Impact of generation mix flexibility on the integration of variable renewable energies

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Abstract

Worldwide, renewable energies are witnessing a huge expansion especially for power generation driven by different factors including the increased demand on fossil fuels and the depletion of its resources, the increase in its cost and the need to preserve the environment. Variable Renewable Energies (VRE) especially depending on wind and solar resources are intermittent by nature and this intermittency can have severe impacts on the operation of the power systems. Power systems are thus required to have a sufficient degree of flexibility to deal with this intermittency especially in the generation side. This paper introduces a hybrid Flexibility Enhanced Priority List-Mixed Integer Linear Programming (FEPL-MILP) method to solve the Unit Commitment (UC) problem and study the impact of the generation mix flexibility on the integration of renewable energies. Results show that, increasing the flexibility of the thermal energy mix used for power generation will have positive technical and economic impacts on the integration of renewable energies into the power system.

International Journal of Engineering, Science and Technology 2018, August

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