

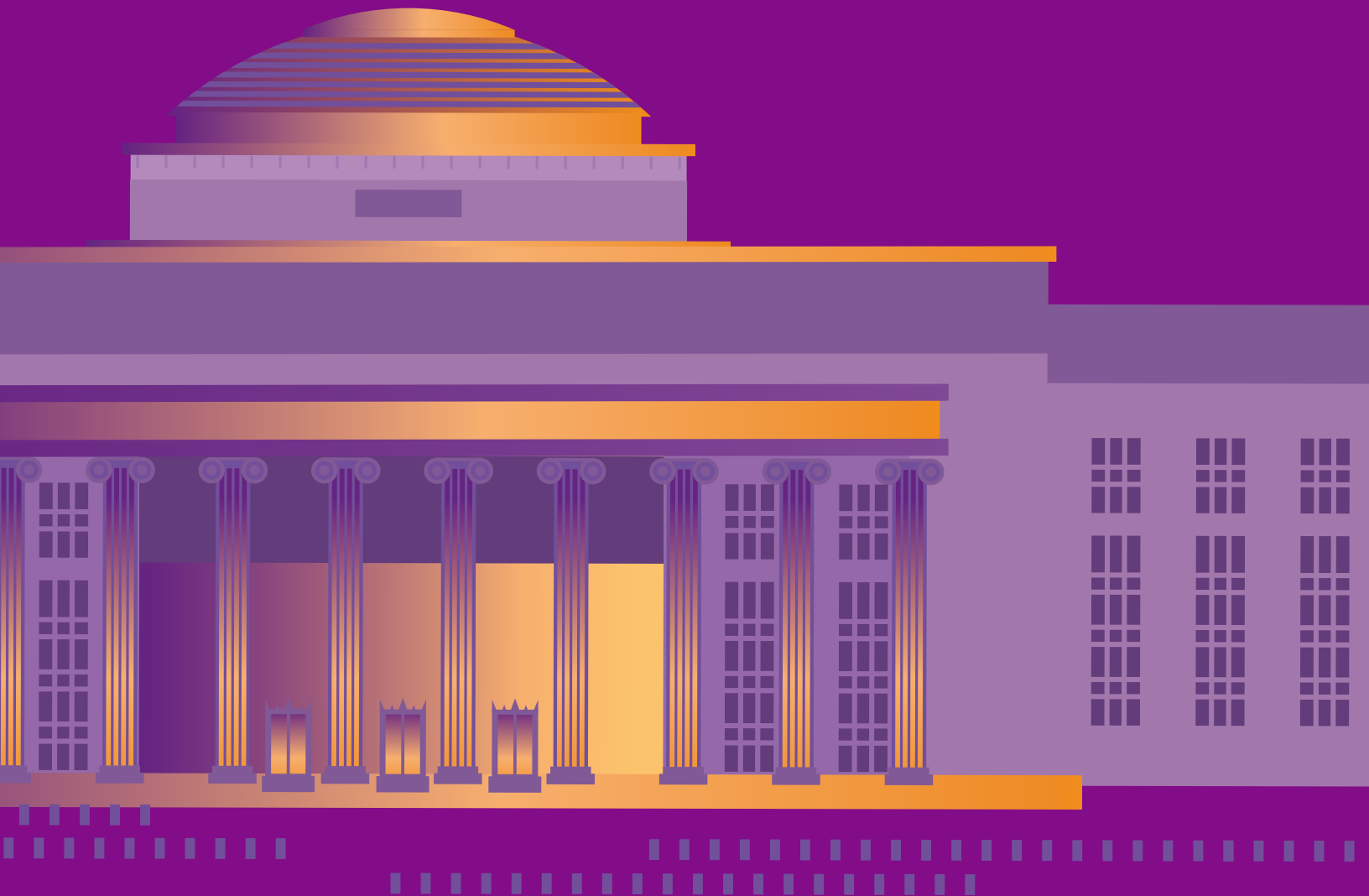
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International Conference on Applied Energy

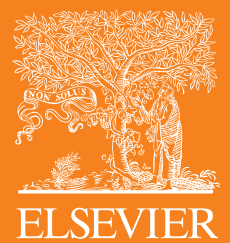
Applied Energy Symposium:

MIT A+B (AEAB2019)

May 22-24, 2019 · MIT, Boston, USA



Applied Energy



Applied Energy covers a broad range of subjects from innovative technologies and systems of both fossil and renewable energy to the economic industrial and domestic use of energy.

