EASTERN TIME ZONE						
Start	**End**	**Duration**	**DAY 1 - WEDNESDAY, JUNE 16**			
10:00 AM	10:10 AM	0:10	**Room 1: Conference Welcome - Thomas Costabile, Executive Director/CEO, ASME (Pre-recorded)**			
10:10 AM	10:15 AM	0:05	**Break**			
10:15 AM	12:00 PM	1:45	**Room 1: Women In Engineering Panel - Moderator, Nesrin Ozalp, Purdue University Northwest Panelists: Margot Gerritsen, Stanford University, Erin Slayton, Henningson, Durham and Richardson, Inc., Ying Sun, National Science Foundation, Evelyn Wang, Massachusetts Institute of Technology, Sophia Haussener, Swiss Federal Institute of Technology Lausanne Chemical Processes for Energy Storage**			
12:00 PM	12:10 PM	0:10	**Q&A**			
12:10 PM	12:20 PM	0:10	**Break**			
12:20 PM	1:10 PM	0:50	**Room 1: Plenary 1 - Dr. James Klausner, UAE University - Introduction by Justin Lapp and Nesrin Ozalp High Temperature Thermochemical Processes for Energy Storage**			
1:10 PM	1:20 PM	0:10	**Q&A**			
1:20 PM	1:30 PM	0:10	**Break**			
1:30 PM	2:20 PM	0:50	**1-1: Energy Nexus - Fuel Efficiency**	**2-1: Green Building/Net-Zero Energy Building Performance**	**6-1: Solar Fuel Production I**	**5-1: CSP Materials Advancements**
			Session Chair: Pei Dong, George Mason University Session Co-Chairs: Jian Zhang, University of Wisconsin-Green Bay; Yang Chen, Oak Ridge National Laboratory	**Session Chair: Yeobeom Yoon, North Carolina State University Session Co-Chair: Dongsu Kim, Hanbat National University**	**Session Chair: Brendan Bulfin, ETH Zurich**	**Session Chair: Peter Loutzenhiser, Georgia Institute of Technology**
			Technical Paper Publication: ES2021-62572 - Fuel Economy Results From Diesel Engine Tuning for Steady Speed and Drive Cycle Operation Authors: James Carl M. Satorre - UP Diliman, Edwin N. Quiros - University of the Philippines, Jose Gabriel E. Mercado - UP Diliman, Paul L. Rodgers - UP Diliman	Technical Paper Publication: ES2021-63799 - Energy Storage Versus Demand Side Management for Peak-Demand Reduction at the Hawaii Ocean Science and Technology Park Authors: Alexander Headley - University of Memphis, Yogesh Manoharan - University of Memphis. Laurence Sombardier - Natural Energy Laboratory of Hawaii Authority, Keith Olson - Natural Energy Laboratory of Hawaii Authority, Benjamin Schenkman - Sandia National Laboratories	Technical Presentation Only: ES2021-62597 - Coupled Heat and Mass Transfer in Anisotropic Heterogeneous Porous Media Applied in Solar Thermochemically Processed Hydrogen and Syngas Authors: Xiaoyu Dai - Ecole Polytechnique Federale De Lausanne, Sophia Haussener - Ecole Polytechnique Federale De Lausanne	Technical Presentation Only: ES2021-69151 - Electrochemical Mitigation of Corrosion in Molten Chloride Salts During CSP Plant Operation Authors: Kerry Rippy - National Renewable Energy Laboratory, Liam Witteman - National Renewable Energy Laboratory, Judith Vidal - National Renewable Energy Laboratory, Abigale Monasterial - National Renewable Energy Laboratory
			Technical Paper Publication: ES2021-62790 - An Investigation of the Fuel Economy of a Drive Cycle Developed Using the Road Load Energy Criterion Authors: Peter Vasquez - Colegio De Muntinlupa , Edwin Quiros - University of the Philippines – Diliman, Gerald Jo Denoga - University of the Philippines – Diliman, Robert Michael Corpus - Polytechnic University of the Philippines – Manila, Robert James Lomotan - Colegio De Muntinlupa	Technical Paper Publication: ES2021-63750 - Bayesian Inference for Incidence Factor of the Thermal Bridge Using In-Situ Measurement Infrared Thermography Authors: Eunho Kang - Hanbat National University, Hyomun Lee - Hanbat National University, Jongho Yoon - Hanbat National University, Dongsu Kim - Hanbat National University	Technical Presentation Only: ES2021-63975 - Thermodynamic Guiding Principles for Designing Efficient High-Temperature Redox Materials for Solar Thermochemical Fuel Production Authors: Sha Li - The Australian National University, Vincent Wheeler - University of Wisconsin-Stout, Apurv Kumar - Federation University, Mahesh Venkataraman - 1414 Degrees, Christopher Muhich - Arizona State University, Yong Hao - Chinese Academy of Sciences, Wojciech Lipinski - The Australian National University	Technical Presentation Only: ES2021-69338 - Development of In-Situ Corrosion Kinetics and Salt Property Measurements Authors: Emily Liu - Rensselaer Polytechnic Institute, Robert Hull - Rensselaer Polytechnic Institute, Jinsuo Zhang - Virginia Tech
			Technical Paper Publication: ES2021-62881 - Effect of Train Energy Consumption on the Wear of Railroad Catenary Contact Conductor Authors: Egide Niringiyimana - Addis Ababa University, Celestin Nkundineza - Addis Ababa University	Technical Presentation Only: ES2021-60524 - Sustainability Indicators for Selected Greenhouse Production Facilities in North America Authors: Jaime Thissen - University of Illinois Urbana Champaign, Paul Davidson - University of Illinois Urbana Champaign	Technical Presentation Only: ES2021-66538 - High-Temperature Heat Recovery System Coupled to a Solar Redox Reactor for Splitting Water and Carbon Dioxide Authors: Alon Lidor - ETH Zürich, Yves Aschwanden - ETH Zürich, Jamina Häseli - ETH Zürich, Philipp Haueter - ETH Zürich, Aldo Steinfeld - ETH Zürich	Technical Presentation Only: ES2021-69518 - High-Temperature Stabilization of Silica Aerogel Monoliths Using Model-Enabled Conformal Atomic Layer Deposition Authors: Andrew J. Gayle - University of Michigan, Zachary J. Berquist - University of Michigan, Yuxin Chen - University of Michigan, Alexander J. Hill - University of Michigan, Jacob Y. Hoffman - University of Michigan, Ashley R. Bielinski - University of Michigan, Andrej Lenert - University of Michigan, Neil P. Dasgupta - University of Michigan
				Poster Presentation Only: ES2021-70087 - Design of Net-Zero Energy Attached Housing Authors: Liam Nelson - Mississippi State University, Jacob Lindley - Mississippi State University, Luke Murray - Mississippi State University, Colby Freeman - Mississippi State University, Jonathan Cimino - Mississippi State University	Technical Presentation Only: ES2021-70079 - Electrochemical Oxygen Pump Assisted Thermochemical Reactor for Highly Efficient Solar Fuel Production Authors: Meng Lin - Southern University of Science and Technology, Song Yang - Southern University of Science and Technology, Wandong Bai - Sichuan University	Technical Presentation Only: ES2021-70893 - Finite Element Modeling of Carbon-Carbon Composites for Renewable Energy Applications Authors: Vahid Daghigh - University of Tulsa, Taylor Brown - Boise State University, Todd Otanicar - Boise State University, Michael Keller - University of Tulsa
