Current Trends in Technology and Science
ISSN: 2279-0535, Volume-VIII, Issue- III, May 2019

Power quality improvement of the Distributed Generation by Using PSAT

Saurabh Kumar Sahu[1], Ritesh Diwan[2], Dr. Manoj Kumar Nigam[3]
[1,2]Department of ET&T, RITEE, Raipur, (C.G.)
[3]Department of Electrical Engineering, MATS University, Raipur, (C.G.)
[1]saurabh.elect2017@gmail.com, [2]riteshdiwan5@gmail.com, [3]nigam74_123@yahoo.com

ABSTRACT
Distributed generation (DG) is associate degree rising construct within the electricity sector, that represents sensible alternatives for electricity offer rather than the normal centralized power generation construct. This paper presents the essential principles of integration distributed generation technologies in low voltage networks and notably focuses on the social science of DC installations and therefore the impact that DC could wear voltage management resulting in improved power quality. Power system operation is extremely difficult from system security, reliableness and potency points of read. The demand of electrical power is increasing continuously and existing power system networks are very complex, large scale, centralized and far from load centers to make energy supply to all customers must be continuously stable and reliable. Integrated distributed generation and existing power systems are capable of supporting energy security, such as during peak demand or power shortages. However it also has some disadvantages. In this study, IEEE-14 bus network, the impact of connecting DG to the Distribution Network (DN) was studied. The simulation results shown indicate disturbances in the power system with the integration of distributed generation.

Keywords:- Distributed Generation, Distribution network, non-renewable energy sources, renewable energy sources.

I. INTRODUCTION

A Distributed Generation may be a new technology that is turning into a very important space of analysis and study these days. A Distributed Generation is outlined as a technology that relies on the utilization of renewable energy sources viz. solar power, biomass energy, heat, recurrent event energy etc. A Distributed Generation as compared to the standard technique of power generation has many benefits like – it occupies less space of installation, economical, versatile and setting friendly technology. varied authors outlined distributed generation as follows:

1. The Electric Power Research Institute defines distributed generation as generation from 'a few kilowatts up to 50 MW' [7].
2. in keeping with the Gas analysis Institute, distributed generation is 'typically between two and twenty-five MW' [7].
3. Cardell defines distributed generation as generation 'between five hundred kilowatt and 1MW [1].
4. The International Conference on Large High Voltage Electric Systems (CIGRE) defines DG as 'smaller than 50-100 MW' [8].

Besides having several advantages, a DG can also cause disturbances in the network if the connected DG is not of optimal size location. A DG can disturb the voltages profile of the network thereby disturbing the reactive power balance in the network which results in more losses and hence reduces the stability of the connected grid network.

Therefore, it is necessary to find out the optimal size and location of DG in order to minimize the losses. The work bestowed shows the disturbances caused by the distribution generating once it's interfaced with the DN. The study has been done on AN IEEE-14 bus check network. The test network under study using PSAT 2.1.7 simulation software. The result showed that with the mixing of Distributed Generation the voltage profile of the network gets disturbed.

Section II discusses the implementation of the projected methodology with and while not metric weight unit affiliation and therefore the best location of metric weight unit affiliation was found.

II. METHODOLOGY

The projected methodology was enforced mistreatment PSAT two.1.7 simulation software system. associate degree IEEE-14 bus network with and while not weight unit association was shown (Fig-1 and Fig-2) severally.

2.1 Size and Location of Distributed Generation

The placement of distributed generation during a distribution system improved the voltage profile with reduced losses. However, placing DG only at optimal location is not sufficient wherein the size of the DG should

also be determined for its efficient working. Wind primarily based distributed generation of 50MVA and 11kV had been connected below the study. Authors of [5], suggested the method for finding the weakest node for the optimal location of DG in any grid connected network. The weakest node is also derived out by looking out of the most fall i.e. the bus with the tiniest voltage magnitude is that the weakest bus. during this bus variety fourteen is weakest bus.