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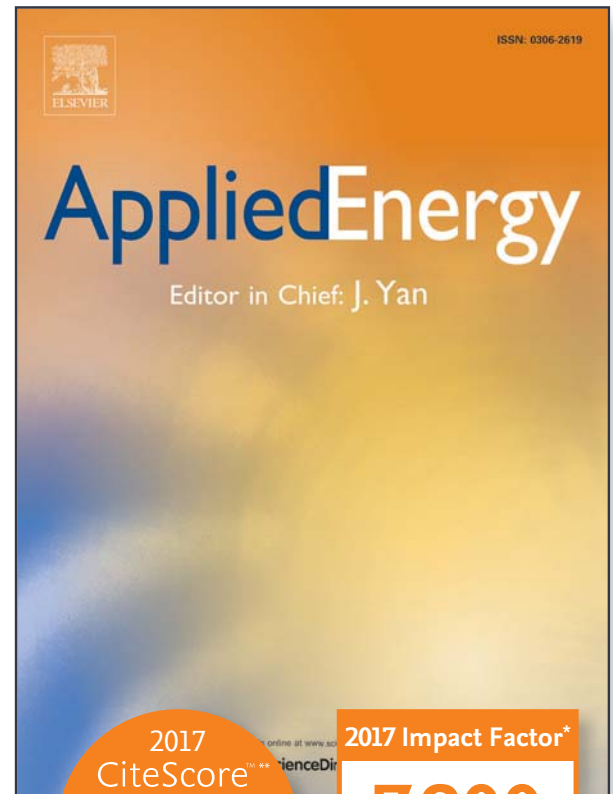
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Welcome



Welcome to AEAB2019-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 will occur on land and in ocean irreversibly and sooner than expected. 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 “A+B” symposium (AEAB2019) 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., in energy storage, superconducting transmission, etc.) that stand a chance to scale to terawatts within 30 years. Examples of topics include, but are not limited to, the following: renewable energy; nuclear energy; clean energy conversion technologies; mitigation technologies; intelligent energy systems; energy storage; and sustainability of energy systems.

The AEAB2019 is organized by the Applied Energy Journal, Applied Energy Innovation Institute (AEii), Massachusetts Institute of Technology USA, Applied Energy UNiLABs, and co-organized by Future Energy Profile/Mälardalen University Sweden.

We look forward to meeting you at MIT in Boston, USA.

Chairs of AEAB2019

Prof. Ju Li
Massachusetts of Institute of Technology

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

- **Welcome to AEAB2019**
- **Committees**
- **Acknowledgments**
- **Plenary Keynotes**
- **Opening Remarks and Banquet Speakers**
- **Investment Panel**
- **Editor Forum**
- **Session Keynotes**
- **Campus and Venue**
- **Speaker's Guide**
- **Program at a Glance**
- **Oral Presentations**
- **Poster Presentations**

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Acknowledgments



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UNILAB

An international virtual lab of collective
intelligence in Applied Energy.

**RESEARCH &
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Eskilstuna Energi & Miljö



CASTELLUM



International Conference on Applied Energy

Plenary Keynotes



DR. Jerry M. Woodall

National Medal of
Technology Laureate
and Distinguished
Professor

University of California,
Davis

Keynote: 24/7 Electricity Produced by Intermittent Power Requires Its Energy Storage

This is a simple story with a no-brainer punchline included in the title. Except for geothermal and nuclear energy, *the sun is, and has been, the source of nearly all energy used on our planet.* The problem is that the earth receives plenty of *intermittent solar power*, but not as *solar energy*. Solar intermittency was not a problem before the industrial revolution, when human daily energy needs were only 1.5-2.0 kWh. The intermittency problem came with the emergence of iron and steel production, industry, and fuel powered transportation. It is important to stress is that *daily sun power did not enable the Industrial Revolution.* Rather, it occurred as the result of the availability of energy storage materials created by the death of life created by intermittent solar insolation over millions of years.