					Technical Presentation Only: ES2021-74422 - Solar Fuel Production From Ambient Air in a Modular Solar Concentrator-Reactor System Authors: Remo Schäppi - ETH Zürich, Philipp Haueter - ETH Zürich, Philipp Furler - Synhelion SA, Aldo Steinfeld - ETH Zürich	
2:20 PM	2:30 PM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
2:30 PM	2:40 PM	0:10	**Break**			
2:40 PM	3:30 PM	0:50	**3-1: Energy Storage Media**	**2-2: Optimization and Control**	**7-1: Photovoltaics**	**5-2: CSP Particle Systems**
			Session Chair: Kelvin Randhir, Michigan State University	**Session Chair: Dongsu Kim, Hanbat National University**	**Session Chair: Justin Lapp, University of Maine**	**Session Chair: Alexander Zolan, National Renewable Energy Laboratory**
			Technical Paper Publication: ES2021-63188 - Using Molding to Fabricate Stable Salt Structures for Thermochemical Energy Storage Authors: Adam Gladen - North Dakota State University, Fardad Azarmi - North Dakota State University	Technical Paper Publication: ES2021-63735 - Artificial Neural Network Based Optimized Control of Condenser Water Temperature Set-Point Authors: Tae Young Kim - Korea University, Jong Man Lee - Korea University, Sung Hyup Hong - Korea University, Jong Min Choi - Hanbat National University, Kwang Ho Lee - Korea University	Technical Presentation Only: ES2021-66489 - Simulations of Solar Power Systems to Provide Electricity to a Model Water Desalination Plant in Floreana Island, Ecuador Authors: Fernando Amoroso - Centro de Energias Renovables y Alternativas CERA-ESPOL, Ruben Hidalgo-Leon - Centro de Energias Renovables y Alternativas CERA-ESPOL, Jaqueline Litardo - Politecnico di Milano, Alejandro Granja - Facultad de Ingenieria en Mecanica y Ciencias de la Produccion FIMCP-ESPOL, Jackeline Calderon - Facultad de Ingenieria en Mecanica y Ciencias de la Produccion FIMCP-ESPOL, Diego Siguenza-Alvarado - Purdue University, Guillermo Soriano - Centro de Energias Renovables y Alternativas CERA-ESPOL	Technical Paper Publication: ES2021-61841 - Preliminary Design, Analysis, and Cost Modeling of the Particle Handling System for a Pre-Commercial 26.5 Mw-E Solid Particle Concentrated Solar Power Plant Authors: Kenzo Repole - Georgia Institute of Technology, Shaker Alaqel - King Saud University, Sheldon Jeter - Georgia Institute of Technology, Hany Al-Ansary - King Saud University, Ryan Yeung - Georgia Institute of Technology, Muhammad Sarfraz - Georgia Institute of Technology

			Technical Paper Publication: ES2021-63814 - A Novel Composite Material of Hygroscopic Salt Stabilized by Nanocellulose for Thermochemical Energy Storage Authors: Adam Gladen - North Dakota State University, Dilpreet Bajwa - Montana State University	Technical Paper Publication: ES2021-63997 - Upper and Lower Threshold Limit of Chilled and Condenser Water Temperature Set-Points During Ann Based Optimized Control Authors: Sang Hun Yeon - Korea University, Won Hee Kang - Korea University, Je Hyeon Lee - Samsung Electronics, Kwan Woo Song - Samsung Electronics, Young Tae Chae - Cheong Ju University, Kwang Ho Lee - Korea University	Technical Paper Publication: ES2021-63850 - Short Term Photovoltaic Power Forecasting Authors: Lamiaa Elsherbiny - Khalifa University, Ali Al-Alili - Khalifa University, Saeed Alhassan - Khalifa University	Technical Paper Publication: ES2021-62529 - Proposed Design and Integration of 1.3 MWE Pre-Commercial Demonstration Particle Heating Receiver Based Concentrating Solar Power Plant Authors: Muhammad Sarfraz - Georgia Institute of Technology, Sheldon Jeter - Georgia Institute of Technology, Ryan Yeung - Georgia Institute of Technology, Hany Al-Ansary - King Saud University, Kenzo Repole - Georgia Institute of Technology, Shaker Alaqel - King Saud University, Abdelrahman El-Leathy - King Saud University, Nader Saleh - King Saud University, Rageh Saeed - King Saud University, Matthew Golob - Georgia Institute of Technology, Abdulelah Alswaiyd - King Saud University
			Technical Paper Publication: ES2021-63978 - Compressed Expanded Natural Graphite (CENG) Processing for Phase Change Material (Pcm) Composites Authors: Jason Woods - National Renewable Energy Laboratory, Wale Odukomaiya - National Renewable Energy Laboratory, Alex Bulk - National Renewable Energy Laboratory	Technical Paper Publication: ES2021-63925 - Evaluation of Simplified Physics-Based Building Energy Model for the Purpose of Automatic Fault Detection Authors: Christopher Fernandez - Georgia Institute of Technology, Sheldon Jeter - Georgia Institute of Technology	Technical Presentation Only: ES2021-63461 - Simulating Steady-State Characteristics of Solar Cells Using Wxamps and Amps-1d Authors: Jiawei Gong - Penn State Behrend	Technical Paper Publication: ES2021-63223 - Sensitivity Analysis of the Levelized Cost of Electricity for a Particle-Based CSP System Authors: Luis F. González-Portillo - Universidad Politécnica de Madrid, Kevin Albrecht - Sandia National Laboratories, Jeremy Sment - Sandia National Laboratories, Brantley Mills - Sandia National Laboratories, Clifford K. Ho - Sandia National Laboratories
			Technical Presentation Only: ES2021-69388 - Preparation of a Sustainable Shape-Stabilized Phase Change Material for Thermal Energy Storage Based on Mg2+-Doped Caco3 / Peg Composites Authors: Md. Hasan Zahir - King Fahd University of Petroleum & Minerals, Kashif Irshad - King Fahd University of Petroleum & Minerals, Amjad Ali - King Fahd University of Petroleum & Minerals, Khaled Own Mohaisen - King Fahd University of Petroleum & Minerals	Technical Presentation Only: ES2021-63853 - Optimal Design and Operation Strategies of Variable Refrigerant Flow Heat Recovery System With a Domestic Hot Water System Authors: Dongsu Kim - Hanbat National University, Byeongho Yu - Mississippi State University, Heejin Cho - Mississippi State University, Hyunjin Nam - LG Electronics, Jaeyoon Koh - LG Electronics		Technical Paper Publication: ES2021-63926 - Preliminary Techno-Economic Optimization of 1.3 MWE Particle Heating Receiver Based CSP Power Tower Plant for the Mena Region Authors: Shakir Shakoor Khatti - Georgia Institute of Technology, Hany Al-Ansary - King Saud University, Sheldon Jeter - Georgia Institute of Technology
