# **2016 First International** Conference on Sustainable Green **Buildings and Communities** (SGBC 2016)

Chennai, India 18-20 December 2016



**IEEE Catalog Number: CFP16H91-POD ISBN**:

978-1-5090-3499-4

# Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP16H91-POD

 ISBN (Print-On-Demand):
 978-1-5090-3499-4

 ISBN (Online):
 978-1-5090-3498-7

#### **Additional Copies of This Publication Are Available From:**

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



# **Table of Contents**

# **Plenary Session**

Advanced Power Converters for Increased Energy Efficiency in Microgrids 1

K. Shenai

Low voltage DC Distribution - Are we ready yet? 6
Rajesh Kunnath, Krishna Vasudevan, Ashok Jhunjhunwala, Devendra Jalihal, Prabhjot Kaur and M.
Kumaravel and B. G. Fernandes

#### **Session I - Smart Grids**

Circulating Net Currents in Meshed Bipolar DC Distribution Grids due to Asymmetrical Line Resistance 12

Elisabeth Vandeventer, Laurens Mackay, Laura Ramirez Elizondo, Pavol Bauer

MEM: Energy Management System for Low Voltage DC Microgrids 18

Ashray Manur, Lee Shaver, Adria Brooks, Alec Sivit, Giri Venkataramanan, Shamsundar Subbarao

Enabling the Fault Tolerant Operation of Shipboard Microgrid Architecture 24 *Pinjala Mohana Kishore, Ravikumar Bhimasingu* 

Power Line Carrier Communication Based Low Cost Power Monitoring and Management System 29 Vidyalaxmi Dani, Rebanta Kumar Chowdhury, Srinath Vasan, Suvetha Ramanan, Ragavedhni K R, S.Sampoornam, Devendra Jalihal

Inverterless Solar DC system design for off grid and near off grid Indian homes 33

Anusha Ramachandran, Sairam Mannar, Ashok Jhunjhunwala

Impact of Voltage Dependent Demand Response on the Dynamics of DC Microgrids 38

Ivan Ramirez-Fonseca, Laurens Mackay, Nils H. van der Blij,

Tsegay Gebremedhin Hailu, Laura Ramirez-Elizondo, Pavol Bauer

A Nonisolated Single Stage Threeport Converter For Hybrid Microgrid Applications 44 *Pinjala Mohana Kishore, Ravikumar Bhimasingu* 

#### **Session II Green Buildings**

Demand Side Management System for Future Buildings 50 C. Phurailatpam, R. K. Chauhan, and B. S. Rajpurohit, F. M. G. Longatt, S. N. Singh

Could mixed AC/DC power systems support more sustainable communities? 56 Lena Petersson Forsberg, Sara Eriksen

Energy efficient appliances in a Residential building 61

D Kamalakannan, V Mariappan, V Narayanan and N S Ramanathan

Green Building Air Conditioning System with Variable Frequency Drive, Variable Air flow controller 67

Ankit Poddar, Prabhjot Kaur, Ashok Jhunjhunwala

Analysis of Solar Estimation from buildings along with Demand Response in a Renewable Microgrid 72

Pavan Penkey, Asad Mohammad, Nathan Gaul, Brian K. Johnson, Herbert L. Hess

Design and development of DC powered BLDC motor for Mixer-Grinder application 77 D Kamalakannan, N Jeyapaul Singh, M Karthi, V Narayanan and N S Ramanathan

#### **Invited papers**

Bringing Uninterrupted DC Power to Indian Homes – The Sasaram Experience 83

Venkat Rajaraman, Krishna Vasudevan, Lakshmi Narasamma, Vinay Tamboli, Aditya Lolla

Design and Development of Sensorless Controller for DC-Operated Mixer-Grinder 89 *Chinmay D. Bhagat, Saurabh P. Nikam, and B. G. Fernandes* 

Increasing Solar Hosting Capacity is the Key to Sustainability 95

Deepak Divan, Prasad Kandula

Energy optimization and Cost Management in multi-storied Green Complexes 100 Ashok Jhunjhunwala, Prabhjot Kaur