In retrospect, using fossil fuels, rather than using daily solar insolation, to launch and develop our current enormous energy consuming and data-driven society was a human tragedy. We are now faced with two daunting global scale energy creation and distribution issues. One is having to legislate use restrictions for societies with opulent lifestyles. This is a dangerous ploy because the “haves” will not be eager to give up what they already have. The other one is that, owing to instantaneous global communication, the “have nots” will “vigorously” demand energy parity.

After all the low hanging “energy conservation” fruit is picked, what’s next? Resources are available to realize a “greatly reduced fossil fuel” solution to satisfy future disparate societal demands for energy. The sun is free. Less than 10 minutes of solar insolation will create a year’s worth of global energy needs. Capitalization costs of solar cells and wind turbines make them non-competitive with fossil fuel. However, a long-life use factor amortization could bring solar power economics into parity with fossil fuels. The principal remaining issue is to mitigate the sun’s intermittency. *This simply requires economical energy storage of wind and solar power.*

Finally, there is plenty of fossil fuel to supply worldwide energy needs for the foreseeable future. But there are many reasons to stop using fossil fuels for energy and to get on with converting daily solar power into 24/7 electricity. An important one is that global scale conversion of solar power to electricity via storage does not raise earth’s temperature!

Keynote: Evolution of the Energy Mix and Its Implications

With the worldwide industrial development, demand for energy increased over time. From a historical perspective, such demand or hunger for energy was met through various means over the time. One of the interesting observations that we can make is that the future has been hard to predict. This talk will focus on the current state of affairs in terms of global energy mix and various trends and future and current alternatives. It is well known that Human Development Index and primary energy use per capita is correlated. As the future energy demand is expected to increase, meeting such demand in a scalable manner poses many current and also future challenges. Some of the key challenges are the GHG emissions and various environmental footprints depending on the source of the energy. Meeting the challenge of reducing GHG emissions will require a fully diversified portfolio of approaches, including conservation and efficiency gains from fossil fuels and renewables.

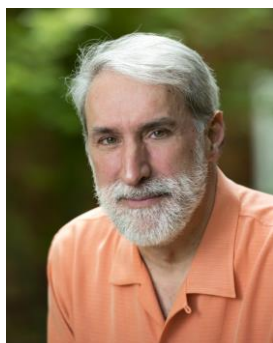


DR. Birol Dindoruk

Chief Scientist

Shell

Plenary Keynotes



DR. Daniel G. Nocera

Patterson Rockwood
Professor of Energy
Harvard University

Keynote: A Sustainable and Renewable Cycle for Food and Fuels from Sunlight, Air and Water

Hybrid biological | inorganic (HBI) constructs have been created to use sunlight, air and water (as the only starting materials) to accomplish carbon fixation and nitrogen fixation, thus enabling distributed and renewable fuels and crop production.

The carbon and nitrogen fixation cycles begin with the artificial leaf, which was invented to accomplish the solar fuels process of natural photosynthesis – the splitting of water to hydrogen and oxygen using sunlight – under ambient conditions. To create the artificial leaf, an oxygen-evolving complex of Photosystem II was mimicked, the most important property of which was the self-healing nature of the catalyst. Self-healing catalysts of the artificial leaf permit water splitting to be accomplished using any water source—which is the critical development for: (1) the artificial leaf, as it allows for the facile interfacing of water splitting catalysis to materials such as silicon and (2) the bionic leaf, as it allows for the facile interfacing of water splitting catalysis to bioorganisms. For the latter, using the tools of synthetic biology, a bio-engineered bacterium has been developed to convert carbon dioxide from air, along with the hydrogen produced from the catalysts of the artificial leaf, into biomass and liquid fuels, thus closing an entire artificial photosynthetic cycle. The HBI, called the bionic leaf, operates at unprecedented solar-to-biomass (10.7%) and solar-to-liquid fuels (6.2%) yields, greatly exceeding the 1% yield of natural photosynthesis.

Extending this approach, a renewable and distributed synthesis of ammonia (and fertilizer) at ambient conditions has been created by coupling solar-based water splitting to a nitrogen-fixing bioorganism in a single reactor. Nitrogen is fixed by using the hydrogen produced from water splitting to power a nitrogenase installed in a bioorganism. The ammonia produced by the nitrogenase can be diverted from biomass formation to extracellular production with the addition of an inhibitor. The nitrogen reduction reaction proceeds at high turnover per cell and operates without the need for a carbon feedstock (other than the CO₂ provided from air). This nitrogen-fixing HBI can be powered by distributed renewable electricity, enabling sustainable crop production with a carbon negative budget.

