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International Conference on Applied Energy

Applied Energy Symposium
MIT A+B 2024

Co-organized with HARVARD

Aug. 12-15, 2024 • 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 CO_2 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 MITAB2024

Prof. Ju Li
Massachusetts of Institute of Technology

Prof. Michael J. Aziz
Harvard University

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

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Acknowledgments

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Program at a Glance

Day 0: 2:00 PM - 6:00 PM, Monday, Aug 12, MIT Stata Center 1st Floor	
14:00 -18:00	Registration
Day 1: 8:30 AM - 8:00 PM, Tuesday, Aug 13, MIT Stata Center	
8:30 -8:35	Chair Welcome & Opening Remarks
8:35-9:25	Reactive Carbon Capture
9:25-10:15	Energy and Environmental Justice: Theory and Action
10:15-10:40	Coffee/Tea Break & Group Photo
10:40-11:30	Cellulosic Biofuel 2.0
11:30-12:20	Nuclear-Energy Heat Hydrogen and Electricity for Large-Scale Mining and Billion-ton Negative Carbon Emissions
12:20-13:30	Lunch Break
13:30-17:45	Carbon Emission and Storage
13:30-16:45	Hydrogen and Energy Storage
13:30-18:05	Energy Management, Policy and Economic 1
18:00-20:00	Dinner Reception (MIT Stata Center, Forbes Cafe)
Day 2: 8:30 AM - 6:05 PM, Wednesday, Aug 14, MIT Stata Center	
8:30-11:30	Carbon Capture and Utilization
8:30-12:45	Green Building & Electric Vehicle
8:30-12:05	Distributed Energy System & Network
11:45-13:30	Lunch Break
13:30-17:40	Energy System & Network
13:30-16:50	Intelligent Energy
13:30-18:05	Energy Management, Policy and Economic 2
Day 3: 8:10 AM - 12:45 PM, Thursday, Aug 15, MIT Stata Center	
8:30-12:25	Renewable Energy
8:30-12:25	Energy Management, Policy and Economic 3

Plenary Keynotes

Aug. 13 (Tues) 8:30-12:00AM: **MIT Stata Center, Room 123**

Curtis P. Berlinguette
Professor
University of British Columbia

Reactive Carbon Capture

Carbon capture and utilization schemes require that CO_2 captured from the atmosphere (or a point source) be released from the sorbent, and that the sorbent be recycled to capture additional CO_2. Alkaline solutions such as KOH are effective at capturing CO_2 through reactions that form (bi)carbonates, but the recovery of CO_2 gas and hydroxide before CO_2 electrolysis requires energy-intensive steps. We solved this problem by designing an electrochemical reactor that converts bicarbonate “reactive carbon capture solutions” into carbon-containing products. In this presentation, I will show how this reactor couples CO_2 conversion with upstream carbon capture. Not only does this reactor bypass the expensive step of liberating CO_2 from the sorbent, but it can also perform better than the reactors fed with gaseous CO_2.

Daniel M. Kammen
Professor
University of California, Berkeley

Energy and Environmental Justice: Theory and Action

With anthropogenic climate change now impacting infrastructure, biodiversity, and energy system design worldwide, new approaches are needed that mix mitigation and adaptation with a very intentional approach to the unequal burdens that affluent and marginalized communities face. This new nexus, 'the Just Energy Transition' is widely discussed, but far less often quantified, and rarely made the central theme in data collection, impact assessment, and proactive science, engineering, public policy, and social justice initiatives. In this talk we review the state of technical and policy approaches to climate justice, and examine how new energy-water-climate-community efforts can lead to lower cost, higher reliability infrastructure design that promotes not only climate-smart, but also community empowering energy policies in the greenhouse. We draw from work in California, the US, and East Africa to make these policies and energy systems design principles concrete.

