Energy storage efficiency 600 kWh

Energy storage efficiency 600 kWh

Figure 5. Turn-round efficiency as a function of compressor and expander isentropic efficiencies, calculated using Equation (8) with pressure ratio of 20 and ratio of specific heats for a monatomic gas such as argon.

Figure 14. Hot store temperature profiles (z = 0 is top, z = 10 m is bottom). (a) After initial charge, (b) after initial discharge, (c) after 100 charge cycles, after 100 discharge cycles.

Figure 15. Cold store temperature profiles (z = 0 is bottom, z = 10 m is top). (a) After initial charge, (b) after initial discharge, (c) after 100 charge cycles, (d) after 100 discharge cycles.

Figure 18. Exergy loss from both thermal stores and complete system energy loss per cycle, Ideal cycle i.e., compressor and expander isentropic efficiencies =1, heat exchange effectiveness =1 and heat exchanger pressure drops = 0.

Figure 29. Effect of 100 h of dwell time on the hot store temperature profile (z = 0 is top, z = 10 m is bottom), a is immediately after charge phase, b is following 100 h in the charged phase.

Figure 31. Break even plot for the cost differential of a coupled vs. de-coupled system (a) is the extra differential CAPEX of a coupled system, (b) represents the returned value of the extra efficiency of the coupled system assuming the sale price of electricity is similar to current renewable price of £50/MWh, (c) represents the returned value of the extra efficiency of the coupled system assuming the sale price of dispatchable electricity is given a premium and becomes worth 5 times the current value of renewable electricity, i.e., £250/MWh).

Citation: Davenne TR and Peters BM (2020) An Analysis of Pumped Thermal Energy Storage With De-coupled Thermal Stores. Front. Energy Res. 8:160. doi: 10.3389/fenrg.2020.00160

Web: https://www.sumthingtasty.co.za/contact-us/
Email: energystorage2000@gmail.com
WhatsApp: 8613816583346