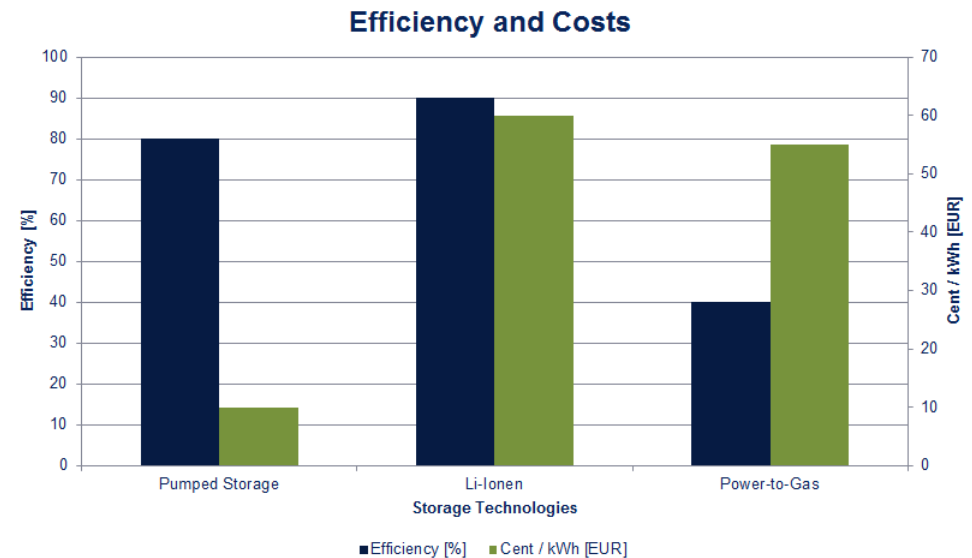
- » Rapid expansion of renewable energies in Germany continues which leads to an increasing share of fluctuating generation from wind and solar power (volatility)
- » Definitive withdrawal from the nuclear energy programme completed until 2022
- » Reduction of overcapacities produced from thermal power stations
- » Currently low price for carbon dioxide with potential of price increase (climate objectives)

Opportunities

- » Increasing demand for storage that enables efficient integration of wind power and solar energy
- » Increasing demand for flexible generation capacity to compensate forecast errors or failure of large wind farms
- » Market recovery after shut down of overcapacities

Risks

- » Political and regulatory uncertainties
- » Complexity of approval procedures
- » High investment costs over a long period
- » Uncertain market design and price development
- » Competing storage technologies
- » Competing pumped storage hydropower stations



Dr. Robert Tichler, Gerda Reiter, MSc - „Energiespeicherung durch Power to Gas Systeme, Linz, 21. März 2014
Link: http://www.vhks.at/uploads/media/Tichler_Energieinstitut_-_Energiespeicherung_Power_to_Gas_21.3.2014.pdf



- » Future electricity system will consist of centralized and decentralized components
- » Looking at the centralized components, we are convinced that pumped storage will keep its importance due to high efficiency at acceptable costs
- » To be able to finance a pumped storage power station a stable environment is crucial – there is need for action!



**Thank you for your
attention!**