						Technical Presentation Only: ES2021-63921 - A Conceptual Design Tool for the Power Tower With Integrated Thermal Energy Storage and Heat Exchanger for PHR-Based CSP Authors: Sheldon Jeter - Georgia Institute of Technology, Hany Al-Ansary - King Saud University
3:30 PM	3:40 PM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
3:40 PM	3:50 PM	0:10	**Break**			
3:50 PM	4:40 PM	0:50	**11-1: Evaluation and Assessment of Fuels and Alternative Fuels**	**4-1: Grid-interactive Efficient Buildings**	**8-1: Wind Energy**	**5-3: CSP Material Lifetime Evaluations**
			Session Chair: Joonsik Hwang, Mississippi State University	**Session Chair: Xin Jin, National Renewable Energy Laboratory** **Session Co-Chair: Liang Zhang, National Renewable Energy Laboratory**	**Session Chair: Julia Nicodemus, Lafayette College**	**Session Chair: Andrey Gunawan, Georgia Institute of Technology**
			Technical Paper Publication: ES2021-60617 - Sustainability Assessment of Aviation Fuel Blends Authors: Cherie Gambino - Arizona State University, Agami Reddy - Arizona State University	Technical Paper Publication: ES2021-62981 - A Study of Cost-Savings Potential of Load Flexibility Measures in Grid Interactive Multi-Family Buildings Authors: Chris CaraDonna - National Renewable Energy Laboratory, Korbaga Woldekidan - National Renewable Energy Laboratory, Jie Xiong - National Renewable Energy Laboratory	Technical Paper Publication: ES2021-61857 - Maximizing Wind Turbine Efficiency by Using Soft Switching Multiple Model Predictive Control Authors: Babak Mehdizadeh Gavgani - Ghent University, Arash Farnam - Ghent University, Jeroen De Kooning - Ghent University, Guillaume Crevecoeur - Ghent University	Technical Paper Publication: ES2021-62305 - Assessment of Particle Candidates for Falling Particle Receiver Applications Through Irradiance and Thermal Cycling Authors: Nathan Schroeder - Sandia National Labs, Kevin Albrecht - Sandia National Labs
			Technical Paper Publication: ES2021-62478 - Feasibility Analysis of Refueling Infrastructure for Compressed Renewable Natural Gas Long-Haul, Heavy-Duty Trucks in Canada Authors: Wahiba Yaici - Natural Resources Canada/CanmetENERGY, Michela Longo - Politecnico di Milano/Department of Energy	Technical Paper Publication: ES2021-63283 - Investigation on Optimal EES Capacity to Maximize Self-Consumption of PV System With Existing Energy-Efficient Houses in Korea Authors: Ruda Lee - Hanbat National University, Jongho Yoon - Hanbat National University, Dongsu Kim - Hanbat National University, Hyomun Lee - Hanbat National University	Technical Paper Publication: ES2021-62501 - Fluttering Amplitude Amplification by Utilizing Flapping Moment in Flutter-Driven Triboelectric Nanogenerator Authors: Yi Zhang - The University of Hong Kong, Ka Chung Chan - The University of Hong Kong, Sau Chung Fu - The University of Hong Kong, Christopher Yu Hang Chao - The University of Hong Kong	Technical Presentation Only: ES2021-66895 - Abrasion Wear at High Temperature in Particle Receiver Type Concentrating Solar Power Systems Authors: Nipun Goel - Boise State University, Tessa Mei-Lin Fong - Boise State University, John Shingledecker - Electric Power Research Institute, Michael Keller - The University of Tulsa, Siamack Shirazi - The University of Tulsa, Todd Otanicar - Boise State University
			Technical Paper Publication: ES2021-62480 - Feasibility Study of Refueling Infrastructure for Hydrogen Gas Long-Haul, Heavy-Duty Trucks in Canada Authors: Wahiba Yaici - Natural Resources Canada/CanmetENERGY, Michela Longo - Politecnico di Milano/Department of Energy	Technical Paper Publication: ES2021-64053 - Sensitivity Analysis of Occupant Preferences on Energy Usage in Residential Buildings Authors: Kaleb Pattawi - Santa Clara University, Prateek Munankarmi - National Renewable Energy Laboratory, Michael Blonsky - National Renewable Energy Laboratory, Jeff Maguire - National Renewable Energy Laboratory, Sivasathya Pradha Balamurugan - National Renewable Energy Laboratory, Xin Jin - National Renewable Energy Laboratory, Hohyun Lee - Santa Clara University	Technical Paper Publication: ES2021-63911 - A Comparative Study of the Influence of Different Wake Models on Wind Farm Layout Optimization Authors: Hamidreza Najafi - Florida Institute of Technology, Puyi Yang - Florida Institute of Technology	Technical Presentation Only: ES2021-69123 - Metallurgical Observations in Metallic Materials Subjected to High-Temperature Abrasion Experiments to Simulate Concentrating Solar Power Particle Systems Authors: John Shingledecker - Electric Power Research Institute, Stephen Tate - Electric Power Research Institute, Nipun Goel - Boise State University, Tessa Mei-Lin Fong - Boise State University, Todd Otanicar - Boise State University, Michael Keller - The University of Tulsa
			Track 11: Invited Talk (Live Presentation) Title: Steam Reforming of Liquid Fuels to Produce Hydrogen-rich Syngas for High Temperature Fuel Cell Cogeneration Applications Speaker: Xinhai Xu, Harbin Institute of Technology	Technical Paper Publication: ES2021-62982 - Rubik's Cube Topology Based Particle Swarm Algorithm for Bilevel Building Energy Transaction Authors: Xiaochun Feng - Northwest A&F University, Yang Chen - Oak Ridge National Laboratory, Jian Zhang - University of Wisconsin-Green Bay, Heejin Cho - Mississippi State University, Xin Shi - Lehigh University	Technical Presentation Only: ES2021-60498 - Experimental and Numerical Investigation of Channeling Effects on Aerodynamics Performance of NACA 0012 Airfoil Authors: Hussein Mohammad - Western Michigan University, Saad Jalil - University of Anbar, Arz Qwam Alden - University of Anbar, Bade Shrestha - Western Michigan University	Technical Presentation Only: ES2021-69656 - Impact Erosion Testing at Low Particle Velocities for Falling Particle CSP Systems Authors: Evan Gietzen - The University of Tulsa, Nipun Goel - Boise State University, Soroor Karimi - The University of Tulsa, Siamack Shirazi - The University of Tulsa, Michael Keller - The University of Tulsa, Todd Otanicar - Boise State University
				Technical Presentation Only: ES2021-70661 - Evaluate the Impact of Building Faults on Demand Response in Small Commercial Buildings Authors: Liang Zhang - National Renewable Energy Laboratory, Matt Leach - National Renewable Energy Laboratory, Xin Jin - National Renewable Energy Laboratory		Technical Presentation Only: ES2021-71309 - Corrosion Mitigation of Stainless Steel Alloys in Molten Chloride Salt Blend for Concentrated Solar Power Applications Authors: Animesh Kundu - Lehigh University, Sreya Dutta - Dynalene, Inc.
