

Liquid air energy storage model for scheduling purposes in island power systems

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Abstract-

Moving towards clean energy generation seems essential. To do so, renewable energy penetration is growing in the power systems. Although energy sources such as wind and solar are clean, they are not available consistently. Using energy storage will help to tackle variability. Liquid air energy storage is gaining attention among different energy storage technologies, as it is a promising option for grid-scale energy storage. This paper presents a detailed mixed integer linear model of liquid air energy storage to be used in scheduling and planning problems. A comprehensive cycle diagram of different processes of liquid air energy storage is presented, and a model has been developed accordingly. Simulations of the proposed model are carried out for the power system of Tenerife island and compared with the basic models. Basic models overlook specific characteristics of liquid air energy storage systems, such as charging and discharging start energy. Results confirm that the use of simple models will lead to misleading conclusions and overestimate the economic benefits of liquid air energy storage.

Index Terms- LAES; energy storage; renewable generation; unit commitment problem

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