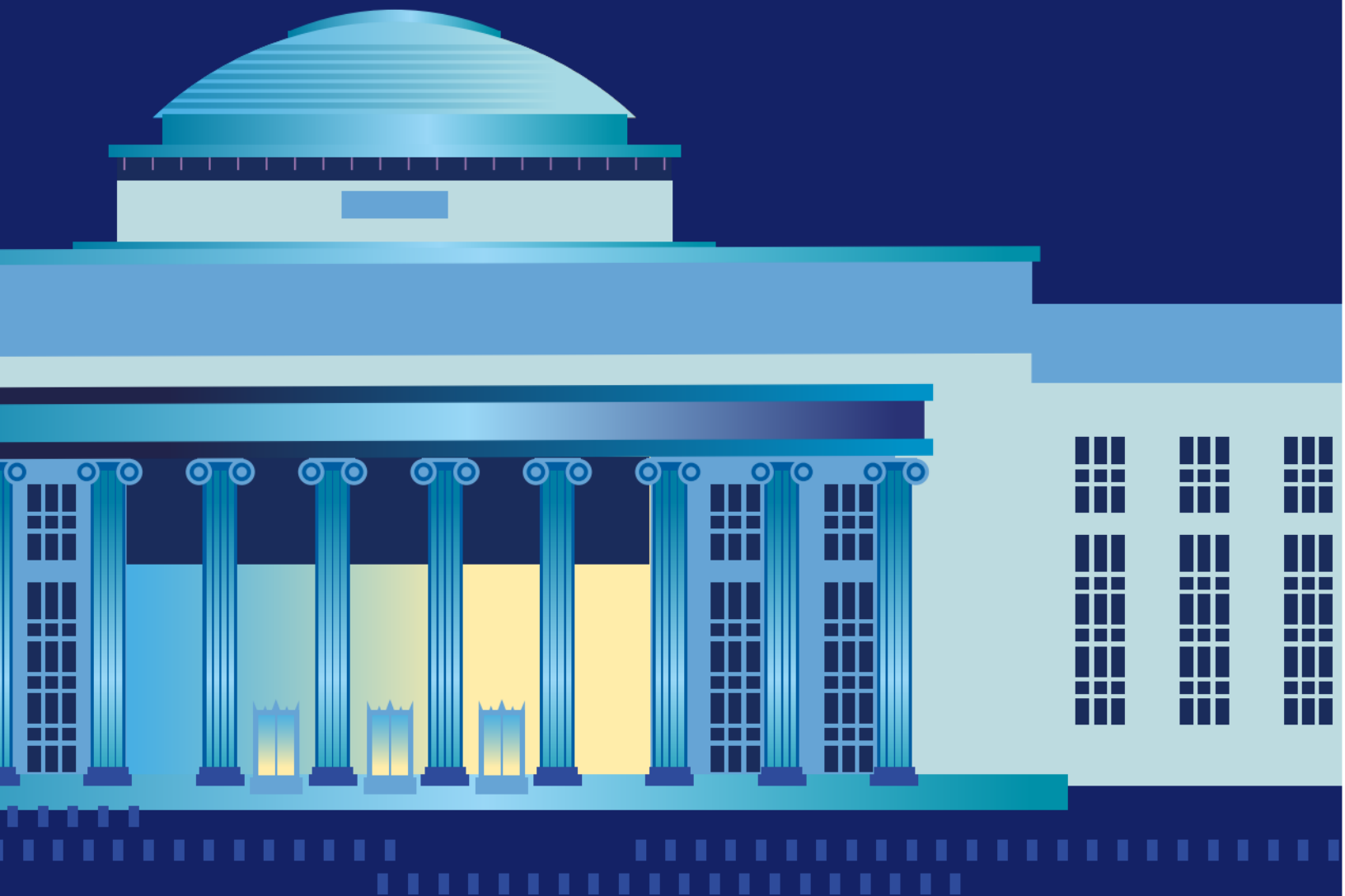


icae

International Conference on Applied Energy

Applied Energy Symposium **MIT A+B 2022**

Co-organized with Harvard
JULY 5-8, 2022 · 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 ocean 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 MIT A+B is organized by Massachusetts Institute of Technology, Harvard University, and Applied Energy Innovation Institute (AEii) jointly.

We look forward to meeting you online.

Chairs of MITAB2022

Prof. Ju Li
Massachusetts Institute of Technology

Prof. Michael J. Aziz
Harvard University

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

- **Welcome to MIT A+B 2022**
- **Committees**
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- **Program at a Glance**
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- **Keynote Sessions**
- **Oral Presentations**

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INTERNATIONAL SOCIETY OF CARBON CAPTURE UTILIZATION AND SEQUESTRATION

Program at a Glance

Day 1: 8:10 AM - 3:40 PM, Tuesday, July 5	
8:00 -8:10	Chair Welcome
8:10-9:00	How Do We View CO2 Capture And Upgrade In A Unified Fashion, And How Can This Drive Innovation?
9:00-9:40	International Green Economy Collaborations
9:40-10:20	Advantages And Disadvantages of Machine Learning in The Power Sector Decarbonization
10:20-11:00	How Can We Accelerate the Improvement of Energy Storage Technologies? Quantitative Insights from Three Decades of Lithium-Ion Battery Improvement
11:00-11:10	Coffee/Tea Break
11:10 AM - 3:25 PM	Carbon Neutrality
11:10 AM - 3:40 PM	Heat Transfer and Building Energy
11:10 AM – 3:40 PM	Power Generator and Distribution
Day 2: 8:10 AM - 3:40 PM, Wednesday, July 6	
8:10-8:50	Developing A Carbon Negative Gas Turbine Based On Chemical Looping Combustion
8:50-9:30	The Green New Deal: Constructing A Climate Security Industrial Complex
9:30-10:10	The Contribution Of Carbon-Negative Oil To Net Zero Pathways
10:10-10:25	Coffee/Tea Break
10:25-11:15	Pathways To The Scalable Electrification And Decarbonization Of Industrial Processes
11:25 AM - 3:40 PM	Hydrogen and Energy Storage
11:25 AM - 3:20 PM	Innovation Now 1
11:25 AM - 3:00 PM	Greenhouse Gas Emission and Storage

