International Conference on Renewable Energies and Power Quality (ICREPQ'21)
Almeria, Spain, 28 -30 July 2021

Grid access of non-synchronous generation: Review of the Spanish regulation

By

Luis Rouco
Universidad Pontificia Comillas
Madrid, Spain

Abstract

Decarbonization of the economy to fulfill the Paris agreement goals requires the development of huge amounts of renewable power generation. Wind and solar photovoltaic power generation technologies have become technically mature and economically competitive technologies. Wind and solar photovoltaic generation are connected to the grid through power electronic converters. It results in formidable challenges for power system stability, control and protection. Due to such fact, it can be stated that ac power systems are facing the largest transformation since Edison, Tesla and Westinghouse.

The development of wind and solar photovoltaic generation depends critically on the access to the grid. In contrast to synchronous generation, the access to the grid of converter based generation (also called non-synchronous generation) is affected by a number of technical constraints.

The Spanish regulation of the grid access of non-synchronous generation has been recently reformulated.

This contribution will review the new regulation [1]. The former regulation will be also discussed ([2], [3]). The former regulation was based exclusively on the Short Circuit Ratio criterion [4]. The new regulation is based on the Weigthed Short Circuit criterion [5] together with steady-state and dynamic security assessments.

References

[1] Circular 1/2021, de 20 de enero, de la Comisión Nacional de los Mercados y la Competencia, por la que se establece la metodología y condiciones del acceso y de la conexión a las redes de transporte y distribución de las instalaciones de producción de energía eléctrica. BOE núm. 19, de 22 de enero de 2021, páginas 6111 a 6125.

[2] Orden de 5 de septiembre de 1985 por la que se establecen normas administrativas y técnicas para funcionamiento y conexión a las redes eléctricas de centrales hidroeléctricas de hasta 5.000 kVA y centrales de autogeneración eléctrica (B.O.E. No. 219, 12 septiembre 1985, páginas 28810 a 28814).

[3] Real Decreto 413/2914, de 6 de junio por el que se regula la actividad de producción de energía eléctrica a partir de fuentes de energía renovables, cogeneración y residuos, B.O.E. núm. 140, de 10 de junio de 2014, páginas 43876 a 43978.

[4] IEEE, IEEE Guide for Planning DC Links Terminating at AC Locations Having Low Short-Circuit Capacities, IEEE Std. 1204-1997, 1997.

[5] NERC, Integrating Inverter-Based Resources into Low Short Circuit Strength Systems. Reliability Guideline, December 2017, disponible en https://www.nerc.com/comm/PC_Reliability_Guidelines_DL/Item_4a._Integrating%20_Inverter-Based_Resources_into_Low_Short_Circuit_Strength_Systems_-_2017-11-08-FINAL.pdf.