4:40 PM	4:50 PM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
4:50 PM	5:00 PM	0:10	**Break**			
5:00 PM	5:30 PM	0:30	**Room: 1 - Welcome Reception & Conference Networking - Introduction by Heejin Cho and Nesrin Ozalp**			

Start	End	Duration	DAY 2 - THURSDAY, JUNE 17			
10:00 AM	11:50 AM	1:50	**Room 1: National Lab Panel - Moderator, Mike Wagner, University of Wisconsin-Madison Panelists: Dr. Mark Messner, Arnonne National Laboratory, Dr. Judith Vidal, National Renewable Energy Laboratory, Dr. Paul Talbot, Idaho National Laboratory, Dr. Kenneth Armijo, Sandia National Laboratory**			
11:50 AM	12:00 PM	0:10	**Q&A**			
12:00 PM	12:10 PM	0:10	**Break**			
12:10 PM	1:10 PM	1:00	**Room 1: Keynote - Dr. Jerry Yan, Royal Institute of Technology (KTH) and Mälardalen University (MDH), Sweden - Introduction by Heejin Cho Energy Transition Towards Carbon Neutrality: Challenge and Opportunities**			
1:10 PM	1:20 PM	0:10	**Q&A**			
1:20 PM	1:30 PM	0:10	**Break**			
1:30 PM	2:20 PM	0:50	**1-2: Nexus: Energy, Water and Climate 1**	**2-3: Large-Scale Building Performance Assessment**	**6-2 Solar Fuel Production II**	**5-4: Novel CSP Component Integration**
			Session Chair: Jian Zhang, University of Wisconsin-Green Bay Session Co-Chairs: Pei Dong, George Mason University; Yang Chen, Oak Ridge National Laboratory	**Session Chair: Dongsu Kim, Hanbat National University**	**Session Chair: Alon Lidor, ETH-Zurich**	**Session Chair: John Shingledecker, Electric Power Research Institute**
			Technical Presentation Only: ES2021-69237 - Model Predictive Control Design for Wastewater Purification System Authors: Kyle Anderson - Water and Energy Technology Lab, Chris Hagen - Oregon State University, Bahman Abbasi - Oregon State University	Technical Paper Publication: ES2021-63651 - Resiliency Evaluation of Net-Zero Residential Communities Authors: Jordan Thompson - University of Colorado at Boulder, Moncef Krarti - University of Colorado at Boulder	Technical Paper Publication: ES2021-63912 - A Forward Feedback Control Scheme for a Solar Thermochemical Moving Bed Countercurrent Flow Reactor Authors: Assaad Alsahlani - Purdue University Northwest, Kelvin Randhir - Michigan State University, Nesrin Ozalp - Purdue University Northwest, James Klausner - Michigan State University	Technical Paper Publication: ES2021-63923 - Application Methods for Refractory Insulation in Hot Particle Storage Bins Authors: Jeremy Sment - Sandia National Laboratories, Kevin Albrecht - Sandia National Laboratories, Matthew Lambert - Allied Mineral Products LLC, Clifford K. Ho - Sandia National Laboratories, Murphy Davidson - Allied Mineral Products LLC
			Technical Presentation Only: ES2021-69423 - Thermodynamic and Economic Analysis of a Hybrid Desalination System With Low Brine Rejection Authors: Rodrigo Caceres Gonzalez - Georgia Institute of Technology, Marta C. Hatzell - Georgia Institute of Technology	Technical Paper Publication: ES2021-63903 - The Impact of Covid 19 on Energy Consumption in the United States: An Overview Authors: Hamidreza Najafi - Florida Institute of Technology, Lindsey Kahn - Florida Institute of Technology	Technical Presentation Only: ES2021-69548 - Investigation of Zr-Doped Ceria and Sr-Doped La-Mn Perovskites as Redox Intermediates for Solar Chemical-Looping Reforming of Methane Authors: Caroline Hill - University of Florida, Enrique Hernaiz - University of Florida, Philipp Furler - Synhelion SA, Simon Ackermann - Synhelion SA, Jonathan Scheffe - University of Florida	Technical Presentation Only: ES2021-62754 - Detailed Engineering of a High Performance Molten Salt Tower Receiver System Authors: Miriam Ebert - German Aerospace Center, Cathy Frantz -German Aerospace Center, Matthias Binder - MAN Energy Solutions SE, Martin Muhr - MAN Energy Solutions SE, Andreas Heinrich - MAN Energy Solutions SE, Christian Schuhbauer - MAN Energy Solutions SE, Markus Stetka - MAN Energy Solutions SE, Nadine Kaczmarkiewicz - MAN Energy Solutions SE, Tobias Kunze - Solar-Institute Jülich of FH Aachen, Univ. of Applied Sciences, Bärbel Schlögl-Knothe - German Aerospace Center, Christian Schwager - Solar-Institute Jülich of FH Aachen, Univ. of Applied Sciences, Cristiano Teixeira Boura - Solar-Institute Jülich of FH Aachen, Univ. of Applied Sciences, Jana Stengler - German Aerospace Center, Stefan Eisen - FLEXIM Flexible Industriemesstechnik GmbH, Bernhard Funck - FLEXIM Flexible Industriemesstechnik GmbH, Stefan Schmitz - German Aerospace Center
			Technical Presentation Only: ES2021-71576 - Data Analytics: A Geospatial Mapping and Phenomenological Relationship for Predicting Total Dissolved Solids in Produced Water Authors: A. G. Agwu Nnanna - The University of Texas Permian Basin, Bibian Ogbuji - The University of Texas Permian Basin	Technical Presentation Only: ES2021-69154 - Space Conditioning Entirely by Ambient Sources Across US Climates Authors: M. Keith Sharp - University of Louisville	Technical Presentation Only: ES2021-69884 - Photo-Thermo-Electrochemical Cells for Efficient Solar Fuel and Power Production Authors: Yuzhu Chen - Southern University of Science and Technology, Meng Lin - Southern University of Science and Technology	Technical Presentation Only: ES2021-65167 - Progress Towards a Gen3 Concentrating Solar-Thermal Power Test Facility Authors: Mark Lausten - US Department of Energy (Contractor), Matthew Bauer - US Department of Energy, Levi Irwin - US Department of Energy (Contractor), Shane Powers - US Department of Energy (Contractor), Rajgopal Vijaykumar - US Department of Energy, Andru Prescod - US Department of Energy (Contractor), Avi Shultz - US Department of Energy
				Technical Presentation Only: ES2021-62618 - On the Role of Energy Mitigation Measures to Reduce Energy Demands in the Context of Changing Climate for a Tropical Coastal City Authors: Jorge Gonzalez - City College of New York, Rabindra Pokhrel - City College of New York	Technical Presentation Only: ES2021-70356 - Experimental Validation of Hybrid Wood Gasification in a High-Temperature Solar Spouted Bed Reactor Authors: Axel Curcio - CNRS-PROMES, Sylvain Rodat - CNRS-PROMES, Stéphane Abanades - CNRS-PROMES, Pascal Aubouin - CEA-INES, Valéry Vuillerme - CEA-INES	Technical Presentation Only: ES2021-62834 - Detailed Engineering of a High Storage Density Solar Power Plant for Flexible Energy Systems Authors: Miriam Ebert - German Aerospace Center, Matti Lubkoll - German Aerospace Center, Gabriele Bertoni - Kinetics Technology S.p.A., Annarita Salladini - NEXTCHEM, Lars Amsbeck - HelioHeat, Lucia Alfieri - Barilla, Antoine Guillick - John Cockerill, Manuel Smolders - John Cockerill, Kevin Misse - John Cockerill, Julian Hertel - German Aerospace Center, Deniz Ackura - Tekfen, Thorsten Duermeier - Durmeier, Wladislaw Schewtschenko - Durmeier, Wei Wu - HelioHeat, Sara Costa -Sugimat, Tereza Levova - Quantis, Martina Neises-Von Puttkamer - German Aerospace Center, Reiner Buck - German Aerospace Center, Luca Ruini - Barilla