Plenary Keynotes

Lee R. Lynd
Professor
Dartmouth College

Cellulosic Biofuel 2.0

Cellulosic biofuels fell short of expectations over the last decade but have potential to play a major role as part of the sustainable energy transition. Perspectives will be offered pursuant to configuring Cellulosic Biofuel 2.0 for success, including:

- The need for cellulosic biofuels as key components of the sustainable energy transition, with an emphasis on negative emissions.
- Graceful land use strategies, in particular for avoiding land competition and enhancing the cost effectiveness and sustainability of food and feed production.
- Consolidated bioprocessing (CBP), a technology with potential to enable cost-competitive conversion of cellulosic biomass to fuels for light and heavy-duty transport applications.
- Terragia, a recently formed startup aiming to commercialize CBP.

Charles W. Forsberg
Professor
Massachusetts of
Institute of Technology

Nuclear-Energy Heat Hydrogen and Electricity for Large-Scale Mining and Billion-ton Negative Carbon Emissions

In a low-carbon world, the mining industry may consume 20% of global energy production. Today the mining industry moves minerals (iron ore, copper, etc.) from hard rock basins long distances to sedimentary rock basins containing fossil fuels. The fossil fuels chemically convert ores into metals such as iron and copper using technologies such as blast furnaces. Take away fossil fuels favors the conversion of ores to metallic iron and copper at the mine site. Nuclear energy can provide at remote sites the required heat, hydrogen and electricity. The hydrogen would be used to fuel mine trucks, direct reduction of iron ore to iron thus replacing coal as a chemical reducing agent and direct reduction of other oxide and sulfide ores to metals. Electricity is required to grind rock. The largest future mining market may be mining and grinding basalt to add as a fine sand to soils and the ocean to remove carbon dioxide (CO_2) from the atmosphere. The calcium and magnesium oxides in the rock react with atmospheric CO2 to ultimately produce carbonates—the same weathering process the earth uses to remove CO_2 from the atmosphere. Some combination of heat, electricity and hydrogen can provide the heat for cement production.

Moderator

Prof. Michael Aziz

Harvard University

Prof. Ju Li

Massachusetts Institute of Technology

Session Keynote Speaker

Prof. Herbert H Einstein

Massachusetts Institute of Technology

Energy Storage in the Geologic Environment

Prof. Marilyn Brown

Georgia Institute of Technology

Mobilizing household adoption of climate-smart electric technologies: Lessons from Georgia and the U.S

Dr. Robert Kleinberg

Columbia University

Problems with Life Cycle Analyses of U.S. LNG Exports and Locally Produced Coal

Prof. Magnus Korpås

Norwegian University of Science and Technology

The Role of Nuclear Energy and Baseload Demand in Capacity Expansion Planning for Low-Carbon Power Systems

Prof. Jay Lee

University of Southern California

Navigating the transition: co-optimization of multiple hydrogen production technologies and electricity sources for resilient supply chain

Prof. Tugce Baser

University of lllinois at Urbana-Champaign

A Community-Scale Geothermal Network in Chicago

Dr. Aimé Fournier

Massachusetts Institute of Technology

Analysis and simulations aimed at electrical fracturing for enhanced geothermal systems

Prof. Edwin Tso

City University of Hong Kong

The Green Revolution: Innovations in Intelligent Building Envelope Materials for Carbon Neutrality

Dr. Rachel Meidl

Rice University

A Systems Perspective for Navigating the Complexities of Sustainability and a Circular Economy

Prof. Wei He

King's College London

Energy storage and flexible technologies for renewable integration and sustainability

