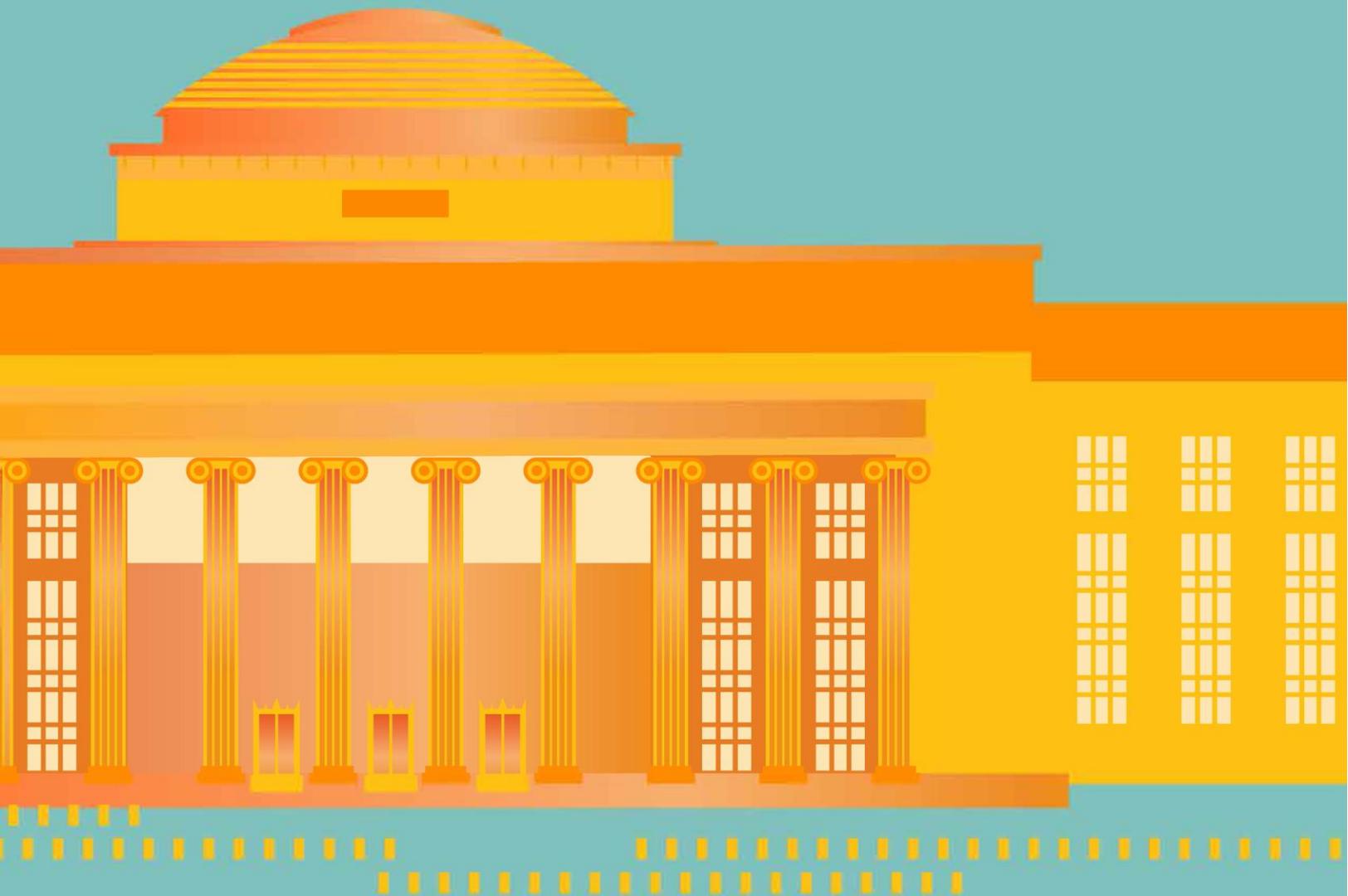


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International Conference on Applied Energy

Applied Energy Symposium **MIT A+B 2020**

Co-organized with Harvard
AUG 13 - 14, 2020 · MIT, Boston, USA



Welcome



Welcome to the Applied Energy Symposium: MIT A+B.

The IPCC report “Global Warming of 1.5°C” (Oct. 2018) issued a dire warning that unless CO₂ emissions are halved by 2030, devastating changes, which will be sooner than expected and irreversible, will occur in oceans and on land. Time is running out for transitioning to new energy systems globally. Logic and numbers show that the world must take a two-step approach: (A) deploy existing, industrially proven technologies, namely solar, wind and nuclear base load at an unprecedented scale and pace, from now to 2050 -- when a house catches fire, firemen must run to the closest hydrants and stop disputing which water stream would be purer; and (B) develop new concepts and technologies that may replace the dirtier parts of (A) post-2050, at terawatt scale.