Program at a Glance

Day 3: 8:10 AM - 4:30 PM, Thursday, July 7	
8:10-8:50	Community Energy and Social Innovation: The Way for Energy Democratisation
8:50-9:30	Carbon Storage Focused Reservoir Management Of A Mature Indian Oilfield To Respond To Climate Change
9:30-10:10	The Oakland Ecoblock: A Net Zero Block-Scale Urban Retrofit and Community Solar Microgrid
10:10-10:25	Coffee/Tea Break
10:25-11:15	Reinventing Advanced Nuclear Energy: History, Prospects And Path Forward
11:15-12:05	Organic-Based Aqueous Flow Batteries For Grid-Scale Electrical Energy Storage
12:05-12:15	Coffee/Tea Break
12:15 AM - 4:10 PM	Materials
12:15 AM - 4:30 PM	Innovation Now 2
12:15 AM - 4:10 PM	Geo-Energy
Day 4: 8:10 AM - 4:00 PM, Friday, July 8	
8:10-9:00	CCS Scale-Up - Building On Northern Lights And 25 Years Of CO2 Storage In The North Sea
9:00-9:40	Engineering Scalable Electrocatalysts For Affordable Production Of Green Hydrogen & E-Fuels
9:40-10:20	Emerging Trends And Decarbonization Needs For Water – Energy Systems
10:20-11:00	Solar-Thermal Synthesis Of Graphitic Carbon And Hydrogen Via Methane Decomposition
11:00-11:10	Coffee/Tea Break
11:10 AM - 4:00 PM	Energy Economics & Policies
11:10 AM - 3:40 PM	Renewable Energy

Participant's Guide

Presentation

You are required to connect to the Zoom meeting room 15mins before your session starts. It is recommended to download the app of Zoom (<https://zoom.us/>). If you have any trouble with using Zoom, please see: <https://support.zoom.us/hc/en-us>.

Change your user name to your full name and add your paper ID (paper ID is not required for plenary speakers and session keynote speakers);

Please always refer to the latest conference program, which can be downloaded from the conference website <https://applied-energy.org/mitab2022/program>, for actual presentation time.

The links of Zoom will be sent before the opening of the conference and also shown in the below. If you need any help, please do not hesitate to contact us via mitab2022@applied-energy.org.

Conference Zoom link Guideline

Room S (for plenary keynotes and session keynotes):

https://us02web.zoom.us/j/84797481610?pwd=gWJzw5o_m8Gwy5GQc4Wb3dismJQoy-.1

Zoom ID: 847 9748 1610

Passcode: 314404

Room A (for oral presentation sessions: Carbon Neutrality, Hydrogen and Energy Storage, Materials, and Energy Economics & Policies):

<https://us02web.zoom.us/j/81487394849?pwd=0vQXneM1hgsUOTqgMLPX7dvSNkamVw.1>

Zoom ID: 814 8739 4849

Passcode: 571140

Room B (for oral presentation sessions: Heat Transfer and Building Energy, Innovation Now 1, Innovation Now 2, and Renewable Energy):

https://us02web.zoom.us/j/83046059257?pwd=gEaVwxhwr9_JQ3HptnHzz5x2prDHyd.1

Zoom ID: 830 4605 9257

Passcode: 826058

Room C (for oral presentation sessions: Power Generator and Distribution, Greenhouse Gas Emission and Storage, and Geo-Energy)

<https://us02web.zoom.us/j/82810374805?pwd=1HZX3YN3S82wC6BN70cPDQgfPb5A9M.1>

Zoom ID: 828 1037 4805

Passcode: 818605

Plenary Keynotes



Edward H. Sargent
Professor
University of Toronto

How Do We View CO₂ Capture And Upgrade In A Unified Fashion, And How Can This Drive Innovation?

8:10-9:00 AM, Tuesday, July 5

CO₂ capture, especially from dilute sources such as air, will be a key aspect of addressing difficult-to-abate sources of emission. Utilization/upgrade of CO₂, especially approaches that enable its incorporation into carbon-negative (cradle-to-gate) long-lived materials, will be a key element of this strategy, since these will provide economic pull-through of the needed solutions. I will discuss advances in each of these key areas and look at them from an integrated perspective.

Pathways to the Scalable Electrification and Decarbonization of Industrial Processes

10:25-11:15 AM, Wednesday, July 6



Yet-Ming Chiang
Professor
Massachusetts Institute
of Technology

Addressing climate change will require decarbonizing the industries which manufacture the material world around us. Of the staggering 33% of global anthropogenic greenhouse gases emissions that arise from the manufacturing of products essential to modern life, nearly half come from just four industries: Cement, steel, ammonia, and ethylene. About 8% (~3 gigatons CO₂ per year) originates from Portland cement production, in which firing of ground limestone (CaCO₃) with aluminosilicates at high temperature results in the stoichiometric emission of CO₂ as well as thermal emissions from burning fossil fuels, primarily coal. Consequently, each kilogram of cement produced emits 0.93 kilograms of CO₂. The rising abundance of very low-cost (but intermittently generated) renewable electricity suggests that new electrical processes could be one pathway to decarbonizing cement production. This talk will discuss an initiative at MIT in which ambient-temperature electrolysis is used to produce acids and bases for the decarbonation of limestone and production of cementitious calcium silicates. Potential applications of the electrolytic approach to materials recycling and mining will also be discussed.

