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Power Quality Improvements by Bidirectional AC/DC Converter for Integration of AC/DC Nanogrids to Power System

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***Abstract* - This paper presents a hybrid AC/DC home infrastructure which involves DC distribution network connected to the current AC infrastructure using through an efficient ac/dc controlled converter. DC network in the home allows for efficient integration of renewable sources and electric vehicles supplying all the native DC loads (DC appliances). While the AC loads (AC appliances) will continue to be connected to an existing AC infrastructure. To mitigate harmonics, providing a power factor correction and compensating for unbalances resulting from nonlinear loads.**

Keywords: Power Quality, AC/DC Converter, Nanogrids, Power System, AC Appliances, AC Loads, Distribution Network.

I. INTRODUCTION

Bad quality of the electric power wears out the system equipment rapidly, increasing the cost of maintenance resulting in system failure. An inconvenient shutdown while leading to strong negative effect to environment. The feasibility of DC systems has been verified for residential systems , commercial systems , shipboard power systems , and industrial systems. The best solution for contemporary home is to combine a dc network along with the legacy ac network. This paper proposes a hybrid ac/dc nanogrid for a residential home network in which the ac and dc infrastructure.

II. EXISTING SYSTEM

In this project, a hybrid AC/DC nanogrid is proposed to offer a solution for the near future smart home. It consists of an AC and DC network and interlinking AC/DC converter connecting them. The linking converter was controlled by an intelligent controller based on modified SRF.

This control technique enables the linking converter to act as APF in order to force the AC supply current at the PCC to be a balanced three phase current regardless the loading condition and the deterioration level of the local AC load current. The controller provides harmonic mitigation and power factor correction at the PCC. A model for the APF and its controller is built in MATLAB/Simulink.

III. PROPOSED SYSTEM

In this proposed system added a wind system along with PV system using artificial neural network instead of a PI controller.

a) Working Operation

This proposed system has Interactive operation strategy for micro grid co-operated with distribution system based on demand response. This Working Operation Renewable Source using Solar panel and Windmill Connected Distributed output using Environment Application. First process Ac Source Voltage through the High Voltage Transformer then Transformer operation using Distributed Load Voltage calculated in Equal Voltage generate the High voltage transformer Working Directly Connected Distributed Load. Second Process Solar Panel Generate Heat energy Convert the Electrical Energy through the Dc-Dc Boost Converter, the Boost Converter Working Operation in solar Panel low Voltage produce the electrical energy. The Boost Converter N:2 output Voltage Convert the DC-AC Connected Distributed load.