The Applied Energy Symposium: MIT “A+B” (MITAB) is dedicated to the accelerated deployment of (A), and new concepts and emerging technologies for (B). For (A), reducing capital and operating costs, managing social dynamics, and minimizing environmental impact while maintaining extreme productivity are key; automation, artificial intelligence, social mobilization, governmental actions and international coordination will provide essential boosts. For (B), we seek new concepts and emerging technologies (e.g. fusion power engineering, superconducting transmission, etc.) that stand a chance to scale to terawatts after 30 years, i.e. “baby technologies” can grow to adulthood in 20-30 years. The AEAB2019 is organized by Massachusetts Institute of Technology, Harvard University, and Applied Energy Innovation Institute (AEii).

We look forward to meeting you online.

Chairs of MITAB2020

Prof. Ju Li
Massachusetts Institute of Technology

Prof. Michael J. Aziz
Harvard University

Prof. Jerry Yan
Editor-in-chief of Applied Energy

- **Welcome to MIT A+B 2020**
- **Committees**
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- **Interview Session**
- **Oral Presentations**
- **Poster Presentations**

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**RESEARCH &
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International Conference on Applied Energy

Program at a Glance

Day 1: August 13, 2020 (Boston Time)	
8:00 -8:10	Chair Welcome
8:10-8:20	Opening Remarks
8:20-9:10	Stable Salt Reactors – A New Platform Technology in Nuclear Fission
9:10-10:00	Nanoscale Design for High Energy Batteries
10:00-10:25	Coffee/Tea Break
10:25-11:15	The Green Energy Revolution is Finally Here
11:15-12:05	Energy Transformations to Meet the Climate Challenge: Advice from the National Academies
12:05-13:10	Lunch Break
13:10-15:10	Energy Policy Session
15:10-15:35	Coffee/Tea Break
15:35-17:35	Renewable Electricity Generation and Smart Grids Session
17:35-18:30	Dinner Break
18:30-20:30	Innovation Session
Day 2: August 14, 2020 (Boston Time)	
8:00-10:00	Carbon Capture, Utilization, Storage Session
10:00-10:25	Coffee/Tea Break
10:25-12:25	Oil and Gas Decarbonization Session
12:25-13:10	Lunch Break
13:10-15:10	Energy Storage Session
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Pre-recorded 6 Oral Sessions and 2 E-Poster Tracks	
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Opening Remarks and Plenary Keynotes



Prof. Robert Armstrong
Director, MIT Energy
Initiative
Massachusetts Institute
of Technology

[Opening Remarks](#)

8:10-8:20, August 13

Robert C. Armstrong is MITEI's director and the Chevron Professor of Chemical Engineering. A member of the MIT faculty since 1973, Armstrong served as head of the Department of Chemical Engineering from 1996 to 2007 and has directed MITEI since 2013, after serving as the organization's deputy director from 2007-2013 with founding director Ernest Moniz. His research is focused on pathways to a low-carbon energy future.

Armstrong has been elected into the American Academy of Arts and Sciences (2020) and the National Academy of Engineering (2008). He received the 2006 Bingham Medal from the Society of Rheology, which is devoted to the study of the science of deformation and flow of matter, and the Warren K. Lewis Award and the Professional Progress Award in 1992, both from the American Institute of Chemical Engineers.

Armstrong was a member of MIT's Future of Natural Gas and Future of Solar Energy study groups. He advised the teams that developed MITEI's most recent reports, *The Future of Nuclear Energy in a Carbon-Constrained World* (2018) and *Insights into Future Mobility* (2019), and is co-chairing the new MITEI study, *The Future of Storage*. He co-edited *Game Changers: Energy on the Move* with former U.S. Secretary of State George P. Shultz.



Dr. Ian Scott
CEO
Moltex Energy

[Stable Salt Reactors - A New Platform Technology in Nuclear Fission](#)

8:20-9:10, August 13

Stable Salt Reactors (SSR's) are a new platform technology in nuclear fission. They are based on the globally patented breakthrough in understanding that nuclear reactors could gain all the enormous intrinsic safety and cost benefits of using molten salt fuel by simply putting that molten fuel into essentially conventional fixed fuel assemblies. This eliminates at a stroke the new hazards, and hence costs, of having to pump that intensely radioactive fuel around a chemical engineering plant that would be extraordinarily challenging to maintain and which would require a certainty of not leaking never achieved before in such a plant.