Virtual Room S
Zoom ID: 847 9748 1610
Passcode: 314404

Plenary Keynotes



Per Peterson

Professor

University of California,
Berkeley

[Reinventing Advanced Nuclear Energy: History, Prospects and Path Forward](#)

10:25-11:15 AM, Thursday, July 7

Today advanced reactor developers are taking multiple paths and pursuing multiple technology options for advanced nuclear reactors. A subset of these technologies use molten salts, the heat transfer fluid originally selected for the Aircraft Nuclear Propulsion program in the 1950's. While the ANP program was short-lived and attention focused correctly toward reactors for submarines, the attributes required for aircraft propulsion—a very high ratio of reactor thermal power to weight and ability to deliver heat at high temperature—remain attractive attributes for future commercial reactors. This presentation will review the history and recent progress toward development of high-temperature reactors cooled by molten salt, and frame this progress inside to broader set of goals to accelerate the development and deployment of zero-carbon technologies to enable a viable path to net-zero CO₂ emissions.



Michael J. Aziz

Professor

Harvard University

[Organic-Based Aqueous Flow Batteries for Grid-Scale Electrical Energy Storage](#)

11:15-12:05 AM, Thursday, July 7

The ability to store large amounts of electrical energy is of increasing importance with the growing fraction of electricity generation from intermittent renewable sources such as wind and solar. Wide-scale utilization of flow batteries is limited by the cost of redox-active metals such as vanadium or precious metal electrocatalysts. We have developed high performance flow batteries based on the aqueous redox behavior of small organic and organometallic molecules, e.g. These redox active materials can be inexpensive and exhibit rapid redox kinetics and high solubilities, potentially enabling massive electrical energy storage at greatly reduced cost. We have developed protocols for measuring capacity fade rates, which are particularly important for establishing very low capacity fade rates, and have discovered that the capacity fade rate is determined by the molecular calendar life, which can depend on state of charge, but is independent of the number of charge-discharge cycles imposed. We will report the performance of some of the very few chemistries with long enough calendar life for practical application in stationary storage, and on progress in reversing capacity fade by recomposing decomposed molecules.

Virtual Room S

Zoom ID: 847 9748 1610

Passcode: 314404

Plenary Keynotes



Torbjørg Klara Fossum
Vice President
Equinor ASA

[CCS scale-up - building on Northern Lights and 25 years of CO2 storage in the North Sea](#)

8:10-9:00 AM, Friday, July 8

CCS is a well-known technology for reducing carbon emissions. Equinor has been the pioneer in the area and established the world's first offshore CCS installation in the Sleipner field in the 1990s. However, the scale-up of CCS is still in the early phase, with many small-scale demonstration projects worldwide. In this presentation, Equinor will discuss the energy trilemma, especially with the impact of the energy crisis after the break of the war in Ukraine. To tackle the energy crisis and climate goal, CCS is a necessary process to scale up significantly than today. Furthermore, we like to share the experiences of establishing large-scale CCS projects targeting to store 30 million tons of CO₂ in Norway, the UK, and the USA. In the end, we want to share the learning as an early mover in CCS and our vision of CCS commercialization towards 2050.

Moderators



Prof. Ju Li

Massachusetts Institute of Technology

Virtual Room S

Zoom ID: 847 9748 1610

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Keynote Sessions

Energy Systems 9:00-11:00 , Tuesday, July 5

Virtual Room S Zoom ID: 847 9748 1610 Passcode: 314404



Prof. Emma Aisbett

Australian National University

[International Green Economy Collaborations](#)



Prof. Svetlana Ikonnikova

Technical University of Munich

[Advantages and Disadvantages of Machine Learning in the Power Sector Decarbonization](#)



Dr. Micah S. Ziegler

Massachusetts Institute of Technology

[How can we accelerate the improvement of energy storage technologies? Quantitative insights from three decades of lithium-ion battery improvement](#)



Moderator

Dr. Audun Botterud

Massachusetts Institute of Technology

Decarbonization 8:10-10:10, Wednesday, July 6

Virtual Room S Zoom ID: 847 9748 1610 Passcode: 314404



Dr. Pietro Bartocci

University of Perugia

[Developing a carbon negative gas turbine based on chemical looping combustion](#)



Prof. William French

Loyola University of Chicago

[The Green New Deal: Constructing a Climate Security Industrial Complex](#)



Prof. Steven Bryant

University of Calgary

[The Contribution of Carbon-negative Oil to Net Zero Pathways](#)



Moderator

Prof. Adam Clayton Powell

Worcester Polytechnic Institute

Keynote Sessions

Innovation Now 8:10-10:10, Thursday, July 7

Virtual Room S Zoom ID: 847 9748 1610 Passcode: 314404



Dr. Pádraig Lyons

The International Energy Research Centre

[Community Energy and Social Innovation: The Way for Energy Democratisation](#)



Prof. Ganesh C. Thakur

University of Houston

[Carbon Storage Focused Reservoir Management of a Mature Indian Oilfield to Respond to Climate Change](#)



Dr. Therese Peffer

University of California, Berkeley

[The Oakland EcoBlock: a net zero block-scale urban retrofit and community solar microgrid](#)



Moderator

Dr. Tyler H. Ruggles

Carnegie Institution for Science

Materials 9:00-11:00, Friday, July 8

Virtual Room S Zoom ID: 847 9748 1610 Passcode: 314404



Prof. Antonio Tricoli

University of Sydney

[Engineering Scalable Electrocatalysts for Affordable Production of Green Hydrogen & E-Fuels](#)



Prof. Akanksha Menon

Georgia Institute of Technology

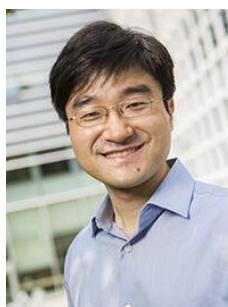
[Emerging Trends and Decarbonization Needs for Water – Energy Systems](#)



Prof. Timothy Fisher

University of California, Los Angeles

[Solar-Thermal Synthesis of Graphitic Carbon and Hydrogen via Methane Decomposition](#)



