

## Commissioning of high temperature thermal energy storage for high power levels

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**Introduction:** A high power and capacity PCM storage unit has been integrated into a heat- and power cogeneration plant in Saarland, Germany. This storage will act as an intermediate back-up to a heat recovery steam generator and gas turbine and is therefore situated in parallel to this unit, also between the feedwater pumps and the steam main. The steam required is superheated at 300°C and 26 bar, resulting in a maximum thermal power of 6 MW. The storage needs to provide a minimum capacity of 1.5 MWh. Operation of this storage unit will increase efficiency and decrease fossil fuel use by reducing the use of a conventional back-up boiler. The filling of the unit with ~32 t of storage material in conjunction with the commissioning of the storage unit is in process and initial data has been acquired. These data will be analyzed and presented. This is part of the project TESIN, funded by the German Ministry of Economic Affairs and Energy.

**Methods:** During the filling and commissioning phase, the PCM storage unit is filled with sodium nitrate salt particles and heated until these particles melt, iteratively until the storage unit is full. During the charging and discharging processes conducted for the filling process, initial insight into the valve dynamics can be gained, as well as limit adjustments made for the control plans, as the main process of discharging and charging will later be automatic. Data is continually acquired throughout this process, so that initial information regarding the storage unit characteristics can be analyzed.

**Results:** An extended finned tube storage unit was built and integrated into an operating power plant. During the first heating of the storage unit at approximately 55% fill level of PCM, steam was produced for the first time, and the initial data show a temperature front moving vertically through the storage unit during heating of the unit.

**Conclusions:** The integration and initial commissioning of the storage unit has been successfully concluded, so that the storage unit filling and control optimization can be finalized. Thereafter, a test spectrum will be conducted in order to characterize the storage unit, followed by standard operation in the power plant. In this presentation, data and experience from the commissioning process will be shown and discussed.

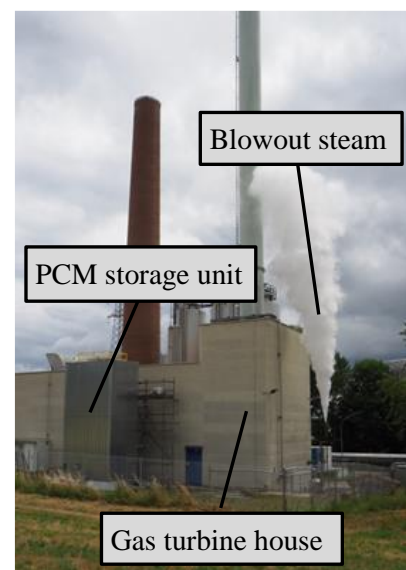


Figure 1: Blowout steam during commissioning of the storage unit.