2.2 Benefits of Distributed Generation

In spite of the many technical and economic impacts of the distributed generation systems, there are a unit such a lot of reasons to push these distributed generation installations which can embody the subsequent main points:

- Reduction of greenhouse emissions
- Grid support
- Reduces the value as there's no use of long line
- Environment friendly
- Avoid the impact of huge grid failure.
- Better power quality and responsibleness.
- Independence from foreign fuels
- Present Higher security of provide
- Promotion of development of sure technology
- Establishment of recent industries with extra employment.

III. RESULT AND DISCUSSION

Comparison of the simulation results obtained with associate degreed while not DG affiliation shows an improvement within the reactive power loss from five.3766 p.u. to 5.3438 p.u in bus no.14

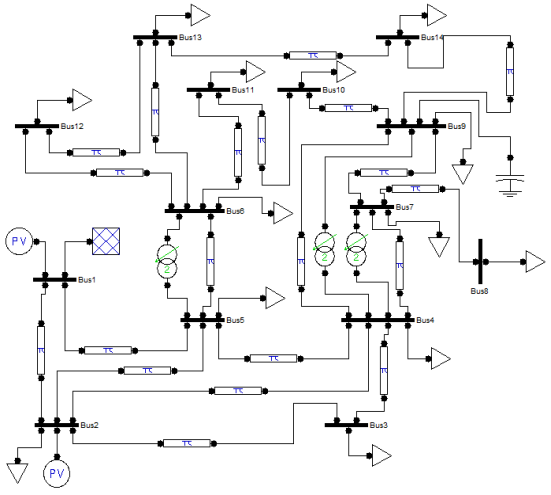

Fig-1: IEEE-14 bus network without DG connection

The variation within the voltage profile of the network with and while not DG affiliation was shown (Fig-3 and Fig-4) severally.

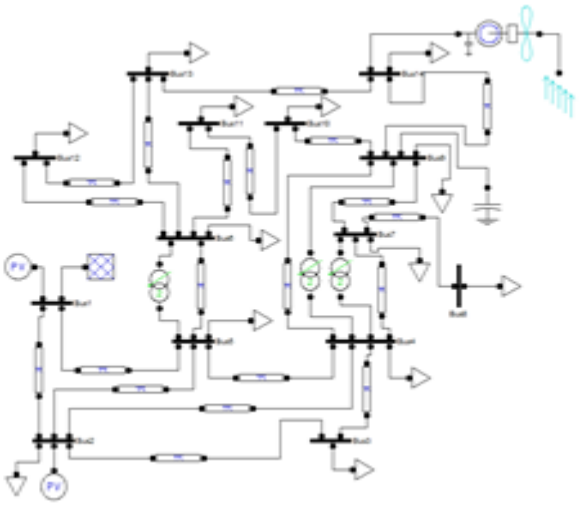

Fig-2: IEEE-14 bus network without DG connection
Benefits of Distributed Generation

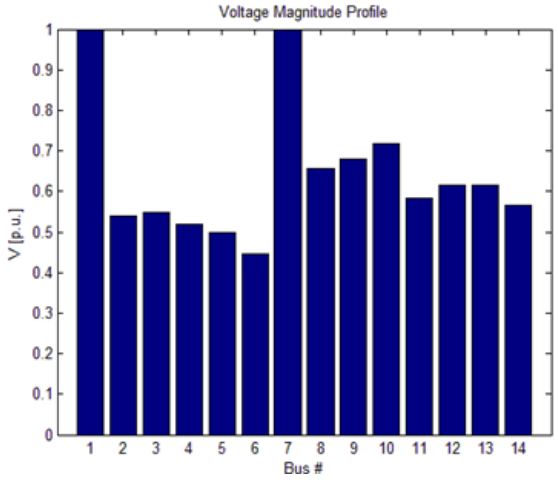

Fig-3: Voltage profile with DG connection.