Moderator

Prof. Xin Li,

Harvard University

Oral Presentations

Carbon Neutrality

11:10 AM - 3:25 PM, Tuesday, July 5

Virtual Room A

Zoom ID: 814 8739 4849

Passcode: 571140

I.D.	Authors	Title
3897	Narayanan Komerath, Ravi Deepak and Adarsh Deepak	An Aerospace Approach To Counter Climate Change
6999	Subhash Kumar, Pádraig Lyons and Brian Norton	A Multi-Regional Model To Assess The Effectiveness Of Emission Reduction Policies And Energy Security Issues In Southeast Asia
1039	Wen-Long Shang, Mingyue Xu, Yanyan Chen and Washington Ochieng	Towards Carbon Neutrality: The Pricing Of Bike Sharing Considering Carbon Price
2689	Jiehui Yuan, Ting Zhou, Depeng Liu, Yan Yi, Zhihong Liu and Xiaohei Leng	Unveiling The Energy Transition Path Of Tourist Attractions Aiming At Carbon Neutrality
797	Xingang Zhao, Alexander Huning, Jasmina Burek, Fengdi Guo, David Kropaczek and Dave Pointer	A Carbon Handprint Perspective On Industrial Decarbonization With Hybrid Energy Systems
1040	Zhengqing Liu and Chi Zhang	Assessment Of Energy-Saving Effect Of Urbanization And Ageing On Carbon Emissions In China
2868	Dina Azhgaliyeva and Hai Le	Firm Investment In Renewable Energy: An Empirical Evidence From The People'S Republic Of China
5617	Lambertus Hesselink and James Gibbons	An Energy Eco-Systems Perspective Towards Achieving 50% Gwg Reduction By 2030so Far Beyond Reach For Complete
5910	Zhimian Hao, Magda Barecka and Alexei Lapkin	Digitalization And Optimization Boost Decarbonization: Accelerating Net Zero From The Perspective Of Carbon Capture And Utilization
8473	Qinglong Wu and Pibin Guo	Application Of The Panel Threshold Model To Analyse The Influences Of Heterogeneous Energy Technologies On Carbon Emissions In China
9503	Yuventus Effendi and Budy Resosudarmo	Socio-Economic And Environmental Impacts Of Intended Decarbonisation Policies In The East Asia Region

Oral Presentations

Heat Transfer and Building Energy

11:10 AM - 3:40 PM, Tuesday, July 5

Virtual Room B

Zoom ID: 830 4605 9257

Passcode: 826058

I.D.	Authors	Title
1769	Kening Yan, Lin Qiu and Yanhui Feng	Expanded Graphite/Erythritol Form-Stable Composite Phase Change Materials With High Thermal Response Speed And High Latent Heat For Photothermal Conversion
6486	Aniket Patankar, Xiao-Yu Wu, Wonjae Choi, Harry Tuller and Ahmed Ghoniem	A Reactor Train System For Efficient Thermochemical Fuel Production
6660	Xinzhang Zhou, Lingshi Wang, Amit Naskar and Xiaobing Liu	Experimental And Numerical Study On The Impacts Of Long Anisotropic Carbon Fiber Inserts On The Thermal Performance Of Phase Change Materials
433	Yuhang Zhang, Yi Zhang, Yi Zhang and Chengxu Zhang	A Hybrid Model For Building Energy Consumption Prediction Considering Social Factors
3634	Mehdi Jafari, Morteza Vahid-Ghavidel, Audun Botterud, Samuel Letellier-Duchesne, Zachary Berzolla and Christoph Reinhart	Combining Urban Building Energy Management And Expansion Planning Of Renewable Energy Systems
3701	Kamel Ghali, Nesreen Ghaddar and Jean Paul Harrouz	Novel Concept Of Hybrid Solid-Liquid Desiccant-Based System For Sustainable Indoor Humidity Pumping (A)
7337	Nouhaila Benachir, Taoufiq Mouhib and Farida Bendriaa	Improving The Energy Performance Of The Building Envelope Using Phase Change Materials
3708	Kraig Farrar and Mark Kimber	Utilization Of Printed Circuit Heat Exchange To Increase Power Density In Molten Salt Reactors
7463	Linzhang Wang, Ruiqu Deng, Ruizhi Zhang and Yonghao Luo	Numerical Modelling Of Fixed-Bed Co-Gasification Process Through Multiple Thermally Thick Particle (Mttp) Model
7654	Rukun Hu, Yuanji Li, Xiaohu Yang and Yaling He	A Study On The Effect Of Metal Foam Tube'S Bottom Cross-Cut On Heat Transfer Performance
8017	Nouhaila Benachir, Taoufiq Mouhib and Farida Bendriaa	Effect Of Solar Ventilation On Thermal Improvement And Energy Efficiency Of Buildings Using Phase Change Materials.
8223	Liang Xia, Wu Deng and Ruohan Wu	Improvement Of The Radial Basis Function Pid (R-Rbf-Pid) Controller For Achieving Higher-Speed Control In Water Heating
9177	Xi Fang and Guangcai Gong	Transferability Investigation Of Deep Reinforcement Learning Control Strategy In The Building Hvac System Level
9491 (poster)	Olga Savchuk, Derek Wietsma, Pablo Duenas Martinez and Carlos Augusto Santos Silva	Building Demand Forecasting In Future Climate: Suitability Of Machine Learning Algorithms
401 (poster)	Marco Molinari, Davide Rolando and Alberto Lazzarotto	Energy And Indoor Environmental Quality Monitoring Of A Lecture Building: Preliminary Results From The Kth Live-In Lab Testbed Ah

