

Back-up power plants for “dark wind lull” in Germany’s power grid with the comparison of CCGT + CCS versus CCGT with hydrogen or direct ammonia firing

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Abstract

The presentation is discussing the use of large-scale back-up power plants for stable electric grid operation in the “dark-wind-lull” in a future cost scenario in example for Germany. It is analysing the future need of back-up electricity needed and is showing the expectable efficiency parameters combined cycle gas turbine power plants (CCGT) with either hydrogen firing or with the operation of natural gas fired CCGTs with carbon capture and storage devices (CCS). The analysis is also including the part load capabilities. It is comparing both technologies in regards of carbon footprint and cost over their operational regime expected in a future electricity supply scenario. It will show the basic cost components of such operation based on a basic CAPEX and OPEX analysis and its hurdles for such operation with needed fast start/stop capabilities and low to medium operational hours served per year in the electric generation.

As a variation of the gas turbine power plants (CCGT) with hydrogen firing it is discussing also the use of imported low carbon ammonia and its use as a power plant fuel, which can be either with direct firing or via prior cracking, which is reducing the process chain efficiency of the CCGT operation. Even the presentation can not represent the future reality due to its unpredictability it gives significant hints for the future planning of back-up electricity generation and cost developments for the last edge of the green electricity transition.