# AEE World Energy Conference 2021

New Orleans, Louisiana, USA 20-22 October 2021

ISBN: 978-1-7138-3865-4

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© (2021) by Association of Energy Engineers (AEE) All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact AEE Energy Books at the address below.

Association of Energy Engineers (AEE) 3168 Mercer University Drive Atlanta, Georgia 30341 USA

Phone: (770) 447-5083 Ext. 222 Fax: (770) 446-3969

www.aeecenter.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

## 2021 AEE World Proceedings Table of Contents



#### Track A

Chapter 1	<b>Decentralized CHP in Puerto Rico 1</b> Marcus Martin, CEO, Martin Energy Group
Chapter 2	<b>Off Grid Combined Heat and Power Solutions for the Greenhouse Market 8</b> Derek Loganbill, PE, Engineering Manager, Martin Energy Group
Chapter 3	<b>City of Springfield Energy Master Plan Case Study</b> 17 Kathleen A. Stanley, CEM, Principal, Energy Advocates LLC
Chapter 4	<b>Energy Master Planning - Establishing the Plan and Lessons Learned</b> 27 Thomas Lanzilotta, CEM, CEA, Campus Sustainability & Energy Manager, Stony Brook University
Chapter 5	<b>Retro-Cx Program Development: Achieving Portfolio Wide Energy &amp; Carbon Reduction Goals through Training and a Culture of Collaboration 34</b> Saverio Grosso, CEM, CEA, EBCP, CBCP, Managing Director, Edison Energy
Chapter 6	<b>Saving Energy Use with Variable Speed Drives and Motor Control 43</b> Duane D. Warren, CEM, CMVP, LEED GA, Senior Energy Analyst, JLL - Corporate Solutions
Chapter 7	Designing and Implementing Corporate Wide Energy Efficiency Program Through Retro- And Monitoring- Based Commissioning and Lighting Savings Initiative Initiatives 47 Vaibhav Gagrani, PE, CEM, LEED AP, Director Energy and Waste Management, Universal Health Services
Chapter 8	<b>Zero Net Energy Performance - Verification Lessons</b> 60 Jason E. Fierko, PE, LEED AP, CEM, Principal, Mechanical Engineer, EwingCole

#### **Track B – Energy Basics**

Chapter 9	Energy Efficiency and Clean Energy Project Finance Basics 73
	Daniel Katzenberger, PE, CEM, GBE, CSDP, CEA, BEMP, Global Sustainability and ESG Leader, Best Buy
Chapter 10	Chillers 101 82 Eric M. Oliver, PE, CEM, LEED AP, Founder, Earthwide, LLC
Chapter 11	The Basics of Steam - What is it, how does it work, and what can it do? 94 Chuck Strand, Director, Government Business Development, FuelCell Energy, Inc
Chapter 12	<b>Compressed Air 101 98</b> Lonnie W. Russell, CEM, REP, CLEP, Project Developer, ABM   Technical Solutions
Chapter 13	Motors and VFDs: How They Work, When They Don't, and What You Can Do 118 Thomas Sherman, CEM, CEA, CDSM, CCASS, President, Sustainable Energy Services, Inc.
Chapter 14	Advancing Building Electrification Projects at an EPIC Scale 144 Tracy M. Phillips, CEM, CDSM, CMVP, Director, Sustainable Real Estate Solutions
Chapter 15	<b>Renewable Technology 152</b> Jessica Harris MFBA, CBCP, CEM, HERS Rater, NGBS Verif, President, Harris Energy Solutions, LLC
	Track C

- Chapter 16 Unique Cx and RCx Programs Produce Significant Savings 161 Paul Graves, CEM, PE, Cp EnMS, Data Center Energy Practitioner (DCEP)-HVAC Specialist, Senior Energy Management Consultant, Jacobs Engineering, Strategic Consulting, Energy Solutions
- Chapter 17 Remote Retrocommissioning During the Covid-19 Pandemic and into the Future 212 Lauren Rueda, CEM, Portfolio Energy Manager, JLL Homa Naeimi, Engineer, Nexant Inc.
- Chapter 18Decarbonization Strategies For Industrials 221Ronald Miller, PE, CEM, REP, MBA, Director of Energy, Reliant Energy Solutions LLC
- Chapter 19 Energy Benchmarks & Best Practices 2010-2020 & Covid Factors 231 Michael F Guerin, PE CEM, AIA, CFM, LEED-GA, GGP, President, Guerin Associates, Inc
- Chapter 20 VHA Energy Engineer's Advisory Board Presentation 2021 247 Allan Federman, VHA Energy Engineer's Advisory Board, Chairperson, US Veterans Affairs

