Innovation type:
Method

TRL: 2

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Target group:

Actor/ purpose	x
DSO, TSO	X
Technology provider	
Member organisation	
Market operator	
Research/ Consultancy	X
Teaching	X

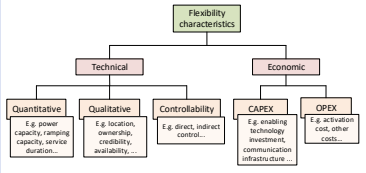

Figure showing classification of characteristics of flexibility resources

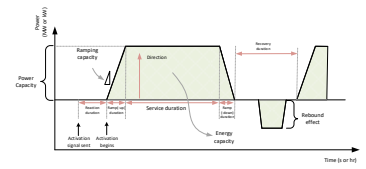

Figure showing an overview of quantitative technical flexibility characteristics described in the paper. This figure gives a comprehensive illustration of how many of these characteristics are related.

Comprehensive classifications and characterisations of flexible resources

The objective of this work has been to propose a comprehensive flexibility definition and unified characterising terms for flexibility resources. Further, a taxonomy method which is applied to classify flexibility resources is proposed under the concept of flexibility. The work also presents benefits of unified characterising terms in mapping flexibility resources to ancillary services.

Challenge

The increased integration of variable renewable energy sources (VRES) distributed across the power system is necessitating the support from flexibility resources and technologies. Power system flexibility is essential to cope with uncertainty and variability of generation from photovoltaic (PV) and wind power.

Flexibility resources have been investigated extensively for the past ten years. Reviews on the topic have been presented from different perspectives, including integration of VRES, distributed energy resources, technologies, ancillary services, markets, power system needs, and security of electricity supply. Nevertheless, there is still a lack of a commonly accepted definition for the term "flexibility resource". In addition, there is inconsistent usage of characterising terms which creates confusion and impedes information flow amongst the different stakeholders.

Solution

Based on an extensive literature review, a unified definition, characterisation, and classification of flexibility resources is proposed. The paper showcases how the clear characterisation of flexibility resources can be used mapping different ancillary service needs to the relevant group of flexibility resources.

Potential

The proposed classification and characterisation of flexibility resources can be used for clarifying the definition of "flexibility resources", and form as basis for general characterisation of flexibility in technical (quantitative, qualitative and control technical) and economic terms (Capital investments (CAPEX), Operational economy (OPEX)).

Reference in CINELDI

The classifications and characterisations of flexible resources are described by SINTEF in the paper "Comprehensive classifications and characterisations of power system flexibility resources", Merkebu Zenebe Degefa, Iver Bakken Sperstad and Hanne Sæle. Electric Power System Research 194 (2021)