Oral Presentations

Power Generator and Distribution

11:10 AM –3:40 PM, Tuesday, July 5

Virtual Room C

Zoom ID: 828 1037 4805

Passcode: 818605

I.D.	Authors	Title
1367	Amos Oppong, Kingsley Nketia Acheampong, Victor Yao Nyakey, Nana Ama Bimpomaa Oti, Godfred Kwabena Brantuo Adjei and Emmanuel Boahen	Radical Decarbonization Of The Electric Power Sector: Modelling Unpredictability And Proposing Viable Transition Pathways
2510	Robert Gaugl, Sonja Wogrin and Udo Bachhiesl	Transition Of The African Power System To Renewable Energies – A Case Study
6765	Boling Zhang, Qian Wang and Ruipeng Tong	Coal Power Demand And Paths To Peak Carbon Emissions In China: A Provincial Scenario Analysis Oriented By CO2-Related Health Impact
6863	Zhenlong Wu, Yanhong Liu and Yangquan Chen	Load Frequency Regulation Of Integrated Micro-Grid Via Cascaded Active Disturbance Rejection Control
8010	Tzu-Hsuan Huang and Wei-Hsin Chen	Integrating Taguchi Method And Neural Network To Optimize And Predict The Geometry Of Unileg Thermoelectric Generator And Performance
4152	Bingyang Li and Meiqian Chen	Estimation Of Radionuclides Migration Mechanism In Thermal Decomposition Of Spent Ion Exchange Resin In Nuclear Power Plant
9385	Yuhao Zhu, Kewen Li, Mahlalela Bhekumuzi Mgijimi, Jifu He, Lei Wang, Aiwei Zheng, Xiaodong Wang, Hongyang Zhang and Changwei Liu	Field Test Of Thermoelectric Generators For Recovering Industrial Waste Heat
5437	Liwei Zhou and Matthias Preindl	A Multi-Layer Software-Defined Architecture with MPC-VFCSS-based Power Module for High Performance Electric Vehicle Energy Conversion
470	Qian Xu, Biao Deng, Gang Chen and Weishu Liu	High-Performance, Flexible Thermoelectric Generator Based On Bulk Materials
6450	Mohamed Keddar, Marcos Da Conceicao, Mamadou Doumbia and Zhifeng Zhang	Electrolyzer Degradation-Power Electronics One Way Interaction Model
1251	Sarah Jordaan, Andrew Ruttinger, Kavita Surana, Destenie Nock, Scot Miller and Arvind Ravikumar	Global Mitigation Opportunities For The Life Cycle Of Natural Gas Fired Power
1415	Goran Durakovic, Pedro Crespo del Granado and Asgeir Tomasgard	Powering Europe With North Sea Offshore Wind: The Impact Of Hydrogen Investments On Grid Infrastructure And Power Prices
4033	Dongxu Ji	Thermoelectric Generator-Organic Rankine Combined Cycle For Power Generation From Low To Medium Temperature Geothermal Source: A Case Study
2464	Maja Perčić, Nikola Vladimir, Ailong Fan and Ivana Jovanović	Holistic Energy Efficiency and Environmental Friendliness Analysis of Inland Ships with Alternative Power Systems
2322 (poster)	Kuanrong Qiu, Hajo Ribberink and Evgueniy Entchev	Optimal Configuration Of Dynamic Wireless Charging Systems For Highway Applications

Oral Presentations

Hydrogen and Energy Storage

11:25 AM - 3:40 PM, Wednesday, July 6

Virtual Room A Zoom ID: 814 8739 4849 Passcode: 571140

I.D.	Authors	Title
7117	Liang Chen, Xihan Zhang, Runfeng Xiao, Zixin Zhang, Shuangtao Chen and Yu Hou	A Two-Stage Reverse Turbo-Brayton Cycle Cryocooler For Zero Boil-Off Storage Of Liquid Oxygen And Hydrogen In Space
2564	Zixin Zhang, Yu Hou, Runfeng Xiao and Liang Chen	Conceptual Design And Analysis Of A Novel System Coupling Hydrogen Liquefaction With Multi-Energy Liquid Air Energy Storage (M-LAES)
2840	Maan Alkaisi and Ahmed Hayali	Multilayers Cesium Based Perovskite/Perovskite Tandem Solar Cells
4576	Andrew Blakers	Mass Energy Storage Is A Solved Problem
4945	Ruchen Huang and Hongwen He	Intelligent Battery Health-Aware Energy Management Strategy For Hybrid Electric Bus: A Deep Reinforcement Learning Method
9567	Jonas Martin, Anne Neumann and Anders Ødegård	Economics Of Sustainable Hydrogen-Fuels For Trucking, Shipping And Aviation
3226	Tyler Ruggles	Hydrogen Production As A Flexible Electricity Load: Considering Grid-Tied Systems
3620	Ziye Ling, Shao Lin, Zhengguo Zhang and Xiaoming Fang	Application Of Salt Hydrate – Expanded Graphite Composite With Thermochemical Storage In Mitigating Battery Thermal Runaway : Experiment And Simulation
5957	Utkarsha Agwan	Electric Vehicles As Mobile Storage In The Power Grid
1432	Yu Zhong	The Application Of Computational Thermodynamics In Solid Oxide Fuel/Electrolyzer Cells
6925	Wei Li	Irreversibility Of Convective Heat Transfer In Thermal Energy Systems
9673	Said Al-Hallaj and Chengxiu Chen	Fast Charging Of High Energy Li-Ion Battery With Integrated Passive Thermal Management
9791	Yuanji Li, Rukun Hu, Xiaohu Yang and Jinyue Yan	The Effect Of Changing PCM Distribution On Thermal Performance Of Latent Heat Storage
8189	Ji Zhang, Zhi Cao, Yan Yang and Chuang Wen	Charging Performance Enhancement Of Phase Change Materials For Latent Heat Energy Storage Using Novel Branch-Structured Fins And Nanoparticles