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b) Block Diagram

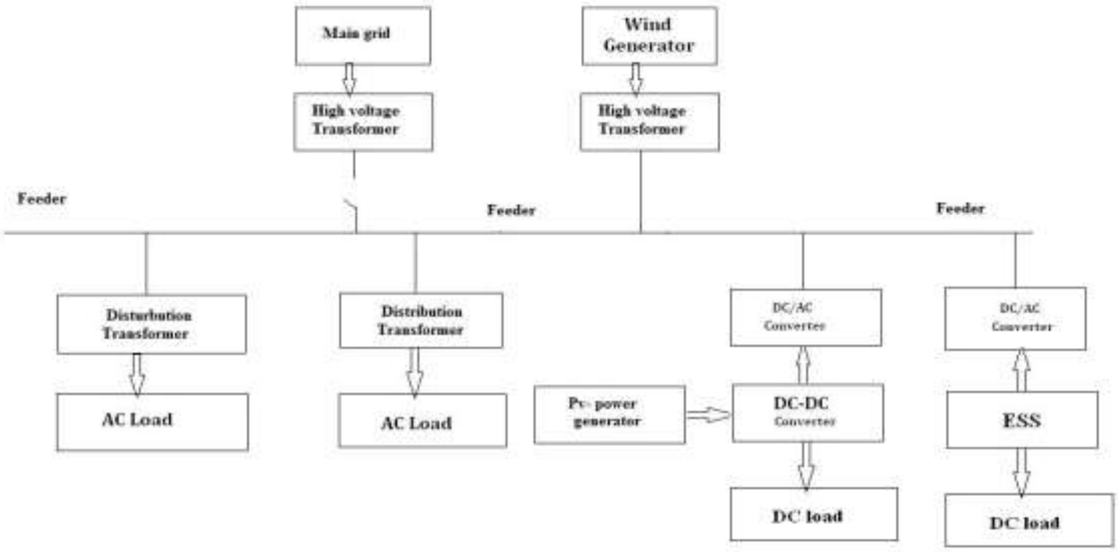

Figure-1: Block Diagram of Proposed System

c) Description

Third process energy storage system (ESS) operation windmill and solar panel through the distributed voltage calculate the renewable source voltage and load voltage equally and then extra generate renewable source voltage stored battery, but reduce the renewable source voltage not equally output distributed load voltage, after connected ESS working operation the ESS voltage dc convert the ac in output distributed equal voltage maintain ESS system. Fourth process totally renewable source voltage and ESS system voltage demand using micro grid based distributed voltage maintain the unit output equal connected distributed output using environment application.

IV. RESULT & DISCUSSION

a) Simulation Result

The micro-grid system was designed and simulated with the PV and wind source components and converter input, output waveforms are plotted for each sections which are shown in figure-3 and figure-4,5 respectively.

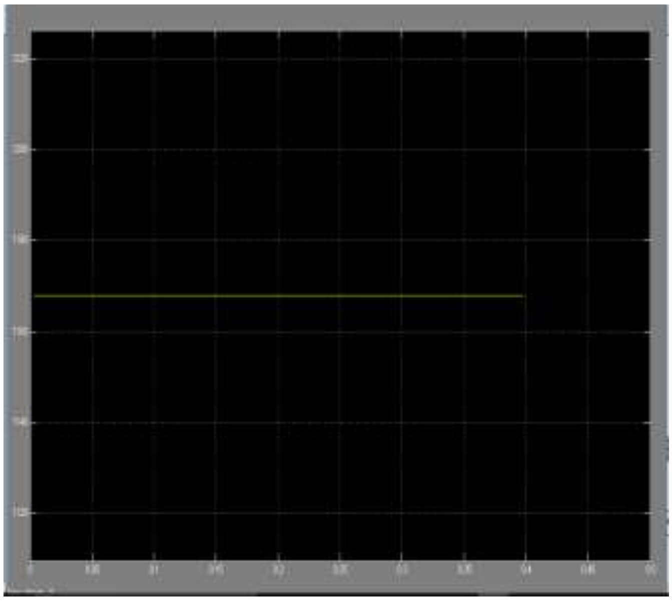

Figure-3: PV panel input

Simulation results show that the controller deals successfully and automatically with various severe power quality issues isolating these problems and preventing them from being seen by the supply. This controller is simple and requires less computation.

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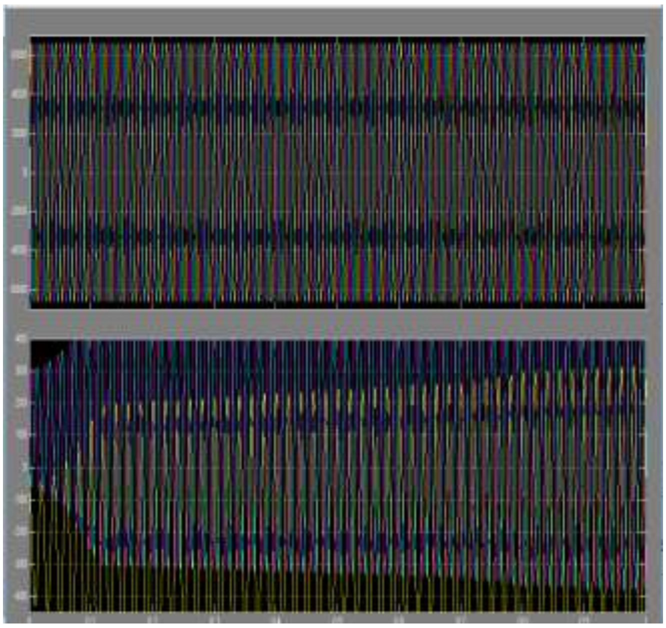

