

Advances in wind integration, recent findings from international collaboration

IEAWIND Task 25

Hannele Holttinen

VTT Technical Research Centre of Finland

Operating Agent of IEAWIND Task 25

This presentation will show the main challenges of integrating variable renewables to power systems. The recent advances in methods and results of integration studies are summarized, based on the reports published in 2018 from IEA WIND Task25: International Energy Agency (IEA) Technology Collaboration Programme (TCP) Wind Research Collaboration Task on Design and Operation of Power systems with Large Amounts of Wind Power. Ongoing experience from countries and regions that already integrate 20-50% of yearly electricity from wind power, as well as integration studies of wind and solar in future power systems are helping to evolve integration study methods. Task 25 published Recommended Practice 16: Wind Integration Studies on how to perform an integration study in 2013. This has been updated to cover solar PV and distribution system studies through collaboration with IEA PVPS Task 14. Wind/PV integration studies usually involve simulations of the power plants in the system and investigations of grid and generation capacity adequacy. A more detailed level includes dynamic simulations and a flexibility assessment, which are necessary when studying higher shares of wind and solar energy in the system. The assumptions and setups of the study (such as investments in the remaining system) are crucial to determining the integration impacts and costs. Because system costs are difficult to allocate to any single plant or technology, it is recommended to quantify increases in power system costs, and instead of allocating system costs to use total cost comparisons and cost-benefit analysis. Adding wind and solar energy to power systems will reduce total operating costs and emissions as wind and PV replace fossil fuels.

The summary report, to be published later in 2018, will summarise the main findings of recent integration studies in participating 18 countries. The advances in wind power technology and short term forecasting of wind energy allow for modern wind power plants to provide grid support and help in integrating the variability and uncertainty of wind energy. The power system transformation towards deeper decarbonisation means linking the energy sectors of power, heat, transport and gas. This will bring more opportunities of flexible power demand that will help integrating high shares of variable generation.