The science that will be presented will show that using only sunlight, air and water, a distributed system may be established to produce fuel and food. Such science will be particularly useful to the poor of the world, where large infrastructures for fuel and food production are not tenable.

Keynote: Nuclear Energy: A New Beginning?

Harnessing the power of the atomic nucleus for peaceful purposes was one of the most astonishing scientific and technological achievements of the 20th century. It has benefitted medicine, security, and energy. Yet, after a few decades of rapid growth, investment in nuclear energy has stalled in many developed countries and nuclear energy now constitutes a meager 5% of global primary energy production.

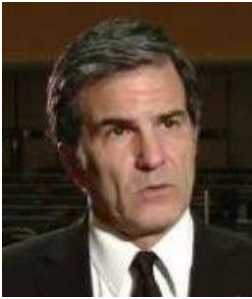
In the 21st century the world faces the new challenge of drastically reducing emissions of greenhouse gases while simultaneously expanding access to energy and economic opportunity for billions of people. In the new MIT study presented here, we have examined this challenge in the electricity sector, which has been widely identified as an early candidate for deep decarbonization. In most regions, serving projected electricity load in 2050 while simultaneously reducing greenhouse gas emissions will require a mix of electrical generation assets that is different from the current system. While a variety of low- or zero-carbon technologies can be employed in various combinations, our analysis shows that excluding nuclear energy as an option may significantly increase the cost of achieving deep decarbonization targets. The least-cost portfolios in our analysis include an important share for nuclear, and the magnitude of this share grows substantially as the cost of nuclear energy drops. Despite this promise, prospects for the expansion of nuclear energy remain decidedly dim in many parts of the world. In this study, we have examined what is needed to reverse that trend. The salient findings will be presented in this talk.



DR. Jacopo Buongiorno

TEPCO Professor
Massachusetts Institute
of Technology

Opening Remarks and Banquet Speakers



MR. Scott Foster

Director, Sustainable
Energy Division, United
Nations Economic
Commission for Europe
(UNECE)

Opening Remarks

Scott Foster has been Director of UNECE's Sustainable Energy Division since 2011. With more than 35 years' experience in energy, Mr. Foster has worked extensively with governments, industry, and international organizations on energy policy, market design and regulation, and climate change strategies. Mr. Foster's particular focus recently has been assisting energy stakeholder's address the critical challenges of sustainability, technology choice, and investment mobilization. Before founding Nomad Energy Consulting in 2004, Mr. Foster was VP of Global Regulatory Affairs with AES Corporation, Senior Director for Global Power with Cambridge Energy Research Associates (CERA), and Senior Expert on Electricity for the International Energy Agency. Mr. Foster holds a BA from Dartmouth College, an MS in Civil Engineering from Stanford University, and an MBA from UC Berkeley



DR. Robert C. Armstrong

Director, MIT Energy
Initiative

Chevron Professor of
Chemical Engineering

Massachusetts Institute of
Technology

Banquet Speaker

Talk: The Global Energy Challenge: What's Ahead

The world is confronted by a two-faceted energy challenge: on the one hand, global energy demand is projected to grow significantly by mid-century and beyond, driven primarily by population growth and by economic growth in developing countries. At the same time, meeting the threat of climate change requires decarbonization of the entire energy system. In this presentation, I focus primarily on the power sector to address this dual energy/climate challenge. Two examples of major changes in generation in the power sector—shale gas and solar energy—are used to illustrate what has been done to date in growing and decarbonizing electricity systems. Each of these comes with its own challenges that, together, help define a long-term strategy captured at MIT in a set of eight low-carbon energy centers. I give examples of game-changing energy technologies emerging in these areas as illustrations of what needs to be done. Finally, developing countries present a unique set of challenges associated with additional economic and other constraints. The Tata Center for Technology and Design at MITEI provides a model for what can be done in these critical regions of the world.



DR. Graham G Rong

Director of Corporation
Relations

Massachusetts Institute of
Technology

Banquet Speaker

Talk: MIT Innovation & Entrepreneurship Ecosystem and How Industry and University Collaborate

Dr. Rong will introduce the MIT Innovation & Entrepreneurship that has cultivated innumerable scientific inventions, technological advancements and over 35,000 startups. He will also discuss the best practices of industry and university collaborations to stay abreast of the latest developments in technology and business practices.

