2021 IEEE 9th International Conference on Smart Energy Grid Engineering (SEGE 2021)

Oshawa, Ontario, Canada
11 – 13 August 2021

IEEE Catalog Number: CFP21SEJ-POD
ISBN: 978-1-6654-3123-1

Copyright © 2021 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:	CFP21SEJ-POD
ISBN (Print-On-Demand):	978-1-6654-3123-1
ISBN (Online):	978-1-6654-4094-3
ISSN:	2575-2677

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

2021 the 9th International Conference on Smart Energy Grid Engineering

(SEGE 2021)

Table of Contents

Preface ..... **vi**
Conference Committees ..... **viii**

Microgrid and Smart Grid

Stability Analysis of a Remote DC Subgrid/Microgrid Connected to a Very Weak AC Grid 1

Saeed Rezaee, Amr Radwan, Mehrdad Moallem, Jiacheng Wang

Applications of Artificial Intelligence in Smart Grids: Present and Future Research Domains 7

Farhad Khosrojerdi, Stéphane Gagnon, Raul Valverde

Environmental Assessment of Digital Infrastructure in Decentralized Smart Grids 13

Daniela Wohlschlager, Anika Neitz-Regett, Bastian Lanzinger

Examining the Applicability of Blockchain to the Smart Grid Using Proof-of-Authority Consensus 19

Ugonna Chikezie, Tutku Karacolak, Josue Campos do Prado

A Novel Probabilistic Risk-Based Energy Management Model in the Smart MicroGrids 26

Sobhan Dorahaki, Rahman Dashti, Hamid Reza Shaker

Utility Scale Battery as Capacity Source for Electric Grid Systems 32

Omid Pourkhalili, Rapinder Sawhney, Sajjad Amrollahi Biyouki, Hadi Parsian

Placement of Battery Energy Storage for Provision of Grid Services – A Bornholm Case Study 36

Zeenat Hameed, Seyedmostafa Hashemi, Hans Henrik Ipsen, Chresten Træholt

Design of a Smart Controller Agent for Demand-Side Management with Low Payback Effect 42

Pegah Yazdkhasti, Chris. P. Diduch

Fault Current Level Analysis of Future Microgrids with High Penetration Level of Power Electronic-Based Generation 48

Hussain Sarwar Khan, Khaled Syfullah Fuad, Mazaher Karimi, Kimmo Kauhaniemi

IoT for Home Energy Management (HEM) Using FPGA 54

Amleset Kelati, Hossam Gaber

Power System and Energy Engineering

A Stochastic Approach to Generate Short-Term Feed-in Profiles of Wind Power Plants 58

Sirkka Porada, Leonard Schulte, Albert Moser

Optimal Scheduling for Behind-the-Meter Batteries under Different Tariff Structures 64

Mostafa Rezaeimozafar, Rory Monaghan, Enda Barrett, Maeve Duffy

Wind Power Forecasting for the Danish Transmission System Operator Using Machine Learning 71

Kathrine Lau Jørgensen, Hamid Reza Shaker

Sampling Strategy Analysis of Machine Learning Models for Energy Consumption Prediction 77

Zeqing Wu, Weishen Chu

Full Shading for Photovoltaic Systems Operating under Snow Conditions 82

Farhad Khosrojerdi, Stéphane Gagnon, Raul Valverde

Model Predictive Control Modular Approach for Multi-source System Management 88

Baptiste Boyer, Philippe Fiani, Guillaume Sandou, Emmanuel Godoy, Cristina Vlad

Dynamic Energy Scheduling Algorithm for an End-User with Energy Storage Device to Save Total Costs 94

Quanjing Zhang, Didi Liu, Hongbin Chen, Junxiu Liu, Cong Hu

Power Electronics and Key Technologies

Hydro-Qu´ebec's Experience of Implementing Power-System Node-Breaker Model for Planning Studies 100

Atieh Delavari, Jacques Prevost, Alain Cotey

Fast Frequency Response Using Model Predictive Control for A Hybrid Power System 104

Abhishek Varshney, Renuka Loka, Alivelu M. Parimi

Electric Vehicle Charging Station: Cyber Security Challenges and Perspective 111

Zoya Pourmirza, Sara Walker

Using Critical Slowing Down Features to Enhance Performance of Artificial Neural Networks for Time-Domain Power System Data 117

Austin Lassetter, Eduardo Cotilla-Sanchez, Jinsub Kim

Case Study on Effect of Transformer Rating on Impulse Voltage Distribution in Windings 124

Harmanpreet Singh Sekhon, Pawan Rathore, Vaman Dommeti

Optimization of Unbalanced Active Distribution Systems Using Cuckoo Search Algorithm 129

Tianjian Wang, Ying Wang, Yan Hou, Fei Gu, Shaoshuai Hou, Wei Jin

Multi-resolution Analysis Algorithm for Fast Fault Classification and Location in Distribution Systems 134
Miguel Jiménez Aparicio, Matthew J. Reno, Pedro Barba, Ali Bidram

Modular Bidirectional Converter with Multiple Power Sources for Fast Charging of Electric Vehicles 141
Abdalrahman Elshora, Yasser Elsayed, Hossam A. Gabbar

Start-up and Smooth Grid Connection of the Doubly Fed Induction Generator 147
Marouane EL AZZAOUI

Fractional PID Controller Tuning Using Krill Herd for Renewable Power Systems Control 153
Regad Mohamed, Bilal Boudy, Hossam A. Gabbar