Oral Presentations

Carbon Emission and Storage

Afternoon, Tuesday, August 13

Location: MIT Stata Center, Room 141

Session Chairs: Kevin Van Geem, Harshil Kamdar

Time	I.D.	Authors	Title
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2:05 - 2:25 PM	341	Ray (Zhenhua) Rui, Ting Hu	Research progress on integrated technology of CO2 geological utilization and storage
2:25 - 2:45 PM	90	Vaibhav Bahadur and Awan Bhati	CO2 hydrates-based seabed storage of carbon : Plan B for gigascale sequestration
2:45 - 3:05 PM	224	Kevin Van Geem	Electrification of steam cracking as a pathway to reduce the impact of the petrochemical industry on climate change
3:05 - 3:25 PM	233	Narayanan Komerath and Ravi Deepak	Exploring Sea Level Rise Reversal
3:25 - 3:45 PM	Coffee/Tea Break		
3:45 - 4:05 PM	295	Harshil Kamdar, Jordan Kruguer, Zachary Weller, Evan Sherwin, Yuanlei Chen, Joshua Romo, Lara Owens, Petr Yakolev, Erin Wetherley and Elena Berman	Creating Accurate Methane Emission Inventories through Data-Driven Airborne Survey Strategies
4:05 - 4:25 PM	234	Bashu Aman, Sampada Acharya and B. Reeja-Jayan	Using Microwave Irradiations to Reduce CO2 Emissions from Alumina Ceramic Sintering Process
4:25 - 4:45 PM	243	Levent Taylan Ozgur Yildirim, Qihao Qian and John Wang	A Critical Review of Assessments of Geological CO2 Storage Resources in Pennsylvania and the Surrounding Region
4:45 - 5:05 PM	301	Evan D. Sherwin, Jordan Kruguer, Erin B. Wetherley, Steve Deiker, Adam R. Brandt, Sebastien C. Biraud and Elena S.F. Berman	Large reductions in Permian Basin methane intensity shown in multi-year comparison of aerially-visible methane emissions
5:05 - 5:25 PM	323	Matthew Kanan, Jade Marcus and Yuxuan Chen	Mobilizing Earth's Base to Remove Carbon and Improve Agriculture
5:25 - 5:45 PM	205	Vladimir Kutcherov	Hydrocarbon Emission from Gas Hydrates: problem or challenge?

Oral Presentations

Hydrogen and Energy Storage

Afternoon, Tuesday, August 13

Location: MIT Stata Center, Room 144

Session Chairs: Yuan Yang, Jeung Ku Kang

Time	I.D.	Authors	Title
1:30 - 2:05 PM	230	Jay Lee **(Keynote Speaker)** and Sunwoo Kim	Navigating the transition: co-optimizing diversified hydrogen and electricity portfolio for resilient supply chain considering hourly fluctuation
2:05 - 2:25 PM	271	Jeung Ku Kang	Atomic and molecular units for high-performance energy storage materials and devices
2:25 - 2:45 PM	263	Hongbing Ding, Ji Chao, Yan Yang and Chuang Wen	Water condensation and droplet wetting on gas diffusion layers in PEMFC by molecular dynamic simulation
2:45 - 3:05 PM	281	Mercy Budu and Keena Trowell	Performance Evaluation of SOFCs with Humidified Hydrogen
3:05 - 3:25 PM	308	Shomik Verma, Mehdi Pishahang and Asegun Henry	Hydrogen combustion coupled with thermophotovoltaics for clean dispatchable power generation
3:25 - 3:45 PM	Coffee/Tea Break		
3:45 - 4:05 PM	324	Yuan Yang	Alkaline metal sulfur batteries for electrochemical energy storage
4:05 - 4:25 PM	321	Jaesung Kim, Dongwei Zhao, Audun Botterud and Fikile Brushett	Durational testing of lithium-ion battery cells using grid-informed duty cycles
4:25 - 4:45 PM	306	Qingye Lu, Md. Mehadi Hassan, Ruijie Yang, Brett Conners and Mojtaba Ebrahimian Mashhadi Mashhadi	Nanostructure Control of Biopolymer-based Electrolyte Membrane for Solid-State Lithium-ion and Sodium-ion Battery

