

Harvesting energy FROM THE SUN

Thermal Energy Storage & The Green Transition of Coal

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There is no all-mighty technology





Denmark is known for its wind power



And its Large scale flat panel installations



Chinese CSP projects







In Denmark we have wind power, but also coal power



Spot market – an instrument to balance the Grid through trading and import/export of power



AALBORG CSP

- Changing Energy



Typically export situation – High wind





Typically import situation – No wind



Import 335 kr Money out of the box Ioss 500.000 Kr/h 1,600,000,000 Kr/y

With 3 x 800 MW Additional Wind

3,200,000,000 Kr/y



EMD International A/S www.emd.dk



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Typical Coal fired power plant unit generating electricity and heat





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Coal fired unit replaced with high temperature storage with Molten Salt and Steam generator





- Changing Energy

Preliminary prediction of P/L from operation and Investment

100 MW/1500 MWH



Made in collaboration with :





The future Total Utility Requirements

To supply the population with reliable green utilities such as Electricity, Heat as well as Fuel in a well balanced network

More Wind More Solar PV/CSP More Geothermal energy More Heatpumps More Production of Hydrogen from High Temperature Electrolysis for green transition of the transport sector

Large electrical High Temperature energy storage systems (days/weeks)

Large district heating Low Temperature energy storage systems (weeks/month)



The future Power grid "Questions to be answered"



The future Electricity system 4.700 MW Existing Wind farms 3 x 800 MW New Off-shore wind farms. (4.700 + 2.400 = 7.100 MW)

Is a new Cabel to UK of 1,300 MW the solution ? Are we buying Green Energy ?

Is relying on Power Ex/Import the solution ??

Are we in position to plan and consume power only when the wind is blowing ?

How does EX/IM affect the BNP ??

How about our supply security ?? (Cabel breaks)

Does it have value to be able to store Green Power and be able to return Power to grid ??



Conclusion

Reuse existing infrastructure Use well known technology

AND > Keep the green energy inside the country Thank You