The first reactor to be developed within this platform is the SSR-W where the W stands for wasteburner. It is a fast spectrum reactor fueled with a mixture of higher actinides extracted from spent conventional nuclear fuel. Very low purity of those higher actinides is acceptable in the SSR-W fuel, indeed it is preferred for non-proliferation reasons. As a result, a radically simpler process for extracting those actinides from spent fuel can be used. This process (WATTS, Waste To Stable Salts) has been patented and is now under development in Canada in conjunction with Canadian Nuclear Laboratories.

The "First of a Kind" SSR-W, a 300MWe single unit, is being developed in conjunction with New Brunswick Power in Canada with the intention of deployment at the Point Lepreau reactor site before the end of the decade. Canada would then become the center of the global export market for this reactor. The design is part way through the Canadian Nuclear Safety Commission's Vendor Design Review. This early regulatory engagement has been of great value in identifying and, to the extent possible, eliminating design factors that might slow the licensing of the reactor. New details of the design following this regulatory engagement will be shared during this talk.

Opening Remarks and Plenary Keynotes



Prof. Yi Cui

Stanford University

[Nanoscale Design for High Energy Batteries](#)

9:10-10:00, August 13

The demand from portable electronics and electric vehicles call for high energy batteries beyond the current lithium ion batteries. Here I will present our recent progress on materials and interfacial design to enable much high energy density batteries, which include 1) High capacity Si anodes with success in commercialization; 2) Li metal anodes: host and interface design to over the lithium metal dendrite formation and interfacial instability; 3) Sulfur as an earth abundant material for high capacity cathodes; 4) Our pioneering development of cryogenic electron microscopy for understanding the battery materials and solid-electrolyte interphase down to atomic scale resolution.



Prof. Daniel Kammen

University of California,
Berkeley

[The Green Energy Revolution is Finally Here](#)

10:25-11:15, August 13

COVID-19 has altered energy consumption patterns worldwide, and highlighted both inequality and systemic racism, including in the energy field.

A clean energy research and deployment agenda can greatly facilitate the movement to a just and inclusive society. In this work I highlight both theoretical and implementation strategies that are built around key synergies between clean energy and water, and social justice. This nexus opens important new avenues for use-inspired basic and applied research.

In this paper we draw on research in the U.S., and from East Africa and Southeast Asia, where the majority of the roughly 800 million people without electricity access live today. In the United States, California, New Mexico, and New York (over 40% of national GDP) have committed to a 100% renewable energy future (by ~ 2045). Overseas an increasing number of nations and subnational regions have committed to this goal.

In exploring the synergies between a green economy and social equity, we find that it is either impossible, or far more difficult and costlier, to design, socialize, and implement the needed energy transition to meet climate goals without making equity a co-equal goal. We draw on cases ranging from solar energy and electric vehicle deployment in low-income communities, to promoting social justice and economic opportunities for women and oppressed minority groups through distributed clean-energy powered mini-grids, to the integration of climate friendly housing and transportation policies. This work provides strong evidence of the economic benefits of integrated design of infrastructure and policy around the co-benefits of between social and environmental goals.

Opening Remarks and Plenary Keynotes



Dr. Marcia McNutt
President
The U.S. National
Academy of Sciences

[Energy Transformations to Meet the Climate Challenge: Advice from the National Academies](#)

11:15-12:05, August 13

For decades, scientists have understood that the key to maintaining a stable climate for Earth is to reduce, if not eliminate, fossil fuel emissions from the energy sector. Some fraction of emissions reductions (~30%) can already be achieved with existing technology – the “low-hanging fruit.” Another 50% of emissions reductions can be accomplished with known solutions, but will require much more effort. The fact that such solutions are not yet widely deployed presents interesting questions for social scientists, including economists, political scientists, and behaviorists. A complete solution to the last 20% of the emissions problem will require overcoming significant challenges, but there are some game-changers on the horizon that can meet our current demands.