Oral Presentations

Energy Management, Policy and Economic 1

Afternoon, Tuesday, August 13

Location: MIT Stata Center, Room 155

Session Chairs: Amos Oppong, Sandra Venghaus

Time	I.D.	Authors	Title
1:30 - 2:05 PM	320	Marilyn Brown **(Keynote Speaker)** and Snehal Kale	Mobilizing residential markets for climate-smart electric technologies: Lessons from the U.S.
2:05 - 2:25 PM	248	Frederick Ofosu Oduro and Amos Oppong	Geothermal Energy Development in East Africa: A Systematic Review of Strategies for Sustainable Resource Management
2:25 - 2:45 PM	228	Christopher Jackson and Emma Aisbett	Multi-Criteria Analysis for Prioritizing Green Industrial Policy
2:45 - 3:05 PM	226	Rui Mao, Zilong Zhao, Xinlei Wang and Wenjun Pan	Management of Greenhouse Solar Harvesting at Low Latitudes: Impacts of Slope, Curvature and Symmetry of the Envelope
3:05 - 3:25 PM	240	Ashley Bock, Pascal Boudreau and Jeffrey Bergthorson	Techno-Economic Assessment of Aluminum, Magnesium, and Zinc as Potential Clean Energy Carriers
3:25 - 3:45 PM	Coffee/Tea Break		
3:45 - 4:05 PM	238	Sandra Venghaus and Rega Sota	Participatory Modelling for the Sustainable Design of Hydrogen Projects in Sub-Saharan Africa
4:05 - 4:25 PM	242	Kester Wade and Destenie Nock	Powering fairness: How equity factors into residential energy efficiency program benefits
4:25 - 4:45 PM	251	Hange Lao and Wei He	Cost-effective solar-powered cold storage for meat perseveration in Sub-Saharan food markets
4:45 - 5:05 PM	265	Ruoqing Wang and Wei He	Cost reduction potential of Carbon Dioxide Removal using Bipolar Membrane Electrodialysis
5:05 - 5:25 PM	268	James Olson, Emily Liu and Brandon Costelloe-Kuehn	A Strategy to Align Nuclear Technology and Climate Initiatives
5:25 - 5:45 PM	260	Kakali Mukhopadhyay and Vishnu Prabhu	Decarbonization pathways of transport sector: A case study of India#
5:45 - 6:05 PM	250	Louis Ziem, Bless Henry Atoklo and Adwoa Sarfo Asante	Greening Ghana: Analysing the Emissions Levy Act 2023 (Act 1112) and Its Implications for Carbon Taxation

Oral Presentations

Carbon Capture and Utilization

Morning, Wednesday, August 14

Location: MIT Stata Center, Room 141

Session Chairs: Yu Huang, Tae Seok Moon

Time	I.D.	Authors	Title
8:30 - 8:50 AM	314	Yu Huang	Accelerating Catalyst Design for Decarbonization of Energy Consumption
8:50 - 9:10 AM	280	Mohammad Ostadi, Daniel R. Cohn, Guiyan Zang, Christopher Douglas and Leslie Bromberg	Potential Expansion of US Low-Carbon Liquid Fuel Production Using Hydrogen-Enhanced Biomass/MSW Gasification and Captured CO2
9:10 - 9:30 AM	302	Tae Seok Moon, Jinjin Diao, Yuxin Tian and Yifeng Hu	Upcycling waste polyethylene terephthalate and other plastics into high-value bioproducts using novel synthetic biology tools
9:30 - 9:50 AM	225	Afroditi Kourou, Subhajit Dutta, Tamas Buzogany, Geraldine Heynderickx, Yi Ouyang and Kevin Van Geem	Optimizing CO2 Capture: Advancements in Process Integration and Intensification to Minimize Energy Consumption
9:50 - 10:10 AM	283	Arash Ostovar and Nashaat N. Nassar	Optimizing Alkali Metal Attribution and Rapid Dielectric Heating in Microwave Swing Adsorption for Enhanced CO2 Adsorbent Regeneration
10:10 – 10:30 AM	299	David Cruz, Hyeonji Park, Phoenix Tiller, Ronalds Gonzalez, Ashutosh Mittal, David K. Johnson and Sunkyu Park	Catalytic Upgrading of Carbohydrates in Paper Sludge to Hydrocarbons
10:30 – 10:50 AM	Coffee/Tea Break		
10:50 – 11:10 AM	327	Opeyemi Fadipe, Seong Lee, Steve Efe and Zheng Li	Computational Fluid Dynamics Analysis of Pressure Drop in Advanced Swirling Fluidized Bed Combustion
11:10 – 11:30 AM	21	Yu Zhe	Environmental and economic evaluation of urban building-integrated photovoltaic and electric vehicle system

