ASES National Solar Conference (SOLAR 2016)

Progress Towards 100% Renewables

San Francisco, California, USA 10 – 13 July 2016

Editors:

Richard Perez David Renne

ISBN: 978-1-5108-3417-0

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2016) by American Solar Energy Society All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact American Solar Energy Society at the address below.

American Solar Energy Society 2525 Arapahoe Ave, Ste E4-253 Boulder, Colorado 80302 USA

Phone: (303) 443-3130

info@ases.org

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 Email: curran@proceedings.com Web: www.proceedings.com

Introduction

Introduction *R. Perez. 2*

Solar Buildings and Architecture I and II

A Case Study on the Merits and Design of a Solar Powered Internet of Things: Intelligent	
Window Shades	
D. Drake, J.S. Preston.	4
Design Schools as Drivers for Sustainable & Affordable Housing	
C. Hazel, L.D. Iulo	12

Solar Electricity - Economics & Policy I and II

Comparing Carbon Fees with Existing Financial Incentives for Solar Electricity	
J. Schaefer	22
The Hazards of Exponential Growth for the Solar Industry – and How Innovating Stronger Business Models Is Key to Survival	
E.I. Schwartz	28
SMUD Solar: A Roadmap for Utilities in Transition	
W. Schirtzinger, D.W. Aitken, D.E. Osborn, S.J. Strong	33

High-Efficiency ZEB & Control Systems

Guidelines for Residential Sub Metering	
M. Hatch, H. Rashed-Ali	44

Inhouse	
S. Stannard, R. Beller, L. Mueller, A. Parr, K. Schollenberger	55
Maryland Net Zero Energy Schools Program	
D.L. Comis	61
House Energy Doctor's Level III Building Energy Audits as Pedagogy and Outreach	
N.V. Chalfoun	66

Resource Assessment: Models & Data

Solar Energy Assessments: When Is a Typical Meteorological Year Good Enough?	
S. Pelland, G. Bender, R. Kenny, L. Leahy, C. Maalouf, B. Schneider	77
Global Validation of REST2 Incorporated Into an Operational DNI and GHI Irradiance Model	
W.T. Gustafson, G. Bender, L. Leahy	84

Renewable Energy Grid Integration

Some Consequences to Grid Operation Due to High Penetration of Distributed PV Systems	
U. Ponsukcharoen, W. Murray	94
Assessing Demand Impact of Solar Capacity Growth in Philadelphia	
J. Ranalli	104

Resource Assessment: Forecasting & Remote Sensing

Forecasting Solar Power and Irradiance – Lessons from Real-World Experiences	
S.D. Jascourt, C. Cassidy, D. Kirk-Davidhoff	112
An Assessment of New Satellite Data Products for the Development of a Long-term Global Solar Resource At 10-100 km	
P.W. Stackhouse, S.J. Cox, K. Knapp, J.C. Mikovitz, R. Perez, B. Scarino,	
J. Schlemmer, M. Sengupta, T. Zhang	121

Solar Thermal Technology Advances I

ew Standard' Solar Hydronic Building Systems: State of the Art in New Mexico 2016	
B. Stickney	128
Solar Thermal Collection with Seasonal Storage	
G. Olson, Y. Yu.	137

SANE - Forum

The Spartan Superway: A Solar-Powered Automated Transportation Network	
B.J. Furman	147
Case Study of a Solar Power Installation on an Automated Transit Network in San Jose	
L. Branco, B.J. Furman, D. Marques de Queiroz Neto, E. Rosenfeld	157
A Study on the Effects of Urban Shadow Impingement on Solar Powered Transportation Systems	
I. Gendler	167

The Value of Distributed Solar Resources

The Right Tone of VOS: Improving the Argument for Local Community Solar	
J. Cliburn, J. Bourg, J. Powers	178
Influencing Utilities Through Shareholder Advocacy: the Madison Gas & Electric Case Study	
D. Wichert, B. Esser	188
Net Metering PV Distributed Resources Benefits All Stakeholders on PJM	
P.M. Jansson	194

Poster Presentations

Design of Wearable Agricultural Solar-powered Sprayer for Remote Areas	
A.M. Farrag	<i>202</i>
Challenges for the Expansion of Solar Power in Brazil	
D.G. Giacobbo	212

Solar Power for Rural America	
J. Glenn	219
Collaborative Prototype Development & Test Project for a Novel Hybrid Solar Concentrating Cogeneration System	
M. Sankrithi, S. Watkins	223