LCE> Vol.1 No.2, December 2010

OPEN ACCESS

Analysis of Transient Dynamic Response of Two Nearby Micro-Grids under Three Different Control Strategies

PDF (Size:726KB) PP. 39-53 DOI: 10.4236/lce.2010.12006

Author(s)

Rashad M. Kamel, Aymen Chaouachi, Ken Nagasaka

ABSTRACT

The need of reducing CO2 emissions in electricity generation field for solving global warming problems have led to increase the interest in Micro-Grid (MG) especially the one which included renewable sources. MG normally operates in normal interconnected mode and connects with the main grid. When a large disturbance happens in main grid, MG transfer to islanding mode. This paper deals with connecting two nearby Micro-Grids to enhance transient dynamic response of the two MGs after isolated from the main grid. Three cases are investigated. The first case discussed the dynamic response of the two MGs when there is no tie line connection between the two MGs after islanding. Second case, studied the dynamic performance of the two Micro-Grids when there is a private line connects the two MGs after islanding from main grid, while the third case deals with two interconnected MGs (after islanding) and automatic generation control (AGC) applied upon each MG to return the frequency to its nominal value and control the tie line power to be with its scheduled value. Results proofed that when two nearby MGs are connected by private line after islanding from the main grid occurs, dynamic response of the two MGs improved well.

KEYWORDS

Micro-Grid, Islanding, Dynamic Response, Tie Line, Nearby MGs and Automatic Generation Control

Cite this paper

R. Kamel, A. Chaouachi and K. Nagasaka, "Analysis of Transient Dynamic Response of Two Nearby Micro-Grids under Three Different Control Strategies," *Low Carbon Economy*, Vol. 1 No. 2, 2010, pp. 39-53. doi: 10.4236/lce.2010.12006.

References

[1] R. Strzelecki, "Power Electronic Control in Smart Electrical Networks," Springer-Verlag, London, 2008.

[2] R. Lasseter et al., "White Paper on Integration of Distributed Energy Re-sources-The CERTS Micro Grid Concept," 2002. Available at: http://certs.lbl.gov/pdf/LBNL-50829.pdf.

[3] N. Hatziargyriou, "MICROGRIDS-Large Scale Integration of Micro-Generation to Low Voltage Grids," EU contract ENK5-CT-2002-00610, Technical annex, May 2002. Available at: http://microgrids.power.ece.ntua.gr/.

[4] J. Lopes et al., "De-fining Control Strategies for Micro Grids Islanded Operation," IEEE Transactions on Power Systems, Vol. 21, No.2, May 2006, pp.916-924.

[5] F. Kanellos et al., "Micro-Grid Simulation during Grid- Connected and Islanded Modes of Operation," International conference on Power Systems transients (IPST '05), Montereal, June 19-23, 2005, paper No. IPST05-113.

[6] S. Barsali et al., "Control techniques of dispersed generators to improve the continuity of electricity supply," Proceedings of Power Engineering Society Winter Meeting, Vol. 2, 2002, pp. 789-794.

[7] F. Katiraei et al., "Micro-grid Autonomous Operation during and subsequent to Islanding Process," IEEE Transactions on Power Delivery, Vol. 20, No. 1, January 2005, pp.248-257.

• Open Special Issues
• Published Special Issues
• Special Issues Guideline

LCE Subscription

Most popular papers in LCE

About LCE News

Frequently Asked Questions

Recommend to Peers

Recommend to Library

Contact Us

[8] D. Georgakis, S. Papathanassiou, N. Hatziargyriou, A. Engler and C. Hardt, "Operation of a prototype microgrid system based on micro-sources equipped with fast-acting power electronics interfaces," Proceedings of IEEE Power Electronics Specialists Conference, vol. 4, Aachen, 2004, pp.2521-2526.

[9] T. Tran-Quoc et al., "Dynamic analysis of an insulated distribution network," Proceedings of IEEE Power Systems Conference and Exposition, Vol. 2, October. 10-13, 2004, pp. 815-821.

[10] R. Caldon and R. Turri, "Analysis of Dynamic Performance of Dispersed Generation connected Through Inverters to Distribution Networks," Proceedings of 17th International Conference on Electricity Distribution (CIRED), Barcelona, May 12-15, 2003.

[11] R. M. Kamel and K. Nagasaka, "Design and Implementation of Various Inverter Controls to Interface Distributed Generators (DGs) in Micro Grids," Japan Society of Energy and Resources, Session 6.1, Tokyo, 2009, pp. 61-64.

[12] R. M. Kamel and K. Nagasaka, "Micro-Grid Dynamic Performance Subsequent to Islanding Process," Japan Society of Energy and Resources, Session 6.1, Tokyo, 2009, pp. 65-68.

[13] Y. Zhu and K. Tomsovic, "Development of models for analyzing the load-following performance of microturbines and fuel cells," Electric Power Systems Research, Vol. 62, No. 1, pp. 1-11, May 2002.

[14] J. Padullés, G.W. Ault, and J. R. McDonald, "An integrated SOFC plant dynamic model for power systems simulation," Journal of Power Sources, Vol. 86, No. 1-2, pp. 495- 500, March 2000.

[15] N. Hatziagyriou et al., "Modeling of micro-sources for security studies," Proceedings of the CIGRé 2004 Conference, Paris, August 30-September 3, 2004

[16] P. Kundur, "Power Systems Stability and Control," McGraw-Hill, New York, 1994.