Oral Presentations

Green Building & Electric Vehicle

Morning, Wednesday, August 14

Location: MIT Stata Center, Room 144

Session Chairs: Chi Yan Tso, Said Al-Hallaj

Time	I.D.	Authors	Title
8:30 - 9:05 AM	229	Chi Yan Tso **(Keynote Speaker)**	The Green Revolution: Innovations in Intelligent Building Envelope Materials for Carbon Neutrality
9:05 – 9:25 AM	10	Yingbo Zhang and Shengwei Wang	Life-Cycle Optimal Design and Energy Benefits of Centralized Cooling Systems for Data Centers Concerning Progressive Loading
9:25 – 9:45 AM	304	You Lin, Kirsi Rajagopal, Antonio Forte, Dharik Mallapragada and Audun Botterud	High-Resolution Analytics for Cost-Effective and Equitable Electrification of Urban Transportation Fleets
9:45 -10:05 AM	236	Jasmina Burek, Yicheng Zhang, Mahsa Ghandi, Cordula Schmid, Ehsan Vahidi, Jeremy Gregory and Randolph Kirchain	The Role of Passive-Solar House Design in Enhancing Sustainability: A Comprehensive Life Cycle Assessment Across the U.S.
10:05-10:25 AM	255	Liang Zhang and Wei He	Quantifying Mileage Differences in Electric Vehicles Through Thermal Management
10:25-10:45 AM	Coffee/Tea Break		
10:45-11:05 AM	335	Said Al-Hallaj and Stoyan Stoyanov	Maximizing eVTOL ROI and Second Life Utilization Through Fast Charge, Thermal
11:05-11:25 AM	278	Andrea Boero Vera, Cordula Schmid, Lourdes Medina, David Claudio, John-Michael Davis, Scott Jiusto, Aaron Smith-Walter and Jasmina Burek	From Crisis to Opportunity: Enhancing Energy Resilience in U.S. School Buildings
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11:45-12:05 AM	307	Rebecca Grekin, Jacques de Chalendar and Sally Benson	Updating "Set it and forget it" Parameters in Existing Commercial Buildings in the United States: An Opportunity for Significant Energy Savings at Low Cost
12:05-12:25 AM	316	Junxiang Zhang, Ying Du, Haoran Zhang and Jinyue Yan	Prospecting Global EV Charging Patterns with Geospatial Features Without Prior Knowledge of EV Charging Records
12:25-12:45 AM	293	Guoquan Lv, Duarte Carlos and Zilong Zhao	Sensitivity Analysis of Energy Flexibility in Radiant Cooling Floors and Ceilings

Oral Presentations

Distributed Energy System & Network

Morning, Wednesday, August 14

Location: MIT Stata Center, Room 155

Session Chairs: Magnus Korpås, Subhash Kumar

Time	I.D.	Authors	Title
8:30 - 9:05 AM	275	Martin Hjelmeland, Jonas Kristiansen Nøland, Stian Backe and Magnus Korpås **(Keynote Speaker)**	The Role of Nuclear Energy and Baseload Demand in Capacity Expansion Planning for Low-Carbon Power Systems
9:05 - 9:25 AM	232	Julia Granacher, Caleb H. Geissler and Christos T. Maravelias	A general system-level framework to analyze the potential of industrial electrification
9:25 - 9:45 AM	241	Anthony Degleris, Abbas El Gamal and Ram Rajagopal	Scalable and Interactive Electricity Grid Expansion Planning
9:45 - 10:05 AM	270	Luca M. Hartmann, Vineet Jagadeesan Nair and Anuradha M. Annaswamy	Circuit-Aware Distributed Optimal Voltage Control for Distribution Grids
10:05-10:25 AM	274	Prashant Saini, Julián D. Osorio Ramírez and Alejandro Rivera Alvarez	Optimized Technology Selection for Microgrid Integration in Islanded Communities: A Case Study of Cordova, Alaska
10:25-10:45 AM	Coffee/Tea Break		
10:45-11:05 AM	294	Sahar Seyyedeh-Barhagh, Rahman Khorramfar, Morteza Vahid-Ghavidel and Behnam Mohammadi Ivatloo	Enhancing Power Grid Resilience to Natural Disasters: A Two-Stage Stochastic Approach Integrating DERs and Repair Crews
11:05-11:25 AM	325	Joao Luiz Juca, Joao Guilherme Ito Cypriano, Rodolfo Quadros and Luiz Carlos Pereira da Silva	Implementation of CampusGRID: A Case Study of Multifunctional Microgrids for Enhanced Energy Efficiency in University Campuses
11:25-11:45 AM	247	Wei Liao and Fu Xiao	Capacity optimization configuration and operation of distributed integrated energy systems considering building-transportation electrification under various carbon emission scenarios
11:45-12:05 AM	254	Weike Peng, Yuntian Chen and Shengwei Wang	Towards carbon-neutral power system in Hong Kong a spatiotemporal evaluation and optimization framework at hourly resolution