Oral Presentations

Innovation Now 1

11:25 AM - 3:20 PM, Wednesday, July 6

Virtual Room B Zoom ID: 830 4605 9257 Passcode: 826058

I.D.	Authors	Title
117	Yanling Zhang, Hao Zhang, Hongxing Yang, Yi Chen and Chun Wah Leung	Energy Performance Of Internally Cooled Desiccant Enhanced Evaporative Cooling System In Hong Kong
623	Anqi Li, Tong Li, Mei Lin and Qiuwang Wang	Dynamic Mode Decomposition Of Impinging Jet In A T-Junction
2469	Alaa Omar (student), Alan Wood (Prof.), Hamish Laird and Paul Gaynor (PROF)	Real-Time Emulation Of A MMC With BESS For EV Application
4885	Leyi Yu, Zhiya Pan, Xue Kong, Ying Zhang, Tao Wang and Yagang Zhang	Applying Optimized Preprocessing Technique And Extreme Learning Machine For Hybrid Wind Speed Forecasting System
4294	Lim Ocktaeck and Muhammad Khristamto Aditya Wardana	Investigation Of Ammonia Homogenization And Nox Reduction Quantity By Remodeling Urea Injector Shapes In Heavy-Duty Diesel Engines
736	Prajwal Chinthoju, Ghanendra Das, James Allison and Kai James	Optimal Design Of Evtols For Urban Mobility Using Analytical Target Cascading (ATC)
415	Dakota Thompson and Amro Farid	Quantifying The American Multi-Modal Energy System With Hetero-Functional Graph Theory
1112	Ebin Daniel and Ali Razban	Analyze And Simulation Of Compressed Air Leak Using Time Series Pressure Measurement
1740	Khaled Mohamad and Philippe Ferrer	Cavity Receiver Designs For Parabolic Trough Collector
5099	Saman Taheri and Ali Razban	A Bi-Level Data-Driven Framework For Fault Detection And Diagnosis Of HVAC Systems With Feature Explainability
3711	Evie Brake, Hayes Okesene, Wei Yu, Isaac Severinsen and Brent Young	Dynamic Geothermal Brine Steam Separation Modelling And NCG Option Evaluation - Towards A Digital Twin
4445 (poster)	Wen-Long Shang, Xuewang Song, Yanyan Chen and Washington Ochieng	Pollutant Emission And Congestion Analysis Based On Floating Vehicle Data

Oral Presentations

Greenhouse Gas Emission and Storage

11:25 AM - 3:20 PM, Wednesday, July 6

Virtual Room C Zoom ID: 828 1037 4805 Passcode: 818605

I.D.	Authors	Title
3208	Hao Chen, Haizeng Yu and Yiqi Zhang	Calculation Of CO2 Sequestration Potential Of Reservoir Based On Support Vector Machine Method
2661	Hongbing Ding, Yu Zhang, Yuanyuan Dong and Chuang Wen	Emerging Carbon Capture From CH4-CO2 Binary System Using Supersonic Flows
3358	Gege Wen, Catherine Callas and Sally Benson	Ccsnet: A Deep Learning Modeling Suite For CO2 Storage
4760	Amer Alanazi	Capillary-Sealing Efficiency Of Caprocks And Influencing Parameters On Hydrogen And Carbon-Dioxide Geo-Storage
8491	Petr Yakovlev, Erin Wetherley and Elena Berman	Optimizing Survey Frequency And Instrument Sensitivity In Methane Emissions Monitoring
1896	Robert L Kleinberg	Methane Emissions From The Oil & Gas Industry Of The Russian Federation
1671	Lukasz Zielinski, Kashif Rashid and Andrew Speck	Key Enablers For Continuous Methane Emissions Monitoring
2648	Ali Toorajipour, Hamed Aghaei, Mehdi Escrochi and Milad Farahani	Optimization Of Pore Compressibility Analysis During Sc-CO2 Exposure And Dissolution
8442	Tugce Baser and Josiane Jello	A Full-Scale Experimental Investigation Of An Advanced Geothermal Energy Storage System
8626	Rukuan Chai, Yuetian Liu, Zhenhua Rui and Qianjun Liu	CO2 Utilization And Sequestration In Reservoir: Effects And Mechanisms Of CO2 Electrochemical Reduction
9476	Dhaval Patel, Bhavikkumar Mahant and Rajnish Kumar	Investigation On Synthetic Natural Gas Storage In The Form Of Gas Hydrate

Oral Presentations

Materials

12:15- 4:10 PM, Thursday, July 7

Virtual Room A Zoom ID: 814 8739 4849 Passcode: 571140

I.D.	Authors	Title
9725	Zishuai Zhang and Curtis Berlinguette	Cement Production In An Electrolyser With Low Carbon Emissions
6113	Bhavikkumar Mahant, Omkar Singh Kushwaha and Rajnish Kumar	Application Of Pnictogen Oxides In Methane Gas Hydrate Formation: An Experimental And Modeling Approach
6095	Antonio Tricoli and Borui Liu	Engineering Dual-Ion Transport Materials For Next Generation High Energy Density Storage (Passcode: nj\$=z02b)
2724	M. Mustafa Azeem, Shiddartha Paul, Daniel Schwen, Michael Short and Kasra Momeni	Role Of Nanovoids In Incoloy-Ni Multilayered Metallic Composites For Advanced Nuclear Reactors
3851	Yangyuan Ji, Matthew Tao, Yuhang Fang, Lamar Mair, Thomas Beechem, David Warsinger and Jeffrey Moran	Self-Propulsion And Photocatalytic Pollutant Degradation By Au@TiO2 Janus Nanoparticles
1172	Sheikh Akbar	Ceramic Nano-Heterostructures By Materials Design: Platforms For Sensing Applications – Opportunities And Challenges
2376	Peng Wang and Laihong Shen	Exploring The Green Production Of Ammonia Via Microalgae Steam Catalytic Gasification Process Over LaFeO ₃ Perovskite
4338	Bo Hou	Dynamic And Steady-State Investigation Of The Band Energy Distributions And Electronic Properties Of Cu ₂ ZnSnS ₄ And Cu ₂ ZnSnSe ₄ Nanocrystals Utilizing Electrochemical Techniques
4636	Jaroslav Milewski and Arkadiusz Szczesniak	A Short Review Of Off-Design Parameters Of A Molten Carbonate Fuel Cell
5090	Zheng Liu	Self-Gating In Semiconductor Electrocatalysis
8074	Di Tian and Zhiguo Qu	Electrochemical Condition Optimization And Techno-Economic Analysis On The Direct CO₂ Electroreduction For Flue Gas
8420	Shaoqiang Nie and Meiqian Chen	Evaluation On Hydrothermal Gasification Of Styrene-Butadiene Rubber With Oxidants Via Reaxff-MD Simulation And Chemical Equilibrium Analysis
8972	John Hannon	Novel Catalytic Conversion Of Renewable Alcohols Into Gasoline, Sustainable Aviation Fuels (Safs) Blendstocks And Chemicals (BTEX) To Partially Mitigate Climate Change