Moderators



Prof. Ju Li
Massachusetts Institute of Technology



Prof. Michael J. Aziz
Harvard University

Topic Session

Energy Policy

13:10-15:10, August 13



Dr. Lourdes Melgar

Massachusetts Institute of Technology

[*The Missing Link to Accelerate Energy Transition: building socio-political support in the era of post-truth*](#)



Prof. Robert Lowe

University College London

[*Lost Generation: System Resilience and Flexibility*](#)



Dr. Rachel Meidl

Rice University

[*Circular Economy, Waste Management, and the Energy Transition: Policies and Practices to Enable Sustainability and Circularity*](#)



Moderator

Prof. Sarah Marie Jordaan

Johns Hopkins University

Renewable Electricity Generation and Smart Grids

15:35-17:35, August 13



Prof. Lambertus Hesselink

Stanford University

[*Dispatchable Solar and Wind Power Without Batteries*](#)



Prof. David Laverty

Queen's University Belfast

[*Open Source Measurement Technologies for Electrical Distribution Networks*](#)



Prof. Magnus Korpås

Norwegian University of Science and Technology

[*How Costs are Recovered in Electricity Markets with Wind, Solar and Storage Plants: An Analytical Approach*](#)



Moderator

Dr. Audun Botterud

Massachusetts Institute of Technology

Topic Session

Innovation

18:30-20:30, August 13



Prof. Z. Jason Ren

Princeton University

[Using Low-Cost Renewable Energy for Carbon Valorization](#)



Prof. Melanie Tetreault-Friend

McGill University

[CSPonD: Demonstration of a 25 kW dispatchable solar power system](#)



Prof. Jinhui Li

Tsinghua University

[Selective Recovery of Lithium from a Spent Lithium-ion Battery by Mechanochemical Induced Solid-phase Oxidation](#)



Moderator

Dr. Emre Gencer

Massachusetts Institute of Technology

Carbon Capture, Utilization, Storage

8:00-10:00 am, August 14



Dr. Sergey Paltsev

Massachusetts Institute of Technology

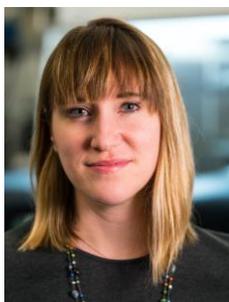
[Hard-to-Abate Sectors: The role of industrial carbon capture and storage \(CCS\) in emission mitigation](#)



Prof. Christian Lastoskie

University of Michigan

[Decarbonizing Freight Transport: Mobile Carbon Capture from Heavy Duty Vehicles](#)



Prof. Betar Gallant

Massachusetts Institute of Technology

[Opportunities for intersection between electrochemistry and CO2 sequestration](#)



Moderator

Prof. Hadi Hajibeygi

Delft University of Technology

Topic Session

Oil and Gas Decarbonization

10:25-12:25 am, August 14



Dr. Murray Reed

CEO, QLM Technology

[Single-photon Lidar gas imagers for practical and widespread continuous methane monitoring](#)



Prof. Robert Kleinberg

Columbia University

[Technological Innovation and Environmental Regulation: Methane Emissions from Oil & Gas Facilities](#)



Prof. Mark Zoback

Stanford University

[Oil and Gas in the Era of Decarbonization](#)



Moderator

Dr. Drew Pomerantz

Schlumberger

Energy Storage

13:10-15:10, August 14



Prof. Ludger Josef Fischer

Lucerne University of Applied Sciences and Arts

[Sensible & Seasonal Thermal Energy](#)



Dr. Said Al-Hallaj

CEO, All Cell Technologies LLC

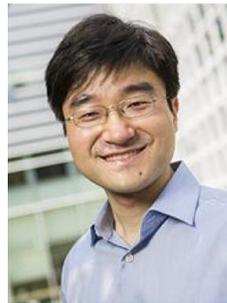
[Recent Developments in Li-ion Battery Pack Thermal Safety](#)



Prof. Simona Onori

Stanford University

[Grid-level Battery Energy Storage: Characterization of Grid Applications for Physics-Based Modelling, Design Optimization, and Technology Evaluation](#)



Moderator

Prof. Xin Li

Harvard University

Topic Session

Hydrogen

15:35-17:35, August 14



Prof. Reinhard Haas

Vienna University of Technology

[Prospects and Impediments for a sustainable hydrogen-based energy system](#)



Prof. Jeffrey Reed

University of California Irvine

[Prospects for Achieving a Self-Sustaining, Large-Scale Renewable Hydrogen Sector in California](#)



Dr. Chukwunwike Iloeje

Argonne National Laboratory

[Implications of power-to-gas energy storage for CO2 mitigation and enhanced energy grid flexibility](#)



Moderator

Prof. Buz Barstow

Cornell University

Interview Session

Promoting Innovation and Entrepreneurship for Economic Nuclear Energy

(Pre-recorded)

*Please click title to view video



Dr. Ashley Finan

The Director of the National Reactor Innovation Center

Ashley Finan is the Director of the National Reactor Innovation Center. In this role, she is responsible for overseeing initiatives to provide resources to reactor innovators to test, demonstrate, and conduct performance assessments to accelerate the deployment of advanced nuclear technology concepts.