Oral Presentations

Energy System & Network Afternoon, Wednesday, August 14 Location: MIT Stata Center, Room 141 Session Chairs: Wei He, Fábio Silva			
Time	I.D.	Authors	Title
1:30 - 2:05 PM	256	Tugce Baser **(Keynote Speaker)**, Josiane Jello, Katherine Nieto, Andrew Stumpf, Ana Morton Riviera, Andrew Barbeau and Nuri Madina	A Community-Scale Geothermal Network in Chicago
2:05 - 2:40 PM	342	Wei He **(Keynote Speaker)**	Energy storage and flexible technologies for renewable integration and sustainability
2:40 - 3:00 PM	322	Atmanandmaya, Loganathan Umanand, Reddy B Subba and Wei He	Analysis and Application of Peltier Module for Surface Temperature Measurement in Hybrid Source Thermal Desalination System by Module Parameter Estimation
3:00 - 3:20 PM	140	Atmanandmaya, Loganathan Umanand and Reddy B Subba	Development of a Coupled Thermal-Electrical Circuit Model for Peltier device in heat pump application for desalination systems
3:20 - 3:40 PM	Coffee/Tea Break		
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4:00 - 4:20 PM	266	Arvind Srinivasan, Paolo Gabrielli and Giovanni Sansavini	Net emission reductions from community-scale multi-energy systems: a global analysis
4:20 - 4:40 PM	279	Sheng Lun Cao, W. Neal Mann, Zhi Zhou, Jonghwan Kwon, Todd Levin and Destenie Nock	Impact Assessment of Representative Period Selection on Texas ERCOT Capacity Expansion Planning for the Mid- and End-of-Century
4:40 - 5:00 PM	326	Sandeep Yadav, Srinivas Seethamraju and Rangan Banerjee	Techno-Economic Assessment of a Satellite LNG Regasification System Utilizing LNG Cold Energy for Cold Warehouse Facilities
5:00 - 5:20 PM	201	Dieudonné Ecike Ewanga	Multi-state system reliability modeling. Extended Markov model in the presence of distributed production
5:20 - 5:40 PM	222	Xiaowen Kang	Differential Analysis of Evolutionary Paths in Energy Systems Networks Based on the Roll Principle

Oral Presentations

Intelligent Energy

Afternoon, Wednesday, August 14

Location: MIT Stata Center, Room 144

Session Chairs: Amos Oppong, Rahman Khorramfar

Time	I.D.	Authors	Title
1:30 - 1:50 PM	253	Amos Oppong, Nana Ama Bimpomaa Oti, Frederick Ofosu Oduro and Kingsley Nketia Acheampong	Towards Proposing Data-Driven Emission Mitigation Pathways for Ghana: The Role of Using Big Data and Artificial Intelligence to Minimizing Errors
1:50 - 2:10 PM	261	Jing Zhang, Zhe Chen, Tianyou Ma, Kan Xu and Fu Xiao	AI-empowered Digital Twin for Smart Building Management
2:10 - 2:30 PM	267	Subhash Kumar and Padraig Lyons	Optimizing energy generation mix for a power system by considering twin challenge of electrification of heat, transport and industry and new data centers in Ireland
2:30 - 2:50 PM	290	Mohammad Seyfi, Behnam Mohammadi-Ivatloo, Jamshid Aghaei, Morteza Vahid-Ghavidel and Rahman Khorramfar	Deep Reinforcement Learning-mixed integer programming for energy management of prosumers in sector coupling
2:50 - 3:10 PM	310	Bin Wang	A Comparison of Deep Learning-Based Object Detection for Unmanned Aerial Vehicle
3:10 - 3:30 PM	329	Samuel Miles, Ryan McCord, Layla Kwong and Daniel Kammen	Internet of Things could shape healthcare facility electrification: Evidence from the Democratic Republic of the Congo
3:30 - 3:50 PM	Coffee/Tea Break		
3:50 - 4:10 PM	334	Hongjun Tan, Zhiling Guo, Zhengyuan Lin, Yuntian Chen, Haoran Zhang and Jinyue Yan	Enhancing Urban PV Potential Assessment through General Generative AI-based Remote Sensing Image Synthesis
4:10 - 4:30	269	Zhe Song and Fu Xiao	Probabilistic short-term forecasting of photovoltaic power using hybrid boosting machine learning based on numerical weather prediction
4:30 – 4:50	252	Wenchao Shi, Xiaochen Ma and Hongxing Yang	Achieving cooling carbon neutrality by PV-powered hybrid natural cooling approach for data centers in hot and humid regions