					Technical Presentation Only: ES2021-70630 - Hydrogen Production From Alternative Feedstocks via Solar Chemical Looping Reforming Authors: Nate Degoede - Valparaiso University, Peter Krenzke - Valparaiso University	
2:20 PM	2:30 PM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
2:30 PM	2:40 PM	0:10	**Break**			
2:40 PM	3:30 PM	0:50	**3-2: Energy Storage for Grid Application**	**12-1: Distributed Energy Systems**	**6-3 Thermochemical Energy Storage and Separation Processes**	**5-5: CSP Optical Characterization and Control**
			Session Chair: Xingchao Wang, Colorado School of Mines	**Session Chair: Wahiba Yaici, Natural Resources Canada Session Co-Chair: Ali Al Alili, Khalifa University**	**Session Chair: Peter Krenzke, Valparaiso University**	**Session Chair: Hany Al-Ansary, King Saud University**

			Technical Paper Publication: ES2021-61729 - Economic Analysis of a Novel Thermal Energy Storage System Using Solid Particles for Grid Electricity Storage Authors: Zhiwen Ma - National Renewable Energy Laboratory, Xingchao Wang - National Renewable Energy Laboratory, Patrick Davenport - National Renewable Energy Laboratory, Janna Martinek - National Renewable Energy Laboratory, Jeffrey Gifford - National Renewable Energy Laboratory	Technical Paper Publication: ES2021-60503 - Optimal Design of Integrated Distributed Energy Systems for Off-Grid Buildings in Different Regions in the United States Authors: Jian Zhang - University of Wisconsin Green Bay, Heejin Cho - Mississippi State University, Pedro Mago - West Virginia University	Technical Presentation Only: ES2021-66363 - Tubular Falling Bed Reactor for Synthesizing a Solid-State Solar Fuel Authors: Kelvin Randhir - Michigan State University, Michael Hayes - Michigan State University, Phillip Schimmels - Michigan State University, Joerg Petrasch - Michigan State University, James Klausner - Michigan State University	Technical Paper Publication: ES2021-60502 - Demonstrating SolarPILOT's Python API Through Heliostat Optimal Aimpoint Strategy Use Case Authors: William Hamilton - National Renewable Energy Laboratory, Michael Wagner - University of Wisconsin - Madison, Alexander J. Zolan - National Renewable Energy Laboratory
			Technical Paper Publication: ES2021-63066 - Terrestrial Heat Repository for Months of Storage (Therms): a Novel Radial Thermocline System Authors: Clifford Ho - Sandia National Laboratories, Walter Gerstle - CSolPower, Athena Christodoulou - CSolPower	Technical Paper Publication: ES2021-62057 - Design and Feasibility Study of Biomass-Driven Combined Heat and Power Systems for Rural Communities Authors: Philippe Schicker - Mississippi State University, Dustin Spayde - Mississippi State University, Heejin Cho - Mississippi State University	Technical Presentation Only: ES2021-67333 - Redox Chemical Looping of Strontium Iron Perovskite Oxide for Oxygen Separation and Nitrogen Production. Authors: Brendan Bulfin - ETH Zurich, Louisa Buttsworth - ETH Zurich, Alon Lidor - ETH Zurich, Aldo Steinfeld - ETH Zurich	Technical Presentation Only: ES2021-70512 - Camera Position Measurement Sensitivity for CSP Optical Characterization Software Authors: Devon Kesseli - National Renewable Energy Laboratory, Guangdong Zhu - National Renewable Energy Laboratory
			Technical Paper Publication: ES2021-63930 - Simulation of an Roc-Based Thermal Energy Storage System in Charge and Discharge Cycles. Authors: Reza Baghaei Lakeh - California State Polytechnic University, Rozina Nalbandian - California State Polytechnic University, Justin Lee - California State Polytechnic University, Ulyses Aguirre - California State Polytechnic University, Karen Girgis - California State Polytechnic University, Benjamin Kong - California State Polytechnic University, Adrian Victorio - California State Polytechnic University	Technical Paper Publication: ES2021-62464 - Dynamic Simulation of Organic Rankine Cycle-Assisted Ground-Source Heat Pump Based Micro-Cogeneration System in Cold Climates: A Case Study in Canada Authors: Wahiba Yaici - Natural Resources Canada/CanmetENERGY, Evgueniy Entchev - Natural Resources Canada/CanmetENERGY, Michela Longo - Politecnico di Milano/Department of Energy	Technical Presentation Only: ES2021-69301 - Design, Modeling, and Operation of Reactors for Solar Thermochemical Air Separation and Ammonia Production Authors: H. Evan Bush - Sandia National Labs, Matthew Kury - Sandia National Labs, Kevin Albrecht - Sandia National Labs, Andrea Ambrosini - Sandia National Labs	Technical Presentation Only: ES2021-70730 - A Non-Intrusive Optical (Nio) Approach to Characterize In-Situ Optical Performance of Heliostats: Progress on UAS Flight Path Generation Authors: Tucker Farrell - National Renewable Energy Laboratory, Rebecca Mitchell - National Renewable Energy Laboratory, Guangdong Zhu - National Renewable Energy Laboratory
			Technical Paper Publication: ES2021-63938 - Effect of Phase Change and Buoyancy-Driven Flows on Charge and Discharge of an Roc-Based Thermal Energy Storage System Authors: Reza Baghaei Lakeh - California State Polytechnic University, Justin Andrew Lee - California State Polytechnic University, Christopher Salerno - California State Polytechnic University, Karen Girgis - California State Polytechnic University, Ulyses Aguirre - California State Polytechnic University	Technical Paper Publication: ES2021-63257 - Least Cost Microgrid Resource Planning for the Natural Energy Laboratory of Hawaii Authority Research Park Authors: Alexander Headley - University of Memphis, Benjamin Schenkman - Sandia National Laboratories, Laurence Sombardier - Natural Energy Laboratory of the Hawaii Authority, Keith Olson - Natural Energy Laboratory of the Hawaii Authority	Technical Presentation Only: ES2021-69348 - Experimental Evaluation of a Solar Carbonation–calcination Reactor Under Simulated High-Flux Solar Irradiation Authors: Lifeng Li - The Australian National University, Bo Wang - The Australian National University, Roelof Pottas - The Australian National University, Mahdiar Taheri - The Australian National University, Mustafa Habib - The Australian National University, Wojciech Lipinski - The Australian National University	Technical Presentation Only: ES2021-70801 - A Non-Intrusive Optical (Nio) Approach to Characterize In-Situ Optical Performance of Heliostats: Progress on 2d Slope Error Calculations With Synthetic Image Data Authors: Rebecca Mitchell - National Renewable Energy Laboratory, Guangdong Zhu - National Renewable Energy Laboratory
			Technical Presentation Only: ES2021-70351 - Dispatch Optimization of a Grid-Scale, Stand-Alone Electric Thermal Energy Storage System Authors: William Hamilton - National Renewable Energy Laboratory, Ty Neises - National Renewable Energy Laboratory, Joshua Mctigue - National Renewable Energy Laboratory	Technical Paper Publication: ES2021-63553 - Study on Operation Scheduling Optimization of Integrated-Energy System in an Industrial Park With Consideration of Heat Storage Authors: Shuting Zhang - Zhejiang University, Xiaojie Lin - Zhejiang University, Wei Zhong - Zhejiang University, Sibin Liu - Zhejiang University		