Oral Presentations

Innovation Now 2

12:15- 4:30 PM, Thursday, July 7

Virtual Room B

Zoom ID: 830 4605 9257

Passcode: 826058

I.D.	Authors	Title
5366	Nesreen Ghaddar, Kamel Ghali and Jean Paul Harrouz	Novel Concept For Developing Portable Personalized Ventilator With Embedded Air Treatment System To Disinfect, Dehumidify, Cool, And Capture Carbon At Low Energy Cost (A)
5627	Jiaqi Luo, Qiang Zhou and Tao Jin	Suppression Of Rayleigh-Taylor Instability In A Gas-Liquid Standing-Wave Thermoacoustic Engine
7183	Paul Schwarzmayr, Felix Birkelbach, Lukas Kasper and René Hofmann	Development Of A Digital Twin Platform For Industrial Energy Systems
8437	Pei Yong, Audun Botterud, Ning Zhang and Chongqing Kang	Capacity Value Of Demand-Side UPS Storage
6364	Zekai Mu and Xianglei Liu	Axial And Radial Graded Porous Ni Foams Catalyst For Highly Efficient Solar-Driven CO₂ Reforming Of Methane
1817	Sijia Geng, Thomas Lee, Dharik Mallapragada and Audun Botterud	Optimal Co-planning of Distributed Energy Resources for Battery and Hydrogen Electric Bus Fleets
8513	Xiaochen Ma, Wenchao Shi and Hongxing Yang	Effect Of Spray Nozzle Parameters On Surface Wettability And Performance Improvement Of Indirect Evaporative Cooler
6345	Graham Buckley, Iftekhar Hussain and Brian Norton	Trial Of A Thermophotovoltaic Device In A Cement Cool Down Grate
5970	Andrew Zalay	Innovative Concrete Solutions And Civil Construction: MIT Deep Water Offshore Wind Floater Gulf Of Maine
7031	Zixin Wang, Liyan Feng, Dong Zhang, Yuan Fang, Meijia Song and Zhen Gong	Experimental And Numerical Investigation Of The Auto-Ignition Characteristics Of Cylinder Oil Droplets Under Low-Speed Two-Stroke Natural Gas Engines In-Cylinder Conditions
9954	Yaodong Tu and Gang Chen	Experimental Observations Of The Photomolecular Effect
2791	Wei He, Yuanyuan Shi, Jifang Zhang, Hailong Li and Shengchun Liu	Liquid Cooling System Optimization Of Data Center Server By Considering Monthly Ambient Temperature And Humidity
9465	Adam Powell	High-Temperature Electrochemistry for Climate Mitigation
6906	P V Aravind, Vandit Vijay, L J P van den Broeke, Sukesh A, Sachin J Purushothaman, K U K Nampoothiri, Vipin Champatan, C Smit, T D John, Sowmya Shreedhar, Ref Lindeboom, Girigan Gopi, S Pande, Biju Illathukandy, T M Nandakishor and John Posada	Negative Emissions At Negative Cost: The Carbon Neutral Coffee Program From India And Its Global Relevance
2545	Islam Elnaghy, Amr Elbanhaway and Alexander Slocum	Assessing The Potential And Optimal Scheduling Of An Integrated Pumped Hydro Reverse Osmosis System For Egypt
5817 (poster)	Tao Liu and Yiqiang Li	Experimental Investigation Of Oxygen-Reducing Air Huff And Puff Process Based On Three-Dimensional Physical Models

Oral Presentations

Geo-Energy

12:15- 4:10 PM, Thursday, July 7

Virtual Room C

Zoom ID: 828 1037 4805

Passcode: 818605

I.D.	Authors	Title
2513	Hao Chen, Chenghao Xu, Haizeng Yu, Haipeng Liu, Peilin Wei and Chao Zhang	A Method For Screening CO2-Injected Reservoirs Using Machine Learning
2779	Xiliang Liu, Hao Chen, Shenglai Yang and Jin Yang	Dynamic Characteristics Of Reservoir Fluids In Unconventional Oil Reservoirs During Supercritical CO2 Flooding
6100	Xurong Zhao, Zhiming Chen, Kang Tang, Dexuan Li, Duo Chen and Biao Zhou	Simulation Of Huff And Puff And Sequestration Of Supercritical CO2 In Fractured Shale Oil Reservoir
8164	Boyun Guo, Peng Zhang and He Zhang	Mathematical Modeling Of Heat Transfer From Geothermal Reservoirs To Gas Hydrate Reservoirs
2270	Hao Chen, Yiqi Zhang and Haizeng Yu	Construction, Performance Evaluation And Enhanced Oil Recovery Regulations Of A Multi-Functional Compound Fracturing Fluid System
5263	Ali Toorajipour, Hamed Aghaei, Mehdi Escrochi and Milad Farahani	Effect Of SC-CO2 Injection On Pore Compressibility Of Limestone
3724	Jun Jin, Hong Tuo, Wei Zhou and Hao Chen	Study On Phase Characteristics Of Carboniferous Middle-Deep Near Critical Condensate Gas Reservoirs In Shixi 16 Well Area
4310	Xiaochen Wang, Xinwei Liao, Kang Tang and Peng Dong	Optimization And Evaluation Of CO2 Storage And Enhanced Oil Recovery In Low Permeability Reservoir
4999	Kangping Gao, Xinxin Xu and Shengjie Jiao	Research On Prediction Of Drilling Energy Consumption Based On Mechanism And Data Hybrid Drive
5067 (poster)	Hao Chen, Haipeng Liu, Yi Wu, Xinyu Qi, Chenghao Xu and Chao Zhang	Prediction Of CO2 Flooding Oil Recovery Based On Support Vector Machine
7587	Josiane Jello and Tugce Baser	Repurposing Abandoned Oil And Gas Wells For Geothermal Applications
7661	Lin Jia and Kewen Li	Modelling Of A Retrofitting Methodology To Revive Abandoned Oil Reservoirs For Geothermal Exploitation

