

Charging and discharging cut-off conditions for energy storage containers





Overview

Compressed carbon dioxide is a promising energy storage technology. However, renewable energy variability can lead to insufficiency during charging and discharging. The present work systematically inv.

Does insufficient charging/discharging affect energy storage performance?

The evaluations of the energy storage density, system efficiency and power output, under the effects of insufficient charging/discharging, are presented in Fig. 8, Fig. 10, Fig. 12. The results demonstrate that the actual performance of density and power, except for the system efficiency, could highly deviate from the targets at design conditions.

What is a sufficient charging/discharging at design conditions?

A clearly defined sufficient charging/discharging at design conditions is a point in the phase space (noted by the star in green), while the rest of the space can be referred to as “off-design conditions”. For example, two dashed curves are given for off-design charging and discharging.

Does insufficient charging and discharging affect energy density?

However, the effects of insufficient charging and discharging, due to the variability of renewable energy have not been investigated before. The output power and the energy density evaluated in the present work could be incorporated with future work of techno-economic analysis.

What are the four scenarios for insufficient charging and discharging?

Therefore, all the scenarios for insufficient charging and discharging can be classified into four categories, which are charge begin, discharge end, charge midway and discharge midway as shown in Fig. 4. These processes will be rearranged in Sec. 4 for further analysis.



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