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Research on Scenario Construction and Economic Analysis for Electric-hydrogen Coupling

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Abstract

Driven by technological breakthrough, cost reduction and policy incentives, hydrogen energy as an electric energy storage medium will play an important role and be applied to each link of power system in the future, showing the development trend as electric-hydrogen coupling. With the reduction of levelized cost of renewable energy and electrolytic cell, and the improvements of renewable energy utilization and energy efficiency, electrolyzed hydrogen will be cost competitive in the future. This paper constructs 7 typical application scenarios of hydrogen energy throughout the source, grid and load of power system, calculates and analyses economic indicators, such as levelized cost of hydrogen (LCOH), using life cycle method. It can be concluded that: The LCOH at the present stage is high, and the conditions for large-scale promotion of hydrogen have not been met in the short term. The LCOH shows a linear downward trend with the decrease of levelized cost of renewable energy or the cost of electrolytic cell. The LCOH shows a downward trend with the increase of the efficiency or utilization hours of hydrogen production system, but the range is gradually decreasing. Generally, when the electrolytic system efficiency exceeds 70% or the utilization time slot exceeds 18 hours, the improvement of relevant parameters has little impact on the decrease of the LCOH.

Note: This document will be opened to the participants on IERE website before the Workshop and opened to the public afterward.