

Offshore Wind Energy Production Expectations Across Atlantic Canada

Authors:

Katie Applebaum, TGS

Abstract ID: 21

Call:: MRC 2025 Technical Track - Call for Abstracts

What Theme Are You Submitting for?: Energy Production, Storage, and Grid Integration

Keywords: data-driven approaches for resource assessment, economic viability, energy storage, grid planning, offshore wind energy production

Forward looking estimates for offshore wind are often presented in terms of capacity, in units of gigawatts (GW). An offshore wind farm's capacity is simply the number of turbines multiplied by the maximum capacity of each turbine. For example, a 1 GW wind farm may contain 50 x 20 megawatt (MW) turbines. Capacity estimates are useful for many planning purposes, but capacity does not tell us how much energy a wind farm will produce, when that energy will be available, or how much revenue will be generated. To understand these aspects, we need to analyze the energy production of the wind farm. Energy production estimates on an hourly, daily, quarterly, or annual basis provide the information necessary to understand revenue profiles, market balancing and grid constraints, and energy storage solutions. Annual energy production (AEP) in units of gigawatt hours per year is the headline statistic for financial reporting and a primary input for levelized cost of energy (LCOE) calculations.

In this analysis, we calculate the expected energy production for all currently proposed offshore wind farms across Atlantic Canada. We apply a consistent, repeatable methodology to calculate the energy production at each proposed wind farm on a time series basis utilizing the best available wind resource and turbine power curve data. We then estimate a construction schedule for all wind farms, which leads to a long-term calendar of increasing offshore wind energy generation across the region. This approach allows us to share AEP and revenue expectations for each province over the next 10+ years. These high-level results are accompanied by deeper analysis that provides insight into the seasonality of offshore wind energy production, grid planning, and energy storage sizing on a province-level basis.