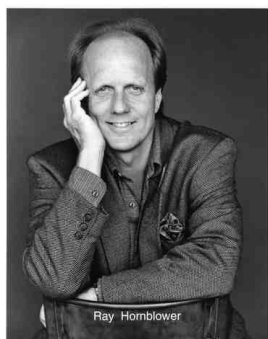
Investment Panel

13:20-14:30, 23rd, May

W20-201 West Lounge

The Investment Path from the Traditional Energy Industry to New Energy Industry

The global new investment in clean energy surged to \$332 bn in 2018 from \$88 bn in 2005 (BloombergNEF, 2019). We are in the middle of a global renewable energy revolution. Investments in renewables have continued to increase each year, led largely by developing countries, and since 2004, the world has invested \$2.9 trillion in green energy sources. Positive developments show that the renewable energy transition is possible, but advances so far are uneven across sectors. After this panel, you will get a better idea of how will technology affect new energy and the investment trend in the renewable energy sector.



Ralph Hornblower III

Founder, Partner and Managing Director of Hornblower & Company, LLC



DR. Ju Li

Chair Professor at Massachusetts Institute of Technology



Montgomery Simus

Vice President of Bayat Energy



Michael Daly

CEO of Executant Global Ventures Group, Limited



Moderator

Ms. Lijie Zhu

Managing Director of Dragon Gate Investment Partners

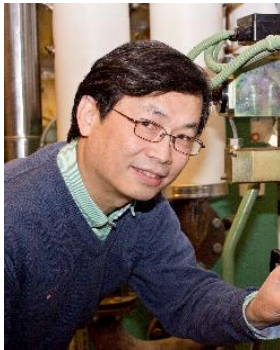
Editor Forum

15:40-16:50, 23rd, May

W20-201 West Lounge

Editor Forum of Energy Journal

- Introduction of energy journals
- Editor's viewpoints on the future energy research
- Trends of scholarly publications
- Interactions among editors, reviewers, authors, and readers



DR. Jerry Jinyue Yan

Chair Professor of Energy
Royal Institute of Technology
Editor-In-Chief of Applied Energy



DR. Aoife Foley

Reader of Queen's University
Editor-In-Chief of Renewable
and Sustainable Energy Review



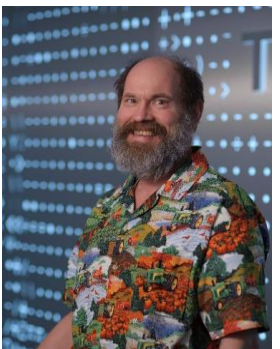
DR. Birol Dindoruk

Chief Scientist of Shell
Editor-In-Chief of Journal of
Natural Gas Science and
Engineering



DR. Brandon Sutherland

Joule, Cell Press
Scientific Editor of Joule



Moderator

DR. Alexander Slocum

Walter M. May and A. Hazel May
Professor
Massachusetts Institute of
Technology

Session Keynotes



DR. Alexander Slocum
Walter M. May and A. Hazel
May Professor
Massachusetts Institute of
Technology



DR. Kaushik Rajashekara
Distinguished Professor of
Engineering
University of Houston



DR. Eric Loth
Rolls Royce Professor
University of Virginia



DR. Peter Bauer
Professor of Electrical
Engineering
University of Notre Dame



DR. Yu Huang
Professor
University of California Los
Angeles



DR. Lee Lynd
Paul and Joan Queneau
Distinguished Professor of
Engineering and Adjunct
Professor of Biology
Dartmouth College



DR. Aoife Foley
Reader and Advisor of Studies,
Editor in Chief of Renewable
and Sustainable Energy Reviews
Queen's University Belfast



DR. Asegun Henry
Associate Professor
Massachusetts Institute of
Technology

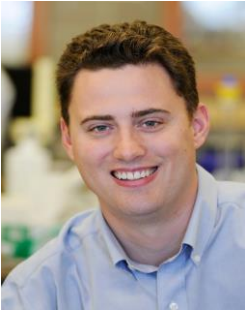


DR. Koroush Shirvan
Assistant Professor
Massachusetts Institute of
Technology



DR. Charles Forsberg
Principal Research Scientist and
Director
Massachusetts Institute of
Technology