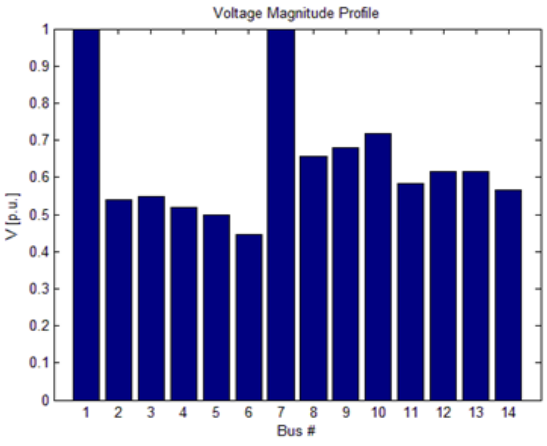

Fig-4: Voltage profile without DG connection

IV. CONCLUSIONS

From the higher than study, it's been ended that the distributed generation has many blessings like - it's eco-friendly, economical, uses renewable sources of energy, no toxic by-products etc. However, it conjointly disturbs the voltage profile of the network if not connected at the best location. beneath the study, the best location of the weight unit has been found by the study of the weakest bus and bus no.14 was found to be the weakest. group action weight unit into the DN conjointly decreases the steadiness of the connected grid network and thereby increasing the reactive power loss.

REFERENCES

[1]. Ackermann, T., Andersson, G., S. oder, L, "Distributed generation: a definition", Electric Power Systems Research, Vol. 57, p.p. 195–204. 2001.

[2]. Hamid Falaghi, Mahmood-Reza Haghifam, "ACO Based Algorithm for Distributed Generation Sources Allocation and Sizing in Distribution Systems" in Power Tech IEEE, pp.555-560. 2007.

[3]. Hossein Shahinzadeh , Sayed Mohsen Nasr-Azadani , Nazereh Jannesari. "Applications of Particle Swarm Optimization Algorithm to Solving the Economic Load Dispatch of Units in Power Systems with Valve-Point Effects" International Journal of Electrical and Computer Engineering (IJECE). Vol 4, no.6, pp. 858~867, 2014.

[4]. M. F. Alhajri, M. R. AlRashidi, and M. E. El-Hawary, "Hybrid Particle Swarm Optimization Approach for Optimal Distribution Generation Sizing and Allocation in Distribution Systems," IEEE, pp.1290-1293. 2007.

[5]. Walid El-Khattam, Y. G. Hegazy, and M. M. A. Salama, "Investigating Distributed Generation Systems Performance Using Monte Carlo Simulation," IEEE Trans. Power Syst., vol. 21, no. 2, pp.524-532, May 2006.

[6]. Chris J. "Investigating Distributed Generation Systems Performance Using Monte Carlo Simulation," IEEE Trans. Power Syst., vol. 21, no. 2, pp.524-532, May 2006.

[7]. Jason M. Sexauer, and Salman Mohagheghi, "Voltage Quality Assessment in a Distribution System With Distributed Generation- A Probabilistic Load Flow Approach," IEEE Trans. Power Del., vol. 28, no. 3, pp. 1652- 1662, Jul. 2013.

[8]. Rangan Banerjee, "Comparison of options for distributed generation in India," ELSEVIER Energy Policy, vol. 34, pp. 101- 111, Jul. 2004.

[9]. J. A. Pecas Lopes, N. Hatziargyriou, J. Mutale, P. Djapic, and N. Jenkins, "Integrating Distributed Generation into electric power systems: A review of drivers, challenges and opportunities, ELSEVIER Electric Power Syst. Research, vol. 77, pp. 1189-1203, Oct. 2006.

[10]. Naresh Acharya, Pukar Mahat, and N. Mithulananthan, "An analytical approach for DG allocation in primary distribution network," ELSEVIER Electrical Power and Energy Syst., vol. 28,pp. 669-678, Feb. 2006.