Chapter 21	Easing Transitions between Flat Plate and Chiller: Strategies to Reduce Surge and Maintain Building Load Efficiently 263
	Bryan Lang, PE, CEM, Engineering Manager, ETC Group
	Chris Jackson, PE, LEED-AP, VP/Principal Engineer, ETC Group

Chapter 22 Steps for Improving Air-Cooled and Water-Cooled Chiller Performance and Energy Efficiency 276 Jim Crockett, PE, MBA, Sr. Project Engineer, ETC Group Greg Jimmie, Energy Engineer, ETC Group

#### **Track D**

- Chapter 23Improved Efficiency with Zero Emission Medium Voltage Heating 290James Lewis, Business Development Manager Sustainable Energy, Chromalox Inc.
- Chapter 24 Water as a Service 302 Katie Hoffmaster, MPA, Sr. Manager - Distributed Water Solutions, NextEra Energy Resources
- Chapter 25 Chilled and Hot Water Pumping Systems 310 Robert F. Kownurko, PE, CEM, BEMP, Engineering Development Manager, CM3 Building Solutions
- Chapter 26Eliminate Condensate Bottlenecks in Reboiler Discharge 326James R. Risko, CEM, PEM, MBA, President, TLV Corporation
- Chapter 27Transportation Electrification: It's Accelerating -- Are you Ready? 352Matt Haakenstad, PE, CEM, CMVP, Senior Director, World Kinect
- Chapter 28Volatile Energy Markets & Industry Procurement Trends 363Dan Conrath, Senior Vice President, StoneX Financial Inc. FCM Division
- Chapter 29Project Financing Using Operational Savings vs. Capital Budget 371Anastasia Beckett, Senior Vice President of Sales, Metrus
- Chapter 30Success with IOT 381<br/>David Long, PE, Building Services, Cromwell
- Chapter 31Big Data = Big Opportunity for Energy Savings 395John Romano, EVP of Sales, Autani, LLC
- Chapter 32Blockchain based P2P Financing Mechanism 400Alain Aoun, CBCP, BEP, CMVP, CAP, CLEP, CEA, REP, Co-Founder and COO,<br/>CEM, Blockchain Leaders

#### **Track E**

Chapter 33	MBCx at the MetLife Building 417 Christy Cannon, CEM, Solutions Consultant, Energy, Yardi Systems Inc. CP Pitones, Senior Account Executive, Energy, Yardi Systems, Inc.
Chapter 34	<b>The Future of Class B/C Building Controls and the Runtime Opportunity 424</b> Alex McCarthy, PE, MBA, CEM, CPD, LEED AP, Associate Director Building Systems, Sidewalk Labs
Chapter 35	Hospital Campus Efficiency and Preparing for Future Policies 429 Robert L. Berninger, CEM, CEA, CSDP, Director - Plant Operations, Energy & Engineering, Memorial Sloan Kettering Cancer Center Ed Kiser, P.E., Director of Engineering, Worthington Energy Innovations
Chapter 36	<b>Three Thermal Energy Storage Case Studies</b> 442 Guy S. Frankenfield, PE, Energy Market Manager, DN Tanks, Inc.
Chapter 37	Green Hydrogen: The Bridge Fuel That Doesn't Stink! 456 Rice Lummis, MBA, Sustainability Lead & Market Risk Manager, 5
Chapter 38	<b>Novel Ways of Storing Cold 465</b> Robert Timmerman, PE, CEM, LEED AP, Principal, R W Timmermam & Associates
Chapter 39	The Implications of New Tax Laws & Reforms for the Energy Industry in a Post- Covid World 473 Jacob Goldman, LEED, AP, Vice President/Chief Engineer, Energy Tax Savers, Inc.d/b/a R&D Tax Savers
Chapter 40	A Sustainable Solution for Improved Indoor Air Quality in a COVID Era 493 Shubham Srivastava, Ph.D., Group Leader - Engineering Simulations Team, Rheem Manufacturing
Chapter 41	<b>Optimizing Energy Management and Sustainability within a post COVID- Environment 504</b> Michael F Guerin, PE CEM, AIA, CFM, LEED-GA, GGP, President, Guerin Associates, Inc.

