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Power Factor Enhancement by Shunt Compensation Using Statcom And Renewable Energy Source

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ABSTRACT

The demand of electrical energy are increasing day by day , due to population, Industrialization and different applications of it. The growth of any country can be understand by how much energy are required or utilization of electrical energy. But also with such high amount of energy generation, due to its different kind of uses in linear and non linear loads it is very important to maintain the power Quality within the appropriate level that is in balance condition for the perfect requirement of loads and its proper operation. Mainly the voltage, current, impedance are the three factor in the power system which we have to maintain for the enhancement of power through any electrical system. here in this paper we are using STATCOM with the Renewable energy source to maintain the power factor of system. Due to variation of loads the parameter get changes in the line and the amount of reactive power get changed. also that affects on system others parameters. Also some other causes of power imbalance like variable load, some natural action lighting strokes, tree falling wind, due to line Inductance and line Capacitance power factor get affected. so for improvement and maintain the quality of power demand it is very use full method of use FACTS device STATCOM with Renewable energy. This arrangement of system performs various task like power factor enhance, link between grid and loads also real power exchange between grid , renewable energy source and dynamic load system.

Keyword:-STATCOM, Power Quality, Renewable Energy Source, FACTS Device

1. INTRODUCTION

1.1.Model Description

Proposed Configuration for Renewable Energy System Interface

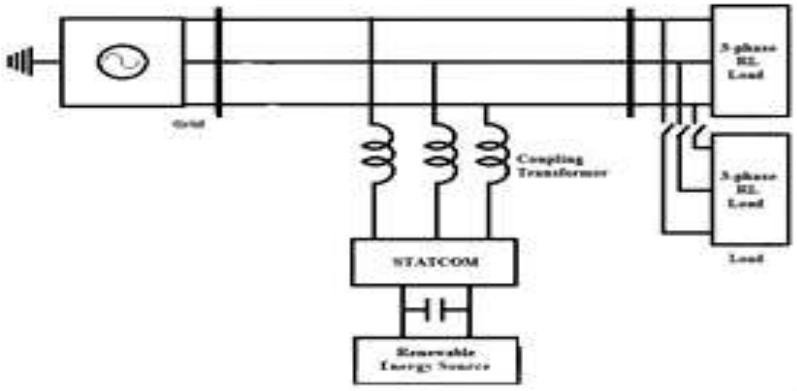

Fig.1 Schematic of the three phase grid system with the STATCOM Interface for renewable energy source

The STATCOM is a power electronics device based on the principle of injection or absorption of reactive current at the point of common coupling (PCC) to the power network. The main advantage of the STATCOM is that the compensating current does not depend on the voltage level of the PCC and thus the compensating current is not lowered as the voltage drops. The other reasons for preferring a STATCOM instead of an SVC are overall superior functional characteristics, faster performance ,smaller size ,cost reduction and the ability to provide both active and reactive power ,thereby providing flexible voltage control for power quality improvement.

When a renewable energy source is used with power electronic interface, the need for the usage of additional converters and power conditioning equipments arises. The drawbacks of using these additional circuits are high switching loss, increased costs and a bulkier system; hence the proposed scheme replaces the need for additional converters with a STATCOM unit.The STATCOM unit is intended for reactive power compensation as demanded by the load; the STATCOM unit is an inverter with DC link capacitor which gets its control pulses from a controller circuit. The control pulses are generated using modified Icosφ algorithm, which in turn causes the STATCOM to provide the real power support from the renewable energy source and reactive power compensation as and when required by the load. The proposed configuration of the three phase grid system with STATCOM interface for renewable energy source is shown in Fig.1.This system configuration comprises of a three phase source (grid) of 400V, 50Hz, and two linear RL loads of rating 5.6kW and 3kVAr are switched at different time intervals.

2. Working

STATCOM is the most important fact controller.It is a static synchronous generator operated as a shunt connected static VAR compensator (SVC) whose capacitive and inductive output current can be controlled independently of the AC system voltage. STATCOM is based on voltage source or a current source voltage converter. Below figure shows a simple single line diagram of STATCOM voltage source converter.The voltage source converters are more economical .A STATCOM is a control reactive power source .It provides voltage support by generating or absorbing reactive power at the point of common coupling without the need of large external reactance or a capacitor bank. The charge capacitor provides a dc voltage to the converter which produces a set of controllable 3 phase output voltage with the frequency of the ac power system. By varying the amplitude of output voltage of converter,the reactive power exchanges between the converter and the ac system can be controlled. If the amplitude of the output voltage of the converter Vc is greater than the ac system voltage V, a leading current is produced i.e.STATCOM is seen as a generator by the ac system and reactive power is generated. Decreasing the amplitude of the output voltage below that of ac system voltage,lagging currents produces,a STATCOM acts as absorber. If the amplitudes are equal,no power exchange takes place. STATCOM can be also be designed as an active filter to absorb system harmonics. In this scheme, converter are use where as in SVC thyristorare used.

3. Supply to 3 phase grid with RL load

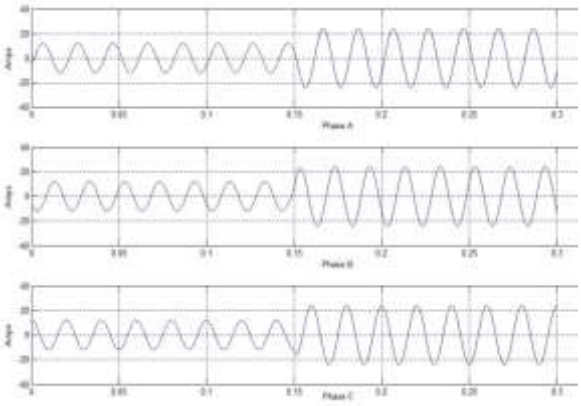

Fig:2.Three phase load current of linear RL load

4.Observation Table

PARAMETER	RESPONDING EQUIPMENT
Voltage	The Booster transformer respond to balance continues to maintain it constant.
Reactive power	Converter-2 of UPFC
Active power	Converte-1 of UPFC
Noise and Pulsations	Digital Filter

5. **Conclusion**

It is cinclude from the above stated data that, THE FACTS Device STATCOM are very usefull and nearly perfect Solution for the power Factor inhancement of the grid. It control the reactive of power electrical system very effectively. with the use of Renewable energy source solar panel as a DC link is very usefull for the reactive power compansasion in the grid. The stated arrangement of devices is quickly take action takes against the change in line parameters. In future thise system also can be implement with higher range of STATCOM or other FACTS & POWER electronics decices to improvement of Power Quality with less losses.

6. **REFFERENCES**

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