Figure-4: PV panel output to grid

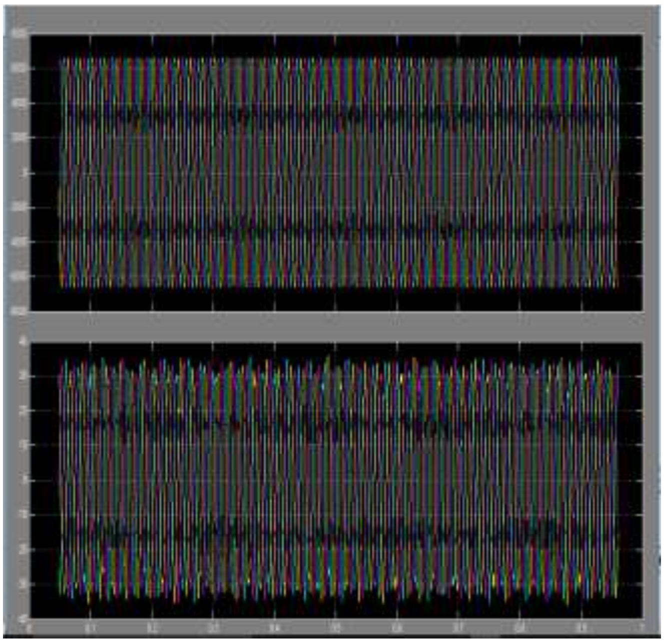

Figure-5: Wind mill output

Applications

- It is a tool used for multi-disciplines.
- It is useful in the medical diagnosis, medical research, stock market prediction, credit assignment, monitoring the condition of machinery, automatic control systems, traffic control, fraud detection, photos and fingerprints, voice recognition, weather prediction, music composition data mining, animal behaviour, etc.

V. CONCLUSION

In this paper, a hybrid ac/dc Nanogrid is proposed to offer a solution for the near future smart home. It consists of an AC and DC network and interlinking AC/DC converter connecting them. The linking converter was controlled by an intelligent controller based on modified SRF. This control technique enables the linking converter to act as APF in order to force the AC supply current at the PCC to be a balanced three phase current regardless the loading condition and the deterioration level of the local AC load current. Moreover, the controller provides harmonic mitigation and power factor correction at the PCC. A model for the APF and its controller is built in MATLAB/Simulink. Different loading conditions were simulated to verify the effectiveness of the system.

REFERENCES

[1] M. Morcos and C. Gomez, "Electric power quality—The strong Connection with power electronics," in *IEEE Power Energy Mag.* vol. no. 5, pp. 1, Sep. 2003.

[2] B. H. Chowdhury, "Power quality," *IEEE Potentials*, vol. 20, no. 2,pp. 5–11,Apr./May 2003.

[3] E. Waffen schmidt and U. Boeke, "Low voltage dc grids," in *Proc. 35tInt. Telecomm. Energy Conf.* 'Smart Power Efficiency', pp. 1–6, Oct. 2013.

[4] M. E. Baran and N. R. Mahajan, "DC Distribution for industrial systems: opportunities and challenges," *IEEE Trans. on industrial applications*, vol. 39, no. 6, pp. 1596-1601, November/December 2003.

[5] T.-L. Lee, P.-T. Cheng, H. Akagi, and H. Fujita, "A dynamic tuning method for distributed active filter systems," *IEEE Trans. Ind. Appl.*, vol. 44, no. 2, pp. 612–623, Mar. 2008.

[6] D. Ward, "The impact of distribution system design on harmonic limits," in *Proc. IEEE Power Eng. Soc*. 1999 Winter Meeting, , vol. 2, pp. 1110–1114, Jan. 1999.

[7] T. Gonen, Electric Power Distribution System Engineering (ser. Electrical Engineering), *2nd ed. New York, NY*, USA: Taylor & Francis, 2007.

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[8] Sannino, G. Postiglione and M. H. J. Bollen, "Feasibility of a DC network for commercial facilities," *IEEE Trans. on industry applications*, vol. 39, no. 5, pp. 1499-1507, September/October 2003.

[9] J.G.CiezkiandR.W.Ashton, "Selection and stability issues associated with a navy shipboard DC zonal electric distribution system," *IEEE Trans. On Power Delivery*, vol. 15, no. 2, pp. 695-669, Apr. 2000.

[10] M. E. Baran and N. R. Mahajan, "DC Distribution for industrial systems: opportunities and challenges," *IEEE Trans. on industrial applications*, vol. 39, no. 6, pp. 1596-1601, November/December 2003.

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