Moderators



Dr. Cheng Sun

*Senior Staff Scientist
Idaho National Laboratory*



Prof. Koroush Shirvan

Massachusetts Institute of Technology

Developing Healthy Innovation and Economy Ecosystem for Clean Energy

(Pre-recorded)

*Please click title to view video



Dr. Ralph Izzo

Chairman and CEO of Public Service Enterprise Group Inc. (PSEG)

Ralph Izzo has been chairman and chief executive officer of Public Service Enterprise Group Incorporated (PSEG) since April 2007. Mr. Izzo is a well-known leader within the utility industry, as well as the public policy arena. He is frequently asked to testify before Congress and speak to organizations on matters pertaining to national energy policy.

Moderator



Prof. Michael Golay

Massachusetts Institute of Technology

Oral Presentations

Energy Storage

*Please click title to view video

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46	Nan Zhang, Benjamin Leibowicz and Grani Hanasusanto	Optimal residential battery storage operations using robust data-driven dynamic programming
62	Jia Liu, Xi Chen and Hongxing Yang	Investigation of hybrid photovoltaic-wind system with battery storage for high-rise buildings in Hong Kong
76	Chen Wang, Xiaosong Zhang, Tongtong Zhang and Xiaohui She	Liquid air energy storage and air separation integration for peak load shifting, oxygen production and heating
78	Kyle Smith, Md Abdul Hamid, Venkat Pavan Nemani and Yite Wang	Exploring multi-scale interactions in Redox flow batteries for resilient energy storage
88	Somesh Mohapatra, Bo Qiao, Ryoichi Tatara, Jeffrey Lopez, Graham M. Leverick, Yoshiki Shibuya, Yivan Jiang, Jeremiah A. Johnson, Yang Shao-Horn and Rafael Gómez-Bombarelli	Quantitative mapping of molecular substituents to macroscopic properties leads to mechanistic understanding and optimized oligoethyleneglycol-based lithium battery electrolytes
97	Hélène Pilorgé, Noah McQueen, Peter Psarras, Caleb M. Woodall and Jennifer Wilcox	DAC paired with industrial waste heat as a path towards carbon neutrality for the U.S. industrial sector
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172	Keena Trowell, Jocelyn Blanchet, Sam Goroshin, David Frost and Jeff Bergthorson	Supercritical metal-water reactions for in-situ hydrogen production
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185	Hilary Johnson and Alexander Slocum	Convolutional energy efficiency metric to identify pumping system opportunities
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246	Yasser Ashraf Gandomi, Irina Krasnikova, Mariam Pogosova, Sergey Ryazantsev, Keith Stevenson and Fikile Brushett	Lithium-conducting Ceramic Membranes for Non-aqueous Redox Flow Batteries
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351	Daxian Cao, Yubin Zhang, Yifei Mo, Yan Wang and Hongli Zhu	Stable thiophosphate-based all-solid-state lithium batteries through conformally interfacial nanocoating

Oral Presentations

Electricity Decarbonization, Power System Flexibility, Smart Grids

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68	Kavita Surana and Sarah M. Jordaan	The climate mitigation opportunity behind global power transmission and distribution
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221	Miguel Gijon-Rivera, Carlos Rivera-Solorio, Iván Patricio Acosta Pazmiño and Jose Ignacio Huertas Cardozo	Scale-up study of hybrid solar parabolic trough concentrators to reduce the emissions of co2 in a Mexican industry sector from now to 2030
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Oral Presentations

Thermal

*Please click title to view video

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315	Brian Bischoff, Lingshi Wang, Xiaobing Liu, Van Baxter and Kyle Gluesenkamp	Experimental Investigation of a Novel Membrane-based Condensing Heat Exchanger used for High Efficiency Furnaces
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Oral Presentations

Innovation Now

*Please click title to view video

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141	Bruno Cossu	Air turbine driven by a wave powered suction pump
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321	Neal Trautman, Ali Razban, Jie Chen	Chilled water system modeling and optimization
330	Hyun-Kyu Choi and Joseph Kwon	Model-based control of alkaline pretreatment for enhanced cellulose accessible surface area
331	Borui Cui, Jin Dong, Jeffery Munk, Jian Sun, Teja Kuruganti	Battery-equivalent model and load flexibility analysis of commercial refrigeration system
340	Robert Schuetzle and Elizabeth Myers	Producing net zero and low carbon liquid fuels from carbon dioxide or flare gas
345	Sonit Balyan, Tuhin S. Khan, Kamal K. Pant and M. Ali Haider	Molecular level engineering of catalytic active sites in Mo/HZSM-5 catalyst for direct methane conversion to fuels and chemicals
353	Ashutosh Rai, Rory Monaghan, Dominic Joyce	Waste to wheels: A circular economy approach of decarbonizing forestry timber fleets
359	Xiangkun Elvis Cao, Tingwei Liu, Tao Hong and David Erickson	Multiphysics modeling and optimization of a glass waveguide based photothermal reactor for CO₂ reduction