Oral Presentations

Energy Management, Policy and Economic 2

Afternoon, Wednesday, August 14

Location: MIT Stata Center, Room 155

Session Chairs: John Ballantine, Ettore Bompard

Time	I.D.	Authors	Title
1:30 - 2:05 PM	8	Rachel Meidl **(Keynote Speaker)**	The Pride and Prejudice of Sustainability: Rethinking Sustainability From a Systems Perspective
2:05 - 2:25 PM	272	John Ballantine	Financing Faster Energy Transitions, redesigning a flexible worldwide financing structure
2:25 - 2:45 PM	291	Audun Botterud, Guillaume Tarel and Magnus Korpås	Towards zero-carbon electricity markets: Price formation and long-term equilibrium
2:45 - 3:05 PM	282	Aaron Tesfa Tsion and Dr Wei He	Identification of Energy Poverty Indicators through Nation-Wide Household Energy Performance Data Analysis
3:05 - 3:25 PM	289	Ivan Endara, Jimmy Cordova and Yaritza Ortega	ELECTRICAL TARIFF A BARRIER FOR THE DEVELOPMENT OF RENEWABLE ENERGIES IN GALAPAGOS
3:25 - 3:45 PM	Coffee/Tea Break		
3:45 - 4:05 PM	277	Ettore Bompard, Audun Botterud, Claudia Concaro, Tao Huang and Stefano Lo Russo	A science based approach for supporting decision-making toward carbon neutrality in cities
4:05 - 4:25 PM	298	Age van der Mei and Audun Botterud	Deploying terawatt-scale renewable energy: where are the world's most economic solar, wind and hydrogen production locations?
4:25 - 4:45 PM	312	Fábio Silva, Aoife Foley, Stefan Bouzarovski, Castro Soares, Milagre Manhique, Patricia M. Kearney, Pádraig Lyons	Energy Poverty Observatory
4:45 - 5:05 PM	313	Greg Bean	Repurposing Fossil Fuel Assets for a Low Carbon World
5:05 - 5:25 PM	328	Kaihui Song and Daniel Kammen	A cost-effective analysis of renewable energy adoption in technology companies: implications to climate targets attainment and energy costs
5:25 - 5:45 PM	318	Hua Song	A sustainable pathway towards methane-assisted biorefineries
5:45 - 6:05 PM	332	Ingemar Mathiasson and Bindu Panikkar	Renewable Energy Transitions and Energy Sovereignty in the Northwest Alaskan Arctic

