



Tutorial on Design challenges in energy management of green telecom

Abstract of Tutorial

Telecommunications has been recognized as one of the prime support services needed for rapid growth and modernization of various sectors of economy. Diesel generators with backup battery are still being used for powering telecom loads in most of the places. These systems require regular maintenance and are characterized by their high fuel consumption and high transportation cost. Also, due to the rapid depletion of fossil fuel reserves and increasing demand of clean energy technologies to reduce the greenhouse gas emission (CO₂, NO_x, and SO_x) urgent search for alternative solutions for powering telecom is needed. Thus, stand alone renewable sources can be a feasible solution for powering telecom loads. The various renewable energy sources such as solar energy, wind energy, fuel cells, biodiesel and so on are being tried for telecommunications applications. For telecommunications operations, obtaining reliable and cost effective power solutions for the expansion of their telecommunications service both within urban areas and to rural and remote areas presents a very challenging problem. As a new era of Renewable Energy Tower (RET) solutions for telecom arises, it is essential to take a closer look at renewable energy technologies.

Various hybrid systems namely, SPV-Battery system, SPV-Fuel Cell (FC) system and SPV-FC-Battery system feeding a stand-alone DC load at a telecom base station are to be investigated, optimized, analyzed and compared. The modeling and sizing optimization of such hybrid systems can be carried out using HOMER.

This tutorial aims at emphasizing the various opportunities prevailing in integrating various combinations of renewable sources to meet the telecom load. Also, the techno-economic analysis to meet the demand in a reliable, sustainable manner with cost effectiveness has to be addressed properly. The choice of specific power plant technology or technology mix for telecom load depends on , the load demand, availability of natural resources, environmental impacts , the Net present cost (NPC), Cost of energy (COE), Carbon emission quantity (CEQ), Economic distance limit (EDL) etc. Also, this tutorial aims to discuss a case study on solar -wind hybrid system using a

novel dc-dc converter powering a rural telecom. At the end of the tutorial, the participants would be able to

1. Understand the basis on which hybrid systems are to be selected to meet any load
2. Various dc-dc converter topologies for telecom load
3. The influence of state of charge of batteries for the back up.
4. Energy management issues and sample results of a case study.

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Dr V.Rajini received the B. E. and M.E. degrees from Annamalai University, India in 1988 and 1992, respectively. She received the Ph.D. degree in high voltage Engineering from Anna University, India, 2008. She is the senior member of IEEE. Dr Rajini has published over 90 technical papers in refereed journals, 1 book, and 3 book chapters. She has been PI/CI on various research grants. Recent funding include the MNRE grant for a novel DC/DC converter for green telecom. Dr Rajini has supervised 14 PhD students; 5 have graduated and 4 have submitted the Thesis and the others are ongoing. Her current research interests include power Electronics, Drives High voltage systems and HVDC.