Oral Presentations

Geoenergy Development and Emission Mitigation

*Please click title to view video

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51	Jeffrey Rutherford and Adam Brandt	Closing the gap: Investigating the persistent underestimation of methane inventories
100	Dandina Rao	HydroFlame – A new “Fire-in-Water” technology and its economic and environmental impact on oil and gas industry
101	Dandina Rao and Bikash Saikia	Gas-assisted gravity drainage – A new technology to reduce industrial CO2 emissions
123	Daniel J. Varon, Jason McKeever, Dylan Jervis, Joannes D. Maasackers, Sudhanshu Pandey, Sander Houweling, Ilse Aben, Tia Scarpelli and Daniel J. Jacob	Satellite discovery of anomalously large methane point sources from oil/gas production
148	Edoardo Rossi, Benjamin M. Adams, Daniel Vogler, Philipp Rudolf von Rohr, Hans-Olivier Schiegg and Martin O. Saar	Advanced drilling technologies to improve the economics of deep geo-resource utilization
151	Scholastica N. Emenike and Duabari S. Aziaka	Optimization of gas loss and CO2 emission during disruption on a natural gas network
215	Benjamin Adams, Martin Saar, Jeffrey Bielicki, Jonathan Ogland-Hand and Mark Fleming	Using geologically sequestered CO2 to generate and store geothermal electricity: CO2 plume geothermal
280	Elena Berman and Steven Deiker	Source-attributable, quantitative results from a basin-wide survey of new Mexico permian methane emissions
294	Saira, Emmanuel Ajoma and Furqan Le-Hussain	Improving the technical feasibility of CO2 storage in oil reservoirs
303	Kaiyu Cao, Prashanth Siddhamshetty, Yuchan Ahn, Mahmoud El-Halwagi and Joseph Kwon	Evaluating the spatiotemporal variability of water recovery ratios of shale gas wells and their effects on shale gas development design
305	Jyoti Phirani and Neelam Choudhary	Quantifying uncertainty in methane hydrate reservoir simulations
310	Ritchie Stagg	The use of enclosed combustion in reducing GHG emissions
343	Jiang Bian, Xuewen Cao, Dan Guo, Wenjuan Sun, Xiaodan Song and Wenming Jiang	Treatment of natural gas with varying CO2 concentration using supersonic flows
364	Renfeng Yang	Difference analysis on steady-state and unsteady-state relative permeability curves
365	Anand Pradhan	Utilizing emerging technologies to reduce methane emissions

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Energy Policy and Economics

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37	S.E. Erturan, H. M. Cekirge and R. S. Thorsen	Planet earth capacity factor and new look criteria
50	Holger Schloer and Sandra Venghaus	The distribution of a global public bad and the key sectors of sustainable development
55	Boling Zhang, Xiaoyi Yang and Ruipeng Tong	Modeling health impacts of coal-based clean energy industry in China: LCA-based and WTP-oriented studies
64	Ross Baldick	The role of sector coupling in renewable integration
85	David Timmons and Rob Terwel	Technical and economic feasibility of carbon-neutral aviation
99	Ehsan Vahidi, Randolph Kirchain and Jeremy Gregory	Potential greenhouse gas mitigation in the United States building sector
109	William French	Mobilizing America to promote climate security
139	Thomas Longden, Fiona Beck and Frank Jotzo	Assessing the long term costs of blue and green hydrogen under zero-emissions objectives
160	Andrew Ruttiger, Sakineh Tavakoli and Sarah Jordaan	Evaluating technology and market scenarios for the deployment of profitable carbon capture, utilization, and storage processes
163	Nicola Cantore, Massimiliano Cali, Leonardo Iacovone, Mariana Pereira - Lopez, Giorgio Presidente, Juergen Amann, Valentin Todorov and Charles Fang Chin Cheng	Energy taxation for inclusive and sustainable industrial development: some empirical evidence for manufacturing firms
164	Eduardo Mello and Peter Bauer	On energy optimal speed trajectories in urban traffic: implementation options
168	Kasper Emil Thorvaldsen, Magnus Korpås and Karen Byskov Lindberg	Methodology for achieving zero-emission for a low-energy building over a year using demand side flexibility strategically
180	Amber Fong and G. Scott Samuelson	Renewable hydrogen production pathways from biomass via anaerobic digestion for California
181	Olga Savchuk, Jan Willem Turkstra, Irin Minne Bouwman, Henri C. Moll	User-centered design and evaluation of decentralized energy systems
182	Sandra Venghaus	Beyond energy: the policy-driven structural change process from lignite mining to a sustainable bioeconomy
202	Jennifer Morris, Mathilde Fajardy, Howard Herzog, Niall Mac Dowell and Sergey Paltsev	The economics of BECCS deployment in a 1.5C or 2C world
227	Renee Obringer, Sayanti Mukherjee and Roshanak Nateghi	Modeling sectoral electricity—natural gas demand and climate nexus: a data-driven multivariate predictive framework
247	Shailesh Wasti, Pablo Ubiratan, Shahab Afshar and Vahid Disfani	Distributed dynamic economic dispatch using alternating direction method of multipliers
306	Raphael Wu and Giovanni Sansavini	Balancing costs, emissions and security in Active Distribution Networks
314	Razi Nalim and Bhumika Sule	Clean pathways from fossil fuels to the hydrogen-carbon economy
327	Eric Boria, Anton Rozhkov, Abolfazl Seyrfar and Ning Ai	Identifying the need for an energy urban planning role
328	John Schramski, Jasmine Badiie and Trevor Richards	Energy, design theory, and the future of technology
336	Ettore Bompard, Tao Huang, Filippo Spertino, Alessandro Ciocia, Audun Botterud and Mehdi Jafari	Assessing the role of RES in energy transition: methodologies and tools