Energy Efficiency in Lighting: AC vs DC LED Lights 106

Ashok Jhunjhunwala, Krishna Vasudevan, Prabhjot Kaur, Bhaskar Ramamurthi, Kumaravel, Santosh Bitra and Kushant Uppal

# **Poster Papers**

Towards Net Zero energy Solar Building, system and concepts 110 Sanjay Kumar

Designing a high Performance Battery Life Cycle Tester. 116

Sushant Mutagekar, John P Kurian, Ashok Jhunjhunwala, Prabhjot Kaur, Shivashankar Gunaki

Conversion of Administrative Complex as Net Zero in Central Electronics Limited, India 120 Umakanth V, Nilabh, Sanjai Kumar, V.K. Kaul

Wireless Sensor Network for DC/AC Homegrids 124

Ashray Manur, Giri Venkatraman

Energy Modeling of Aggregated Community Scale Residential Microgrids 130 Adria Brooks, Ashray Manur, Giri Venkataramanan

Solar Powered Electric Vehicle 136 Manivannan S, Kaleeswaran E

Fault Locator for Sub-Transmission Lines with Integrated Distributed Generation 140 *OD Naidu, Neethu George,* 

A New Fault Location Method for Underground Cables in Distribution Systems 146 OD Naidu, Neethu George, Debasish Pradhan

High Efficient Single Stage Single Phase Boost Inverter with minimized harmonic distortion 151 *T.Dineshkumar, M.Mathankumar, M.Sundaram* 

#### Session III Renewable Tech & Green Buildings

Solar Thermal Energy Storage on PCM Based Integrated Saw Tooth Collector for Institutions 156 Babu S, Abishraj VR, Suthagar S

A novel method to predict Non-uniform illumination pattern on a large scale rooftop SPV array

162

Kuntal Ghosh, Phalguna. P, Siddhartha P. Duttagupta, P.K. Gupta

Design of Converters for leveraging 48V DC Power line at Homes / Offices 168 Pooja Rani , Vignesh D, Shivshankar Gunaki , Ashok Jhunjhunwala

LPPT control of a photovoltaic system under partially shaded condition 173 M Kranthi Kumar Reddy, Vaskar Sarkar

Optimization of Domestic Heating System by Implementing Model Predictive Control 179

Esmaeel Khanmirza, Ahmad Esmaeilzadeh, Amir Hossein Davaie Markazi

AMI Rollout Strategy and Cost-Benefit Analysis for India 185 Reji Kumar Pillai,Rupendra Bhatnagar, Hem Thukral

Grid tied Roof top solar: problems, learnings and solutions 191

Neel Mathews, Narendar Rao, Gowrisankar, Biswajit pattnaik, G. Siva Prasad

#### Session IV Smart Grids and EVS

Electric Transportation Action Plan for India 196 Girish Ghatikar, Reji Kumar Pillai, Akshay Ahuja

Optimal Electric Vehicle Charging Schedule for Demand Side Management 202 Priyanka Shinde, K. Shanti Swarup

Green Transportation using Intelligent Solar Electric Pedal Assist Three Wheeler 208 Visakh Sasikumar, Jacob Thekkekara, Ashok Jhunjhunwala

The energy efficiency of fractal solar grids 211

Suraj Kumar, Ramakrishna Ramaswamy, Saroj K Nayak

Sizing of Solar DC Microgrid for sustainable off-grid communities: Economics, polices and societal implications 215

Saranya A, K Shanti Swarup

EV: Communication Infrastructure Management System 221 Anitha Dhianeshwar, Prabhjot Kaur, Sree Hari Nagarajan

Current Injection based Front-End Power Quality Improved Converter for Telecom Load 227 Saravana Prakash P, R Kalpana, Bhim Singh, G Bhuvaneswari

# **Invited Papers**

PEER- a tool to design, measure and monitor the performance of smart grid 233

Mili Majumdar, Ishaq Sulthan, Aumkar Borgaonkar