#### Track F

- Chapter 42Maintaining Balance through Transactive Energy510Craig Henry, CEM, CEA, District Manager, Honeywell Smart Energy
- Chapter 43Energy Security, Resiliency, Sustainability and Optimization of Energy Systems521Ashish N. Agrawal, PhD, CEM, CDSM, CMVP, CEA, Senior Vice President, Guernsey

Chapter 44	Army & Army Reserve Energy Strategic Integration for the Future 541 Steve Patarcity, MS, Army War College, 2004, Assistant Director/Senior Strategic Planner, G35 Office, Office of the Chief of Army Reserve
Chapter 45	Behind-the-Meter Wind Power Re-imagined 549 Richard J. Costello, PE, CEM, MSEM, BSME, President, Acela Energy Group, Inc.
Chapter 46	<b>COVID Building Setback Success or Failure? See What the Data Shows 558</b> Steven D. Heinz, PE, CEM, CMVP, Founder and CEO, EnergyCAP, Inc.
Chapter 47	<b>Analytics is More Than FDD 568</b> John Petze, Principal, Co-Founder, SkyFoundry, LLC
Chapter 48	<b>Autonomous Buildings - Unlocking Energy Efficiency and Smart Cities 578</b> Troy Harvey, CEO, PassiveLogic
Chapter 49	<b>Analytics Moves to the Edge 608</b> John Romano, EVP of Sales, Autani, LLC
Chapter 50	Maximizing the EPAct 179D Tax Deductions for Energy Efficient Buildings & Related Incentives 614 Cindy Blumenfeld, Director, Engineered Tax Services
Chapter 51	NOVA College-Wide LED Retrofit Project 642 Miles D. Smith, CEM, CEA, C.MVP, Senior Project Manager, Energy, CBRE   Heery NVCC
Chapter 52	<b>The Truth about LED and UV 656</b> Daniel Fonseca, MS, MBA, Manager Product Operations, Orion Energy Systems Inc.
Chapter 53	Innovative Financing: Using CPACE and Tax Incentives to Fund Your Energy Project 667 Daniel Audette, C.E.M., LEED GA, President, DA Energy Modeling
	Track G
Chapter 54	<b>Strategic Elements of an Enterprise Energy Management System 677</b> Dave Bullington, Vice President Sales & Marketing, MPC Energy, LLC
Chapter 55	<b>Telling Your Energy Story for Awareness 690</b> Ashley Williams, MCRP, ATEM, Chief Operating Officer, Texas Energy Managers Association
Chapter 56	Integrating Solar into Energy Projects - Just Squeeze and Bake 701 Parker Higgs, Regional Director of Energy Services, Entegrity Energy Partners, LLC

### Track H

Chapter 57	It's Back to the Future with Microgrids! 713 Stephen A. Roosa PhD, CEM, CMVP, REP, CSDP, CRM, BEP, CBCP, President RPM Asset Management
Chapter 58	<b>Renewable Energy to Green Ammonia: Impact of Power Profiles on Techno- economic performance of Casale Green Ammonia Process</b> 733 Chris Mancinelli, Country Manager – Americas, Casale US, Inc.
	The Better Plants Program
Chapter 59	Leveraging Celanese' Global Energy Council to Improve Energy Management Systems 740
	David Reid, P.Eng., CEM, Sr. Manager Energy and Productivity, Celanese Corporation
Chapter 60	
	<b>Leveraging Sustainability for Energy Efficiency Success</b> 747 Sharon Nolen, PE, CEM, Program Manager & Fellow, Global Natural Resources, Eastman
Chapter 61	
	<b>Energy Savings with Machine Upgrades - Buy New or Rebuild?</b> 757 Thomas Bunz, Sr Manufacturing Engineer, Valmont Industries
Chapter 62	<b>Developing and Maintaining a Culture for Energy Efficiency and Carbon</b> <b>Efficiency 764</b> Edwin D. Willhite, CEM, Regional Facilities Leader, Schneider Electric
Chapter 63	Edwin D. Whinte, CEW, Regional Fachities Leader, Schneider Electric
	Monetizing Waste heat from CHP and O&G/Petrochemical Industries 774 Loy Sneary, CEO, Gulf Coast Green Energy
Chapter 64	
	<b>Ford and DTE Energy CHP Partnership</b> 779 Mike Larson, Director, Business Development, DTE Energy Services
Chapter 65	<b>Operationalizing Energy Efficiency in Manufacturing 788</b> Joe Rietmulder, Certified Safety Professional, Sr. Director, Environment/Health/ Safety, TE Connectivity
Chapter 66	
•	<b>Normalized Energy Performance Reporting for Global 3M Sites 794</b> Tanmay Soni, CEM, CMVP, CRE, MMSc, Advanced Energy Analyst, 3M
Chapter 67	Raising Awareness for Energy Efficiency with Energy Treasure Hunts and
	Virtual In-Plant Training 808 Alex Floyd, CEM, CDSM, Assistant Director – Sustainability, Lopez-Dorada Foods

