Available online at www.sciencedirect.com

ScienceDirect

Energy Procedia 74 (2015) 414 – 422

Energy Procedia

International Conference on Technologies and Materials for Renewable Energy, Environment and Sustainability, TMREES15

Grid connected photovoltaic system, for a 800 W

Ali BOUHAFS, BENDAAS Mohamed Lokmane, DJARALLAH Mohamed.

Université Kasdi Merbah Ouargla, Laboratoire Génie Electrique, Faculté des Sciences et Appliquées, Ouargla 30000 Algérie.

Abstract

The purpose of this work is on analyzing large, grid connected with three-phase inverter system, which presents the three-phases grid-connected inverter designed for a 800W photovoltaic system. These PV systems are interfaced to the grid invariably by a power electronic DC-DC converter and inverter. Many of the important characteristics of the PV generation are influenced by the design and performance of those power electronic converters. The power plant that features a maximum power point tracking (MPPT) scheme shows accurate and fast response, and it is integrated in DC-DC converter. The inverter has a role to generate a current sinusoidal and to inject it into the networks electrical supply. The whole system which presented is simulated in Matlab.

Peer-review under responsibility of the Euro-Mediterranean Institute for Sustainable Development (EUMISD)

Keywords: inverter, boost converter, PV system

I.INTRODUCTION

The Earth is known as the blue planet because of the color of the oceans that cover two thirds of its surface. This planet, the third planet from the Sun, is the only one where the right conditions exist to sustain life, something that makes the Earth special. It has liquid water in abundance, a mild temperature, and an atmosphere that protects it from objects that fall from outer space. The atmosphere also filters solar radiation thanks to its ozone layer. Slightly flattened at its poles and wider at its equator, the Earth takes 24 hours to revolve once on its axis. This plant is so rich by many things which made the man thought how to use them as sort of energy. Nowadays, the world changes to become more developed, therefore the demand of the energy has known increasing recently. The massy usage of the fossil fuels, such as the oil, the coal and the gas, result in serious greenhouse effect and pollute the atmosphere, which has great effect on the world. Meanwhile, there is a big contradiction between the fossil fuels supply and the global energy demand, which leads to a high oil price in the international market recently. The energy shortage and the atmosphere pollution have been the major limitations for the human development. How to

Peer-review under responsibility of the Euro-Mediterranean Institute for Sustainable Development (EUMISD)
doi:10.1016/j.egypro.2015.07.639

find renewable energy is becoming more and more exigent. All of these reasons urge the scientists to look for new power source; one of these sources is the solar energy. The abundance of solar energy in the most of the ²world make the design of effective and profitable facilities based on solar modules is especially important [1, 11].

Nodaway there are software, which intended to simulate of photovoltaic systems such as Pvsyst, Hybrid, Ilse, Pvsol, Ashling, and PvWatts, etc. The traditional tools of design before mentioned can carry out extensive and precise analyzes, but generally, they do not allow the user to modify the algorithms. This degree of freedom can be only given in an open architecture: MATLAB allows this process of disposition to modify any existing routine or to include new ones. The use of photovoltaic systems is common now. The solar energy has been used in systems of illumination, electrification, signaling, and communication means of reception for education via satellite in far located communities, heating, pumping and purification of water etc., but as it happens with every new technology, there is not sufficient investigation regarding the conditions of work and operation of these systems. When they are evaluated, designed or when economic analyses of the system for benefiting from solar energy are made a rigorous, detailed information is required.

Converters interfacing PV module with the grid involves two major tasks. One is to ensure that the PV module is operated at the maximum power point. The other is to inject a sinusoidal current to the grid. Later, these tasks shall be reviewed in this paper. Simulating results are obtained for the normal regime.

2. SYSTEM TOPOLOGY

Fig 1 shows the power converter structure used to interface the photovoltaic array with the power grid. The first stage is the boost converter, which will raise the relatively low solar voltage to a level suitable (720 V) for the DC link directly connected to the inverter. The second stage is the DC to AC converter that operates in a current controlled mode, which will inject unity power factor current to the grid.

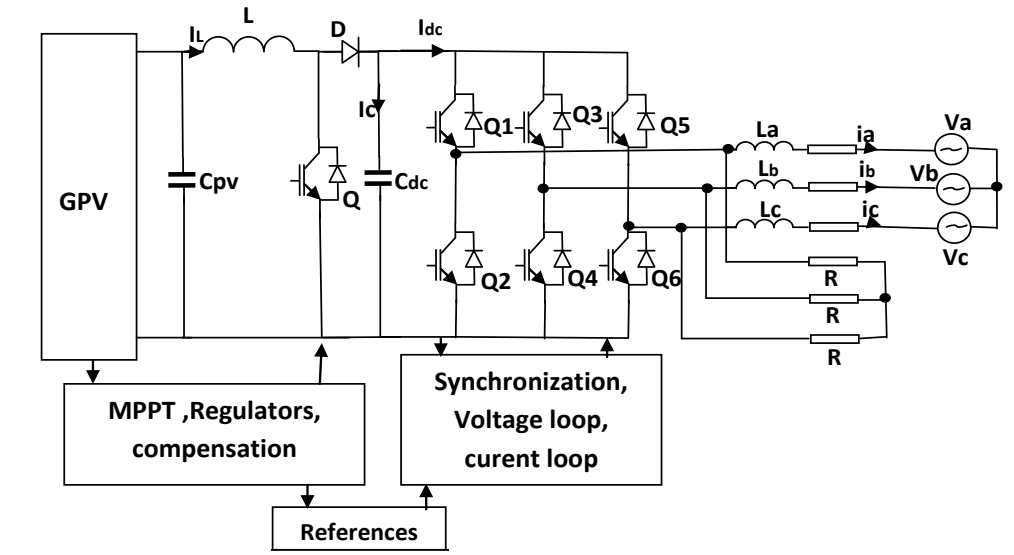

Fig. 1: General Topology of grid connected photovoltaic system