3:30 PM	3:40 PM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
3:40 PM	3:50 PM	0:10	**Break**			
3:50 PM	4:40 PM	0:50	**16-1: Emerging and Hybrid Technologies I**	**11-2: Assessment and Treatment of Biofuel, Biomass and Wastes**	**10-1: Electrochemical Energy Conversion and Storage**	**5-6: Particulate Media Characterization**
			Session Chair: Jen King, National Renewable Energy Laboratory	**Session Chair: Han Hu, University of Arkansas - Fayetteville**	**Session Chair: Jun Xu, University of North Carolina at Charlotte**	**Session Chair: Cathy Frantz, German Aerospace Center**
			Technical Paper Publication: ES2021-63383 - Performance of Bio-Inspired Oscillating Hydrofoil Turbine; a Computational Fluid Dynamics Study Authors: Sameer Osman - Egypt-Japan University of Science and Technology, Esraa Mansour - Egypt-Japan University of Science and Technology	Technical Paper Publication: ES2021-60484 - Evaluation of the Influence of 1,4-Dioxane and Exhaust Gas Recirculation on the Performance and Emission Values of a Diesel Engine Fuelled With Low Viscous Biofuel Blend Authors: Mebin Samuel Panithasan - Indian Institute of Technology Kanpur, Gnanamoothi Venkadesan - University College of Engineering Villupuram	Technical Paper Publication: ES2021-63582 - Performance of Two-Dimensional Functionally Graded Anode Supported Solid-Oxide Fuel Cells Authors: Mahmoud Ahmed - Assiut University, Sameer Osman - Egypt-Japan University of Science and Technology (EJUST), Khaled Ahmed - King Abdulaziz University	Technical Presentation Only: ES2021-68379 - Experimental Determination of Radiative Properties of Ceramic Particles Authors: James Abraham - University of Michigan, Mike Mayer - University of Michigan, Rohini Bala Chandran - University of Michigan
			Technical Paper Publication: ES2021-63425 - A Dispatch Optimization Model for Hybrid Renewable and Battery Systems Incorporating a Battery Degradation Model Authors: Sahana Updahya - University of Wisconsin-Madison, Michael Wagner - University of Wisconsin-Madison	Technical Paper Publication: ES2021-63768 - Waste-to-Energy Technology Suitability Assessment for the Treatment and Disposal of Medical, Industrial, and Electronic Residual Wastes in Metropolitan Manila, Philippines Authors: Reynald Ferdinand Manegdeg, University of the Philippines Diliman, Analiza Rollon, University of the Philippines Diliman, Florencio Jr. Ballesteros, University of the Philippines Diliman, Eduardo Jr. Magdaluyo, University of the Philippines Diliman, Louernie De Sales-Papa, University of the Philippines Diliman, Emma Macapinlac, University of the Philippines Diliman, Roderaid Ibañez, University of the Philippines Diliman, Rinlee Butch Cervera, University of the Philippines Diliman, Eligia Clemente, University of the Philippines Diliman	Technical Presentation Only: ES2021-65055 - Coupled Mechanical-Electrochemical Phase-Field Model for Crack Propagation and Li Dendrite Growth in Solid State Battery Authors: Chunhao Yuan - University of North Carolina at Charlotte, Jun Xu - University of North Carolina at Charlotte	Technical Presentation Only: ES2021-68703 - High Temperature Diffuse Reflectance Measurements for Particulate Media Authors: Mike Mayer - University of Michigan, James Abraham - University of Michigan, Rohini Bala Chandran - University of Michigan
			Technical Paper Publication: ES2021-63914 - Performance Study of Thermoelectric Power Generators at Different Geometrical Configurations Authors: Mohamed Elsabahy - Egypt-Japan University for Science and Technology(E-JUST), Ramy Rabie - Egypt-Japan University for Science and Technology(E-JUST), Mahmoud Ahmed - Assiut University	Technical Presentation Only: ES2021-67494 - Environmental Impacts of Power Generation From Biomass Residue in a Rural Community Authors: Veera Gnaneswar Gude - Mississippi State University, Hariteja Nandimandalam - Mississippi State University, Mohammad Marufuzzaman - Mississippi State University	Technical Presentation Only: ES2021-69255 - Detecting "Real" End-of-Life of Spent EV Lithium-Ion Battery for Second-Life Applications Authors: Zoran Milojevic - Newcastle University, Pierrot Attidekou - Newcastle University, Simon Lambert - Newcastle University, Prodip Das - Newcastle University	Technical Presentation Only: ES2021-69342 - Radiative Transfer Modeling in a High Temperature Packed Bed With Experimentally Determined Single-Particle Scattering Phase Function Authors: Shin Young Jeong - Georgia Institute of Technology, Chuyang Chen - Georgia Institute of Technology, Malavika Bagepalli - Georgia Institute of Technology, Joshua Brooks - Georgia Institute of Technology, Devesh Ranjan - Georgia Institute of Technology, Peter Loutzenhiser - Georgia Institute of Technology, Zhuomin Zhang - Georgia Institute of Technology

			Technical Presentation Only: ES2021-74438 - Solar Irradiance Measurement at High Altitudes Using Pyranometers and Weather Balloons Authors: Yun Liu - Purdue University Northwest, Michael Jerde - Purdue University Northwest			Technical Presentation Only: ES2021-72498 - Granular Flow Experiments and Modeling at Elevated Temperatures Coupled With Measured Properties for Solar Thermal Energy Storage Authors: Malavika Bagepalli - Georgia Institute of Technology, Shin Young Jeong - Georgia Institute of Technology, Justin Yarrington - Georgia Institute of Technology, Joshua Brooks - Georgia Institute of Technology, Zhuomin Zhang - Georgia Institute of Technology, Devesh Ranjan - Georgia Institute of Technology, Peter Loutzenhiser - Georgia Institute of Technology
						Technical Presentation Only: ES2021-72506 - The Effect of Particle Mixture and Multiple Scattering on the Radiative Properties of Particle Beds Authors: Chuyang Chen - Georgia Institute of Technology, Joshua Brooks - Georgia Institute of Technology, Peter Loutzenhiser - Georgia Institute of Technology, Devesh Ranjan - Georgia Institute of Technology, Zhuomin Zhang - Georgia Institute of Technology
4:40 PM	4:50 PM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
4:50 PM	5:00 PM	0:10	**Break**			
5:00 PM	5:05 PM	0:05	**Room 1: Conference Networking - Introduction by Heejin Cho and Nesrin Ozalp**			
5:05 PM	5:15 PM	0:10	**Breakout Rooms Open & Attendees Move to their Selected Rooms by 5:15 PM**			
5:15 PM	5:45 PM	0:30	**Room 1 - Moderator: Heejin Cho Topic: Getting Involved in ASME Advanced Energy System Division Committee Activities**	**Room 2 - Moderator: Nesrin Ozalp Topic: Audience Feedback, Volunteering and ES2022-Suggestions?**	**Room 3 - Moderator: Justin Lapp Topic: Advancement and Research Trend of CSP**	
Start	**End**	**Duration**	**DAY 3 - FRIDAY, JUNE 18**			
10:15 AM	11:05 AM	0:50	**1-3: Nexus: Energy, Water and Climate 2**	**2-4: Advanced HVAC Equipment & Systems**	**9-1: Solar Desalination and Industrial Process Heat**	**5-7: Receiver and Reactor Development**
			Session Chair: Yang Chen, Oak Ridge National Laboratory Session Co-Chairs: Pei Dong, George Mason University; Jian Zhang, University of Wisconsin-Green Bay	**Session Chair: Weimin Wang, University of North Carolina at Charlotte**	**Session Chair: Parthiv Kurup, National Renewable Energy Laboratory**	**Session Chair: Rohini Bala Chandran, University of Michigan**
