

Summarized: Exploration of Situations in which underground HVDC may be Preferred to an Overhead Transmission Line

We explore situations in which choosing to build a buried HVDC transmission line may be preferred to an overhead HVAC transmission line. We parametrize potential project delays in transmission projects, exploring the benefits that buried cable may have when overhead HVAC faces higher opposition. Preferences are examined from the perspective of net present value and levelized cost. We synthesize a range of buried HVDC costs and employ HVAC costs from the Midcontinent Independent System Operator. We simulate a wind farm, a solar farm, and co-located storage employing NREL models. We find that NPV frameworks tend to prefer HVDC under more circumstances than LCOE frameworks, especially at higher energy prices. While there is uncertainty in HVDC costs, HVDC can have a better NPV than HVAC over all explored HVDC costs given sufficient HVAC delay and energy prices over \$70/MWh. The LCOE perspective only selects buried HVDC at the lower end of its cost range, and with HVAC delays of nearly a decade. This changes considerably with distance, where LCOE chooses HVDC under most HVDC cost and HVAC delay assumptions after about 600km. Co-located batteries make HVDC slightly more preferable under LCOE, but adding a battery is never preferable to its absence under our explored LCOE or NPV transmission frameworks