Poster Presentations

E-Poster Track 1

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18	Xiangyu Gao, Lin Zhang, Zhuo Xu and Fei Li	High output power density of a shear-mode piezoelectric energy harvester based on Pb(In_{1/2}Nb_{1/2})O₃-Pb(Mg_{1/3}Nb_{2/3})O₃-PbTiO₃ single crystals
31	Wenfeng Liu, Chuanyi Tang, Xiaolun Yan, Huazhi Xin, Xin Liu and Xubin Zhao	Apply Grey Relation Analysis to identify and characterize inter-well interference based on the tracer monitoring in the Mahu Sag
70	Fang Liu	Structure and control co-optimization for a CO₂ heat pump with thermal storages
72	Feng Wang, Lin Zhang and Shaohua Jiang	Ultra-High phosphorus-doped wood-derived carbon enabling high-capacity for supercapacitor
84	Jingqi Tan, Jiaqi Luo, Jianjian Wei and Tao Jin	Performance of a modified two-phase thermofluidic oscillator with low GWP working fluids for low-grade waste heat recovery
142	Tongtong Zhang, Xiaohui She and Yulong Ding	Liquid air energy storage for shifting the nitrogen demand of the ammonia synthesis system
159	Zhifeng Tang, Huihua Feng and Yao Wang	Experiment evaluation on starting process of opposed-piston free-piston linear generator
171	Afnan Mashat, Nan Shi and Amr Abdel-Fattah	Autonomous nano-capsules for subsurface remediation and energy harvesting applications
190	Ying Zhuang, Wei Pei, Li Kong and Shizhong Zhang	An autonomous optimization model for multi-source heat-power combined microgrid considering hydrogen production
195	Haitao Zhao	Enabling the catalytic oxidation of Hg ⁰ by O ₂ via the development of novel CeO ₂ -MoO ₃ /γ-Al ₂ O ₃ catalysts and its mechanism
201	Yakun Liu, Earle Williams, Joan Montanya, Zhengcai Fu, Qibin Zhou, Anirban Guha, Ryan Said, Jeff Lapierre, Yeqing Wang, Haitao Zhao, Stan Heckman and Michael Stock	Global lightning environment for wind turbines in wind energy harvesting
230	Yangyuan Ji, Yuhang Fang, David Warsinger and Jeffrey Moran	Photocatalytic self-propelled micromotors for acceleration of advanced oxidation processes
248	Anand Selveindran	CO₂-EOR and carbon storage in a mature Indian oilfield: from laboratory study to pilot design
255	Bo Li, Daniel Kammen, Minyou Chen and Ziming Ma	Offshore wind power in China: remake mix and structure of power system
344	Shun Liu	Test experiment of minimum miscibility composition of hydrocarbon gas drive in abnormal high temperature and pressure well
346	Kuanrong Qiu, Hajo Ribberink and Evgueniy Entchev	Advantage and feasibility of wireless charging electric bus systems
348	Kuanrong Qiu and Evgueniy Entchev	Biofuel-fired ORC-based micro-CHP and working fluid selection
350	Tiancheng Ji, Peixue Jiang and Ruina Xu	Disclosing carbon-water-cost nexus on China's road to greener shale gas via CO₂-enhanced shale gas recovery (CO₂-ESG)
361	Singaram Lakshmanan and Kannaiyan Gnanavel	Modelling and Thermodynamic analysis of small scale compressed air energy storage systems with thermal recovery
366	Wei Du, Qi Zhou, Kaina Qiu, Xiaotian Mu, Honglei Ding and Weiguo Pan	Numerical simulation and response surface analysis on combustion optimization of coal-fired boiler
367	Jiwei Wu, Hualin Wang, Yuan Huang, Haitao Lin and Qiang Fu	Hydrocyclone micrometer sized separation technology for exploitation of natural gas hydrate
368	Prakash Chinnakutti and Dr Gnanavel Kannaiyan	Design and analysis of spinning reserve gravity hydro energy storage technology
369	Qingzi Zhu, Xu Tan, Mario Caccia, Mehdi Peshahang, Bamdad Barari, Caleb Amy, Colin C. Kelsall, Kenneth Sandhage and Asegun Henry	ZrC/W-based Printed Circuit Heat Exchanger for Generation 3 CSP
370	Qingzi Zhu, Bamdad Barari, Mehdi Peshahang, Mario Caccia, Xu Tan, Michael Bichnevicius, Kenneth Sandhage and Asegun Henry	Hydraulics performance of a 2MW molten salt-sCO ₂ PCHE