Oral Presentations

Energy Economics & Policies

11:10 AM – 4:00 PM, Friday, July 8

Virtual Room A

Zoom ID: 814 8739 4849

Passcode: 571140

I.D.	Authors	Title
2639	Sufang An, Xiangyun Gao, Feng An and Haizhong An	Early Warning Of Critical Transition In Energy And Stock Market
3372	Raquel Alonso Pedrero and Pedro Crespo del Granado	Interactions Between Retailers And Energy Communities: Studying Tariff Subscriptions And Balancing Costs
5342	Shivani Parikh, Mahala Lahvis, Zeyneb Magavi, Parichehr Salimifard, Jonathan Buonocore and Joseph Allen	Understanding Differences In Seasonal Variation By US State: Applications Of The Falcon Curve
6017	Dongwei Zhao, Sarah Coyle, Audun Botterud and Apurba Sakti	Ensuring Social Optimum And Revenue Adequacy: Mechanism Design For Low-Carbon Energy Resources Investment In Deregulated Electricity Markets
6048	Fabio Silva, Castro Soares and Milagre Manhique	Social Innovation For Community Energy In Developing Countries – New Models And A Mozambican Case Study
7729	Florian Siekmann and Sandra Venghaus	Determining Sustainable Transition Paths Using A Multi-Stakeholder Decision Support System
8039	Holger Schloer and Stefanie Schubert	The Food-Energy-Water-Nexus Between Ecomodernism And Degrowth Narrative – A Welfare Economics Model Approach
8302	Francesca Andreolli, Chiara D'Alpaos and Peter Kort	Impact Of P2P Trading On The Decision To Invest In Domestic PV-Battery Systems
474	Sandra Venghaus and Aylin Calik	Resilience Of The European Green Deal In Turbulent Times – The COVID-19 Pandemic
5741	Jasmine Badiee and John Schramski	Energy Investment, Socioeconomic Structures, And Sustainable Energy Systems
9234	Ettore Francesco Bompard, Stefano Corgnati, Antonio Forte, Andrea Mazza, Audun Botterud and Carlo Papa	A Conceptual Framework For Comparing Alternative Commodities In The Energy Transition
6226	Charles Forsberg	What Is The Demand For Low-Carbon Liquid Hydrocarbon Fuels And Feedstocks?
1385	Shiva Madadkhani and Svetlana Ikonnikova	Can Renewable Energy And Carbon Policies Address Security And Affordability Challenges? A Machine Learning Analysis Of The Power Price Dynamics In Germany
584	John Ballantine and Mohammed Almehdar	OPEC Might Be Investing In Our Futures
1719	Robert Hayes	Nuclear Energy As A Safe, Environmentally Friendly And Sustainable Baseload Supply
8468	Xiaowen Kang	Explanation Of The Decision-Making Process Based On The Nested Self-Consistency Principle

Oral Presentations

Renewable Energy

11:10 AM – 3:40 PM, Friday, July 8

Virtual Room B Zoom ID: 830 4605 9257 Passcode: 826058

I.D.	Authors	Title
2051	Shah Kabir, Jose Benavides, Pushpesh Sharma and Ahmed Al Saedi	Transitioning To Thermal/Solar Energy Resources For Power Generation & Direct Use
5829	Mohammad Ostadi, Leslie Bromberg, Daniel R. Cohn and Emre Gencer	Methanol Production From Synergistically Integrated Natural Gas Reforming And Biomass Gasification
3991	Abhijeet Anand, Ravi Kumar, Vivek Kumar and Priyanka Kaushal	Assessment Of Sugarcane Residues Derived Biochar For Carbon Sequestration In The Soil In India
6172	Yong Hoon Lee, Saeid Bayat and James Allison	Control Co-Design Using A Nonlinear Wind Turbine Dynamic Model Based On Openfast Linearization
6932	Preyashkumar Patel, Rushil Patel, Kavish Shah, Sunil Kale and Paragi Shah	District Cooling System With Solar Based Vapor Absorption Chiller: A Techno-Economic Case Study
7313	Shang Liu and Meng Lin	Mechanistic Understanding Of Coupled Transport Phenomena For Rational Design Of Solar Interfacial Evaporation Devices
9648	Songye Zhu and Jian Zhang	Power Performance Of Wind Turbines In Wake Regions
8145	Robert Brown	Carbon Negative Energy Through Pyrolysis Of Lignocellulose Biomass
8555	Saeid Bayat, Yong Hoon Lee and James Allison	Nested Control Co-Design Of A Spar Buoy Horizontal-Axis Floating Offshore Wind Turbine
2102	Srijoni Banerjee, Arnab Atta and Debabrata Das	Process Parameter Optimization For Microalgal Biodiesel Production In A Biorefinery Approach
4692	Xiaotao Bi, Haoqi Wang and Roland Clift	Optimal Use Of Waste Biomass As A Renewable Energy Source For Meeting 2030 Paris Target
6078	Zhiping Zhang, Fuke Ai, Yamang Li, Zengshe Liu, Qiyou Wu, Zhisai Duan, Hanchuan Liu and Quanguo Zhang	Co-Production Process Optimization And Carbon Footprint Analysis Of Bio-Hydrogen And Bio-Fertilizer From Straw Biomass By Photo-Fermentation
8514	Zhenyi Wang, Jun Cheng, Danni Guo, Lechong Chen, Xuanxiang You and Yang Tang	A Novel Simulation Calculation Model Based On Photosynthetic Electron Transfer For Microalgal Growth Prediction In Any Photobioreactor
8906	Andy Zalay	Walk The Talk: MIT Harvard Campus Powered By A Floating Wind Farm
4117 (poster)	Kuanrong Qiu and Evgueniy Entchev	Biomass-Fired Organic Rankine Cycle-Based CHP For Community-Scale Applications

