



Energy Efficiency and Renewable Energy Solution in Telecommunication

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Abstract. The basic requirements for telecommunication power systems are related to their safety, long life and uninterruptible power (voltage). Power system based on renewable energy, design for power feeding of telecommunication equipment has to fulfill same requirements. The subjects of this paper are ICT impact on environment, energy efficiency and power system based on renewable energy requirements, design, calculation and sizing of its major part: photovoltaic cell, wind turbine, diesel generators and storage battery and "intelligent" control with focus on weather condition and battery status in this kind of system and benefits as: fuel consumption and CO₂ emission reduction and logistic cost decreasing.

Keywords

Telecommunication, ICT, renewable energy, CO₂ emission.

1. Introduction

The European Commission today called on Europe's information and communication technologies (ICT) industry to outline by 2011 the practical steps it will take to become 20% more energy efficient by 2015. ICT equipment and services alone account for about 8% of electrical power used in the EU and about 2% of carbon dioxide emissions. But using ICT in a smart way could help reducing energy consumption and CO₂ emission in energy-hungry sectors such as buildings, transport and logistics [1].

Due to new power and energy context such as greenhouse effect and other environmental issues, fuel depletion and electricity cost increase, new regulation and standards, telecom operators have to make efforts for using renewable energy solution [2].

In telecommunication the renewable energy sources, because of the high cost for Wh, are generally used in remote areas where the public mains is unavailable [2].

Renewable energy and energy efficiency solutions can present significant investment costs, which mean that Governments have to make efforts and create regulatory frame to stimulate investments in this area.

Because of ICT impact on environment, telecom operators have to use renewable energy and energy efficiency solutions wherever is possible.

Serbian Government also has to stimulate using of renewable energy sources and developing of these technologies. In telecom area, plan of Republic Agency

for Electronic Communication is to promote and stimulate the use of renewable energy sources by telecom operator.

Such renewable energy sources are: Fuel Cells, Photovoltaic cell, Wind Turbine Generators, Micro hydro Generators, Stirling machine, fresh air cooling, etc.

In telecom application an efficient and reliable solution is to combine renewable and "traditional" energy sources.

Hybrid power system capture the best features of each energy resource and provide "grid-quality" electricity.

To achieve uninterruptible power feeding of telecommunication equipment with quality power, hybrid power system includes energy storage system and redundant technology.

For hybrid power system design, the cites reliability studies play an important role, because it is necessary to keep the system at its best performance level [5].

This work will present requirements, design, calculation, sizing and "intelligent" control of hybrid system, which is combined from the next major part: Photovoltaic cell, Wind Turbine Generators, Diesel back-up generators and storage battery.

2. Requirements

The basic prerequisites imposed to telecommunication power systems are related to their safety, long life and uninterruptible power [6,7].

Energy efficient solution has to provide reduction of energy consumption. Climate system present critical component, which is directly related to the telecommunication equipment reliable operation. In some period, energy consumption of climate system can present significant part of total energy consumption at the location where telecommunication equipment is installed. Hybrid power system design for power feeding of telecommunication equipment has to provide quality uninterruptible voltage (AC, DC or both). In order to avoid very high costs, an optimization method should be used and good one is described in [8]. One of the major requirements is to design hybrid system cost effectively, with minimum exploitation costs.

A. Outdoor cabinet design

Outdoor cabinets are design to provide weather and mechanical protection. In some period (e.g. summer),