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E-Poster Track 2

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7	Cong Zhang, Hairong Li, Ke Peng, Junge Li and Shunqi Zeng	Emergency control method of industrial park integrated energy system based on energy conversion
54	Yunqi Wang, Jing Qiu, Xiao Han, Lingling Sun, Hengrong Zhang and Yuan Ma	Operational planning for integrated energy system with carbon flow and trading scheme towards emission reduction
73	Tanveer Hussain, Sid Suryanarayanan and Sm Shafiul Alam	An improved transmission switching algorithm for managing Post-(N-1) contingencies in electricity networks
94	Jinyu Chen, Haoran Zhang, Wenjing Li, Yi Sui, Xuan Song, Ryosuke Shibasaki	An investigation on the emission performance of ride-hailing
98	Drake Hernandez and Emre Gencer	Techno-economic Analysis of Balancing California's Power System on a Seasonal Basis with Hydrogen and Lithium-Ion Batteries
143	Yang Shichun, Feng Song, Xie Hehui, Liu Jian, Chen Fei and Hua Yang	Connected HEVs energy management strategy research under the road slope and traffic information preview
147	Shichun Yang, Hehui Xie, Fei Chen, Jian Liu, Song Feng and Junbing Zhang	Research on energy management strategy of hybrid electric vehicles based on hierarchical control in the connected environment
158	Wen-Long Shang, HuiBo Bi and Yanyan Chen	Environmental benefits of bike sharing based on limited trip data
162	Tianyu Yang, Qinglai Guo and Hongbin Sun	A three-stage incentive scheme for integrated energy-traffic systems using deep Q-learning network
165	Abdullah Algarni, Sid Suryanarayanan and Howard Jay Siegel	Initial studies on integrating demand response aggregators and carbon taxation into electricity markets
170	Kamini Singh and Anoop Singh	E-mobility: A shifting paradigm of consumers towards ev-prosumers
209	Zahra Heydarzadeh, Michael Mackinnon, Clinton Thai, Jeffrey Reed and Jack Brouwer	Comprehensive study of major methane emissions sources from natural gas system and their dependency to throughput
223	Juanjuan Hou, Lancui Liu, Yusheng Liu and Jiutian Zhang	Study on the potential and path of collaborative governance of energy and water in China
270	Yuanda Hong, Wu Deng, Ezeh Collins, Sung-Hugh Hong, Haitao Zhao and Zhenhua Rui	Energy, environment and economic (3E) multi decision-making model for energy-efficient retrofit frameworks (ERF) on existing buildings - case study in Shanghai
322	Hongliang Sun, Yiwei Shao, Yulong Zhao	Microstructured graphene anode fabrication for microbial fuel cell using light
325	Abolfazl Seyrfar, Hossein Ataie and Sybil Derrible	A review of building energy benchmarking
355	Tong Xu and Longyu Shi	Energy, water, and land resources consumption of the public building: a case of the people's bank of China
358	Behzad Golparvar and Ruo-Qian Wang	Predicting the output power uncertainty of an offshore wind turbine based on environmental conditions
362	Wenjing Lyu and Jin Liu	Artificial intelligence in the energy sector