			Technical Paper Publication: ES2021-63958 - A Semi-Empirical Water and Energy Analysis of Industrial Production of Nickel From Mineral Ores: Comparative Analysis Between Two Different Technologies of Calcination Authors: Janneth Ruiz - Cerromatoso S.A (South 32), Antonio Ardila - Cerromatoso S.A (South 32), Bernardo Rueda - Cerromatoso S.A (South 32), Jorge Echeverry - Universidad del Norte, Daniel Quintero - Universidad del Norte, Arturo Gonzalez - Universidad del Norte, Lesme Corredor - Universidad del Norte	Technical Paper Publication: ES2021-63776 - Design and Development of an Experimental Apparatus for Hardware-in-Loop Testing of Solar Assisted Heat Pump Systems Authors: George Benzion van Arnold - University of North Carolina at Charlotte, Weimin Wang - University of North Carolina at Charlotte	Technical Paper Publication: ES2021-62308 - Comparison of the Performance of a Solar Thermal Absorption Chiller and a Novel Sub Wet-Bulb Evaporative Chiller for Cooling Processes in Food Manufacturing Authors: Emily Fricke - University of California-Davis, Vinod Narayanan - University of California-Davis	Technical Paper Publication: ES2021-62902 - Design Development, Testing, and Optimization of a 6.5 Mw-Thermal All-Refractory Particle Heating Receiver Authors: Ryan Yeung - Georgia Institute of Technology, Sheldon Jeter - Georgia Institute of Technology, Muhammad Sarfraz - Georgia Institute of Technology, Kenzo Repole - Georgia Institute of Technology, Hany Al-Ansary - King Saud University, Shaker Alaqel - King Saud University, Abdelrahman El-Leathy - King Saud University, Abdulelah Alswaiyd - King Saud University
			Technical Presentation Only: ES2021- 64971 - Power Outages Prediction Using Weather and Night-Light Satellite Data Authors: Jorge Gonzalez - City College of New York, Juan Pablo Montoya-Rincon - City College of New York	Technical Paper Publication: ES2021-63980 - A Numerical Investigation of Thermal Comfort for Thermoelectric-Based Cooling Systems Authors: Hamidreza Najafi - Florida Institute of Technology, Mohadeseh Seyednezhad - Florida Institute of Technology	Technical Paper Publication: ES2021-63359 - Experimental Study on a Passive Solar Desalination Unit Associated With Fresnel Lens and Thermal Storage Authors: Jun Yan Tan - Universiti Tunku Abdul Rahman (UTAR) Sungai Long, Jun Wei Ding - Universiti Tunku Abdul Rahman (UTAR) Sungai Long, Zhi Yong Ho - Universiti Tunku Abdul Rahman (UTAR) Sungai Long, Rubina Bahar - Universiti Tunku Abdul Rahman (UTAR) Sungai Long	Technical Paper Publication: ES2021-63763 - Image Analysis of Particle Flow in Centrifugal Solar Particle Receiver Authors: Serdar Hicdurmaz - Institute of Solar Research German Aerospace Center (DLR), Reiner Buck - Institute of Solar Research German Aerospace Center (DLR), Bernhard Hoffschmidt - Institute of Solar Research German Aerospace Center (DLR)
			Technical Presentation Only: ES2021- 62358 - Thermo-Economic Analyses of Net Water-Producing Solid Oxide Fuel Cell-Gas Turbine Hybrid Systems Authors: Fabian Rosner - University of California, Irvine, Scott Samuelsen - University of California, Irvine	Technical Presentation Only: ES2021-68893 - A Novel Tankless Adsorption Heat Pump Water Heater Authors: Darshan Pahinkar - Florida Institute of Technology, Nitish Chauhan - Florida Institute of Technology, Anurag Goyal - National Renewable Energy Laboratory	Technical Paper Publication: ES2021-63858 - Enhancement the Solar Still Performance Using Chimney Exhaust Gasses Authors: Hamdy Hassan - Egypt-Japan University of Science and Technology (E-JUST)	Technical Presentation Only: ES2021-62212 - Predicting the Annual Thermal Performance of Next-Generation Falling Particle Receivers Subject to Wind Authors: Brantley Mills - Sandia National Laboratories, Reid Shaeffer - Sandia National Laboratories, Clifford Ho - Sandia National Laboratories
					Technical Presentation Only: ES2021-69173 - Concentrating Solar Thermal Desalination: An Approach of Utilizing High-Exergy Solar Radiation for Water Production Authors: Yanjie Zheng - Vanderbilt University, Rodrigo Caceres Gonzalez - Georgia Institute of Technology, Marta Hatzell - Georgia Institute of Technology, Kelsey Hatzell - Vanderbilt University	Technical Presentation Only: ES2021-63552 - Test Setup for the Experimental Evaluation of the Convective Heat Transfer for Nitrate Salt in Tubular Solar Receivers Authors: Cathy Frantz - German Aerospace Center (DLR), Reiner Buck- German Aerospace Center (DLR), Marc Röger - German Aerospace Center (DLR), Jana Stengler - German Aerospace Center (DLR)
					Technical Presentation Only: ES2021-70780 - Methods of Recycling Produced Water Using Enhanced Evaporation Authors: Gabriel Leal - University of Texas Permian Basin, Christian Castillo - University of Texas Permian Basin, Bibian Ogbuji - University of Texas Permian Basin, George Nnanna - University of Texas Permian Basin	Technical Presentation Only: ES2021-63668 - Impact of Spatial and Temporal Non-Uniformity in Heat Flux on the Performance of a Micro-Pin-Array Solar Receiver Authors: Raymond Odele - University of California Davis, Vinod Narayanan - University of California Davis
11:05 AM	11:15 AM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
11:15 AM	11:25 AM	0:10	**Break**			
11:25 AM	12:15 PM	0:50	**Room 1: Plenary 2 - Dr. Roderick Jackson, National Renewable Energy Laboratory - Introduction by Heejin Cho Building A Just Transition to a Sustainable Energy Future**			
12:15 PM	12:25 PM	0:10	**Q&A**			
12:25 PM	12:35 PM	0:10	**Break**			
12:35 PM	1:25 PM	0:50	**3-3: Building Energy Storage**	**15-1: Geothermal Energy**	**16-2: Emerging and Hybrid Technologies II**	**5-8: Receiver Characterization and Control**

			Session Chair: Wale Odukomaiya, National Renewable Energy Laboratory	Session Chair: Amanda Kolker, National Renewable Energy Laboratory	Session Chair: Jen King, National Renewable Energy Laboratory	Session Chair: Jeremy Sment, Sandia National Laboratories
			Technical Paper Publication: ES2021-60517 - Heat Based Power Augmentation for Modular Pumped Hydro Storage in Smart Buildings Operation Authors: Yang Chen - Oak Ridge National Laboratory, Ahmad Abu-Heiba - Oak Ridge National Laboratory, Saiid Kassaee - University of Tennessee, Knoxville, Chenang Liu - Oklahoma State University, Guodong Liu - Oak Ridge National Laboratory, Michael Starke - Oak Ridge National Laboratory, Brennan Smith - Oak Ridge National Laboratory, Ayyoub Momen - Oak Ridge National Laboratory	Technical Paper Publication: ES2021-60659 - A 3-Dimensional Numerical Thermal Analysis for the Configuration Effect of a Single and Double U-Tube on the Borehole Performance Authors: A. H. Tarrad - University of Lorraine	Technical Paper Publication: ES2021-63836 - Simulation of a Wet-Surface Bare Rod Heat Exchanger Authors: Abdul Raheem Shaik - Khalifa University, Ali Al-Alili - Khalifa University, Saeed Alhassan - Khalifa University	Technical Paper Publication: ES2021-62319 - Receiver Outlet Temperature Controller for Falling Particle Receiver Applications Authors: Nathan Schroeder - Sandia National Labs, Hendrik Laubscher - Sandia National Labs, Clifford Ho - Sandia National Labs, Brantley Mills - Sandia National Labs