Oral Presentations

Renewable Energy

Morning, Thursday, August 15

Location: MIT Stata Center, Room 141

Session Chairs: Aimé Fournier, Ju Li

Time	I.D.	Authors	Title
8:30 - 9:05 AM	340	Aimé Fournier **(Keynote Speaker)**, Laurent Demanet and Paris Smalls	Analysis and simulations aimed at electrical fracturing for enhanced geothermal systems
9:05 - 9:25 AM	41	Chenglong Cao, Gang Lin, Jingying Fu and Ziqiang Bu	Capacity allocation optimization method for a Photovoltaic-Pumped Hydro Storage system from abandoned coal mine
9:25 - 9:45 AM	200	Mabruk Adams, Yuyin Wang and Bang Du	Operational mode and powdered activated carbon promoting syntrophic propionate oxidation during anaerobic digestion of complex organic substances
9:45 - 10:05 AM	249	Beenish Saba, Thaddeus Ezeji and Katrina Cornish	Bioenergy from Food Waste Fermentation: A comparison of Conventional and Electro-Fermentation
10:05-10:25 AM	257	Josiane Jello, Katherine Nieto, Andrew Stumpf and Tugce Baser	Numerical Investigation of Thermal Interference in Adjacent Geothermal Systems
10:25-10:45 AM	Coffee/Tea Break		
10:45-11:05 AM	262	Subhash Kumar, Padraig Lyons, Aoife Braiden and Rory Dunphy	Exploring Potential Geothermal District Heating areas by using GIS and Multi Criteria Decision Analysis Methodology in Ireland244
11:05-11:25 AM	288	Remo Schäppi and Aldo Steinfeld	Thermochemical fuel production from sunlight and air
11:25-11:45 AM	303	Peter Scott, Remo Schäppi, Aniket Patankar, Ziyao Wu and Ahmed Ghoniem	Design & Modeling of an Indirectly Irradiated Solar Thermochemical Hydrogen Reactor for use in a Reactor Train System
11:45-12:05 AM	333	Owen Wang and Xiaotu Ma	Innovating the Recycling of Solar Panels with an Eco-friendly Alkaline Leaching Process
12:05-12:25 AM	235	Zilong Zhao, Guoquan Lv, Yanwen Xu and Pingfeng Wang	A Reliability-Based and Stochastic Optimization for Balancing Capacity and Uncertainties in a Roof-Mounted Photovoltaic (PV) System

Oral Presentations

Energy Management, Policy and Economic 3

Morning, Thursday, August 15

Location: MIT Stata Center, Room 155

Session Chairs: Ivan Endara, Emily Liu

Time	I.D.	Authors	Title
8:30 - 9:05 AM	198	Robert Kleinberg **(Keynote Speaker)**	Problems with Greenhouse Gas Life Cycle Analyses of U.S. LNG Exports and Locally-Produced Coal
9:05 - 9:25 AM	79	Florian Siekmann and Sandra Venghaus	Agree to Disagree – Striving for Consensus in Regional Energy Transitions in Germany
9:25 - 9:45 AM	231	Xiaoyu Lin, Shengwei Wang and Kui Shan	Short-term Chiller Plant Control Strategies Utilizing Intrinsic Thermal Storage under Real-time Tariffs changes
9:45 - 10:05 AM	237	Sandra Venghaus, Sebastian Lubjuhn, Florian Siekmann, Rega Sota and Ali Ebadi Torkayesh	Proactive Policy Advice - The Potential of Machine Learning for Predictive Policy Scenario Generation
10:05-10:25 AM	276	Rahman Khorramfar, Ayse Selin Kocaman and Beste Basciftci	The Role of Pumped-hydro Energy Storage in a Power System with Large Renewable Penetration and Uncertainties
10:25-10:45 AM	Coffee/Tea Break		
10:45-11:05 AM	285	Yixi Tian	Processing and Beneficial Uses of Waste-to-Energy Residues in Civil Engineering Applications
11:05-11:25 AM	286	Bryan Higgins, Lincoln Pratson and Dalia Patiño-Echeverri	Critical Assessment of Repurposing Oil & Gas Wells for Enhanced Geothermal Systems Based on Wells in New Mexico, USA
11:25-11:45 AM	330	Alexandra Grayson, Felix Askenberger, Samuel Kuersteiner and Daniel Kammen	Equity in the Expanding US Clean Energy Workforce: A Review and Application to the Marine Renewable Energy Sector
11:45-12:05 AM	311	Yanqi Chen, Ji Zhang, Ding Wu, Yan Yang and Chuang Wen	Thermo-economic assessments of pumped thermal electricity storage systems using supercritical carbon dioxide as the working fluid
12:05-12:25 AM	211	Kui Shan	Development and Implementation of Optimal Control Strategies for Complex HVAC Systems