Islanding Control Architecture in future smart grid with both demand and wind turbine control - DTU Orbit (07/01/2019)

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In recent years, a large number of Distributed Generation units (DG units) such as Wind Turbines (WTs) and Combined Heat and Power plants (CHPs) have been penetrating the distribution systems. Meanwhile, an intentional island operation of distribution systems is proposed as a potential measure against power supply outages by continuously running DG units during system emergencies. However, there are some challenging security issues for an island operation, such as the power imbalance during the islanding transition and the coordination of feeder protection systems. To tackle the former issue, which is the focus of this paper, available resources including both DG units and demand should be fully utilized as reserves. The control and coordination among different resources requires an integral architecture to serve the purpose. This paper develops the Islanding Control Architecture (ICA) for future smart grid, based on the Islanding Security Region (ISR) concept. With the ISR, system operators can assess beforehand if an island operation can be successful for a given distribution system at its current operating state. In case of unfavorable assessment, control measures will be suggested to coordinate different resources, aiming at pulling the system back into the ISR to ensure a successful island operation on time.

General information
State: Published
Organisations: Department of Electrical Engineering, Center for Electric Power and Energy
Contributors: Chen, Y., Xu, Z., Østergaard, J.
Pages: 214-224
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Electric Power Systems Research
Volume: 95
ISSN (Print): 0378-7796
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.31 SJR 1.048 SNIP 1.412
Web of Science (2017): Impact factor 2.856
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.32 SJR 1.032 SNIP 1.516
Web of Science (2016): Impact factor 2.688
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.74 SJR 0.962 SNIP 1.606
Web of Science (2015): Impact factor 1.809
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.86 SJR 0.996 SNIP 1.867
Web of Science (2014): Impact factor 1.749
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.92 SJR 1.061 SNIP 1.902
Web of Science (2013): Impact factor 1.595
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 3.13 SJR 1.068 SNIP 2.112
Web of Science (2012): Impact factor 1.694
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1