			Technical Presentation Only: ES2021-63449 - Physical Model of Underground Thermal Energy Storage Efficiency Authors: Anders Carlsson - Washington University	Technical Paper Publication: ES2021-64051 - Performance Considerations for Ground Source Heat Pumps in Cold Climates Authors: Robbin Garber-Slaght - National Renewable Energy Laboratory	Technical Paper Publication: ES2021-63934 - Investigations of Lab-Scale, Heat Exchanger Prototypes Designed to Provide Refugia for Trout Authors: Rajib Uddin Rony - North Dakota State University, Adam Gladen - North Dakota State University, Sarah Lavallie - North Dakota State University, Jeremy Kientz - South Dakota Game, Fish, and Parks	Technical Paper Publication: ES2021-63336 - Particle Plume Velocities Extracted From High-Speed Thermograms Through Particle Image Velocimetry Authors: Jesus Ortega - University of New Mexico, Guillermo Anaya - University of New Mexico, Peter Vorobieff - University of New Mexico, Clifford Ho - Sandia National Labs, Gowtham Mohan - University of New Mexico
			Technical Presentation Only: ES2021-69387 - Development of a Shape-Stabilized Phase Change Material Utilizing Natural Materials and Industrial Byproducts for Thermal Energy Storage in Buildings Authors: Md. Hasan Zahir - King Fahd University of Petroleum and Minerals, Khaled Own Mohaisen - King Fahd University of Petroleum and Minerals	Technical Paper Publication: ES2021-65121 - Cost and Technical Profiling of Geothermal District Heating Using Geophires and Comsof Heat Simulation Software Authors: Nicholas Fry - Reykjavik University and Iceland School of Energy		Technical Paper Publication: ES2021-63466 - Near-Field and Far-Field Sampling of Aerosol Plumes to Evaluate Particulate Emission Rates From a Falling Particle Receiver During On-Sun Testing Authors: Andrew Glen - Sandia National Laboratories, Andres Sanchez - Sandia National Laboratories, Darielle Dexheimer - Sandia National Laboratories, Clifford Ho - Sandia National Laboratories, Swarup China - Pacific Northwest National Laboratories, Fan Mei - Pacific Northwest National Laboratories, Nurun Nahar Lata - Michigan Technological University
				Technical Presentation Only: ES2021-63432 - Geothermal Operational Optimization With Machine Learning (GOOML) Authors: Grant Buster - National Renewable Energy Laboratory, Nicole Taverna - National Renewable Energy Laboratory, Michael Rossol - National Renewable Energy Laboratory, Jay Huggins - National Renewable Energy Laboratory, Jon Weers - National Renewable Energy Laboratory, Paul Siratovich - Upflow, Andrea Blair - Upflow		Technical Paper Publication: ES2021-63791 - A Non-Intrusive Particle Temperature Measurement Methodology Using Thermogram and Visible-Light Image Sets Authors: Jesus Ortega - University of New Mexico, Clifford Ho - Sandia National Labs, Guillermo Anaya - University of New Mexico, Peter Vorobieff - University of New Mexico, Gowtham Mohan - University of New Mexico
				Technical Presentation Only: {ES2021-69200} - Optimization of a Sparger Head for Airlift Pumping of Downhole Geothermal Fluids Authors: Terence Musho - West Virginia University, Daniel Hand - Sustainable Engineering LLC, Roy Mink - Mink GeoHydro Inc, Nigel Clark - West Virginia University		Technical Paper Publication: ES2021-63810 - A Flexible Thermal Model for Solar Cavity Receivers Using Analytical View Factors Authors: Michael Wagner - University of Wisconsin-Madison, Jacob Kerkhoff - University of Wisconsin-Madison
1:25 PM	1:35 PM	0:10	ROOM 1 Q&A		ROOM 3 Q&A	ROOM 4 Q&A
1:35 PM	1:45 PM	0:10	Break			
1:45 PM	2:35 PM	0:50	3-4: General Energy Storage	5-9: CSP Energy Storage and Heat Exchange		
			Session Chair: Abhishek Singh, University of Twente, Netherlands	Session Chair: Todd Otanicar, Boise State University		
			Technical Paper Publication: ES2021-63490 - Heat Transfer Modeling in a Counter-Current Moving-Bed Tubular Reactor for High-Temperature Thermochemical Energy Storage Authors: Wei Huang - Mississippi State University, Eric Million - Mississippi State University, Kelvin Randhir - Michigan State University, Joerg Petrasch - Michigan State University, James Klausner - Michigan State University, Nick Auyeung - Oregon State University, Like Li - Mississippi State University	Technical Paper Publication: ES2021-62746 - Assessment of Packing Structures for Gas-Particle Trickle Flow Heat Exchanger for High Temperature Application in CSP Plants Authors: Markus Reichart - German Aerospace Center - Institute of Solar Research, Martina Neises-Von Puttkamer - German Aerospace Center - Institute of Solar Research, Reiner Buck - German Aerospace Center - Institute of Solar Research, Robert Pitz-Paal - German Aerospace Center - Institute of Solar Research		
			Technical Paper Publication: ES2021-63832 - Experimental Investigation of Latent Heat Thermal Energy Storage System Enhanced by Annular and Radial Fins Authors: Addison Hockins - Gannon University, Samantha Moretti - Gannon University, Saeed Tiari - Gannon University	Technical Paper Publication: ES2021-63435 - Thermal-Economic Optimization of Moving Packed Bed Particle-to-Sco2 Heat Exchanger Using Particle Swarm Optimization Authors: Yanjie Zheng - Vanderbilt University, Kelsey B. Hatzell - Vanderbilt University		
			Technical Presentation Only: ES2021-63258 - Design and Development of a Prototype Fluid Bed Heat Exchanger for Discharging Power Generation Authors: Xingchao Wang - Colorado School of Mines and National Renewable Energy Laboratory, Patrick Davenport - National Renewable Energy Laboratory, Jeffrey Gifford - Colorado School of Mines and National Renewable Energy Laboratory, Jacob Wrubel - National Renewable Energy Laboratory, Ruichong Zhang - Colorado School of Mines, Zhiwen Ma - National Renewable Energy Laboratory	Technical Paper Publication: ES2021-64050 - Development and Testing of a 20 kwth Moving Packed-Bed Particle-to-Sco2 Heat Exchanger and Test Facility Authors: Kevin Albrecht - Sandia National Laboratories, Hendrik Laubscher - Sandia National Laboratories, Matthew Carlson - Sandia National Laboratories, Clifford Ho - Sandia National Laboratories		

				Technical Presentation Only: ES2021-70411 - Development of a Prototype 40 kwth Counterflow Particle-Supercritical Carbon Dioxide Fluidized Bed Heat Exchanger for Concentrating Solar Energy Driven Brayton Power Cycles With Particle-Based Thermal Energy Storage Authors: Jesse Fosheim - Colorado School of Mines, Winfred Arthur-Arhin - Colorado School of Mines, Azariah Thompson - Colorado School of Mines, Gregory Jackson - Colorado School of Mines		
2:35 PM	2:45 PM	0:10	**ROOM 1 Q&A**	**ROOM 2 Q&A**	**ROOM 3 Q&A**	**ROOM 4 Q&A**
2:45 PM	2:55 PM	0:10	**Break**			
2:55 PM	3:30 PM	0:35	**Room 1: ES Awards - Moderators: Heejin Cho and Nesrin Ozalp**			