#### **EPA ENERGY STAR**

Chapter 68	An Evaluation of the Potential for Deep Decarbonization in the Industrial Sector by 2050 815		
	Elizabeth A. Dutrow, CEM, Physical Scientist, US EPA ENERGY STAR		
Chapter 69	GM's Roadmap to Zero Emissions 822		
	Alfred J. Hildreth, CEM, Global Energy Manager, General Motors Company		
Chapter 70	<b>Virent – Innovative Technologies for Renewable Fuels and Chemicals</b> 826 Dave Kettner, President and General Counsel, Virent		
	Poster Sessions		
Chapter 71	<b>Better Asset Management Equal Better Energy Management</b> 833 Dan Arant, CEM, PEM, Solutions Consultant Manager – Energy, Dude Solutions, Inc.		
Chapter 72			
	<b>Carbon Reduction Strategies for Industrial and Retail Business</b> 842 Olga Curnen, CEP, Senior Business Development Manager, WGL Energy		
Chapter 73	Investigating Mass Transit Efforts on Energy Demand in Kuwait 940		
	<b>Investigating Mass Transit Effects on Energy Demand in Kuwait</b> 849 Norah Al-Safi, Rawan Al-Kandari, Yousef M. Al-Abdullah, Sreekanth K.J., and		
	Fotouh Al-Ragom Energy Efficiency Technologies Program (EET), Energy and Building Research Center (EBRC), Kuwait Institute for Scientific Research (KISR)		
Chapter 74			
	<b>Energy Efficiency Trends for Houses in Slovakia 852</b> Anna Predajnianska, PhD Student, Slovak University of Technology in Bratislava, Slovakia, Faculty of Civil Engineering, Department of Building Services		
Chapter 75	,,, _,		
	The Viability of Residential PV & Storage Installation within the Lebanese Network: Lessons learned from a pilot installation 857 Rabih El Medawar, Ms.Eng., MBA, CEM, CRM, CWEP, CLEP, Energy & Electric Utility Consultant		
Chapter 76	Policy Deadman for Duilding Francy Data Management in India 964		
	<b>Policy Roadmap for Building Energy Data Management in India</b> 864 Shravani Itkelwar, Deepak Tewari, Dr. Bhaskar Natarajan, Alliance for an Energy Efficient Economy, New Delhi		

#### **On Demand**

- Chapter 77 Implementation Experience of An FDD System in a Large commercial Complex in Toronto 874 Kaushik Bhattacharjee, CEM, CEA, CMVP, Principal, Reipower, Inc.
  Chapter 78 Optimizing Ventilation Using Low-Cost Sensors to Improve Health, Safety, and Energy Efficiency 884 Amanda R. Kirkeby, Rachel L. Romero, PE, Otto Van Geet, PE, LEED AP, National Renewable Energy Laboratory Nicholas Napp, Xmark Labs, LLC.
  Chapter 70 Energy Savings of VED and Adiabatia Cooling in Chillers: A Paolity Chaek. 890
- Chapter 79Energy Savings of VFD and Adiabatic Cooling in Chillers: A Reality Check 889Rafael Pérez-Cortines, CEM, CEA, CMVP, Senior Business Development Supervisor,<br/>Daikin Europe NV