Session Keynotes



DR. Edouard Asselin
Canada Research Chair Professor
University of British Columbia



DR. Hailiang Wang
Assistant Professor
Yale University



DR. Ettore Bompard
Professor of Power Systems
Politecnico di Torino



DR. Cheng Sun
Staff scientist
Idaho National Laboratory



DR. Mehrdad (Mark) Ehsani
Robert M. Kennedy Professor
Texas A&M University



DR. Dabo Guan
Chair Professor
University of East Anglia



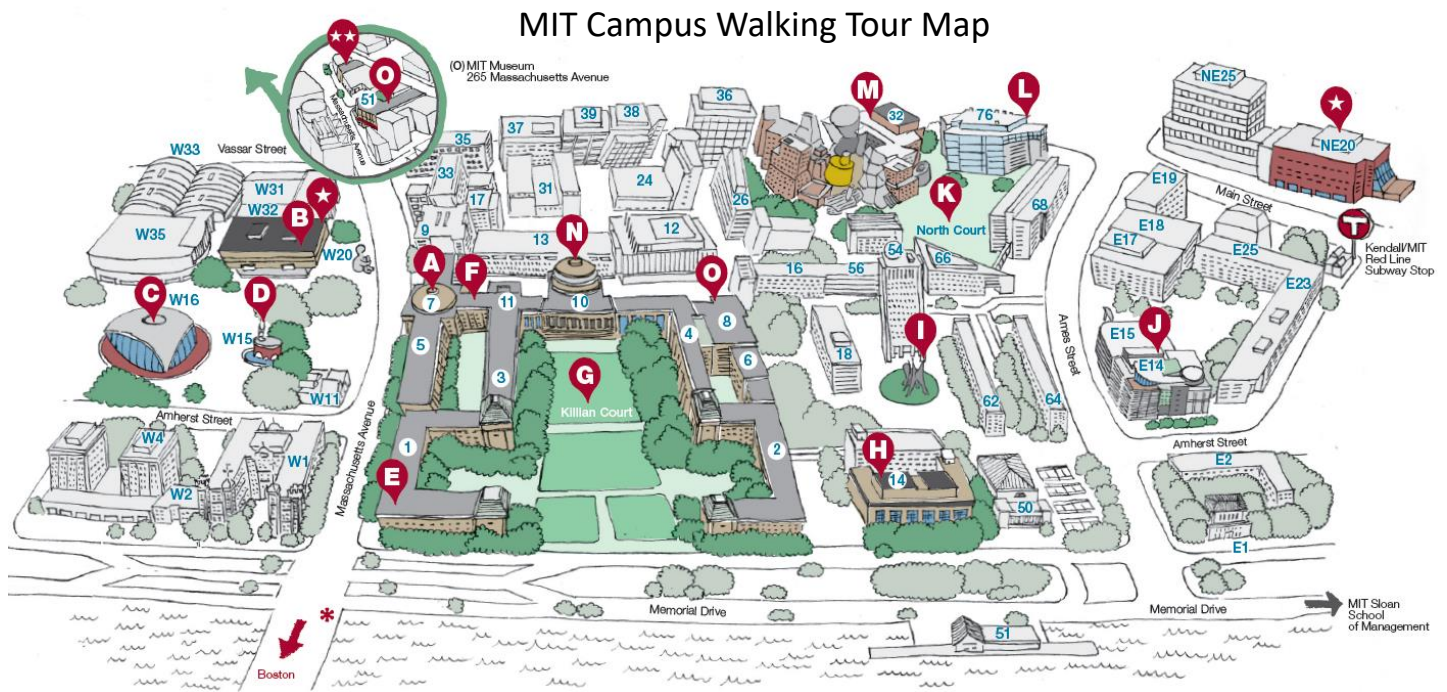
DR. Ian Marius Peters
Research scientist
Massachusetts Institute of
Technology

Campus and Venue

MIT Campus Tour Schedule

Campus Tour Meeting Location: front door outside MIT W20 Stratton Student Center

Campus Tour Time: 2:20 pm, 3:20 pm, 4:20 pm on May 22nd, each tour is about 1.5 hour



A: Visitor Information Center (77 Massachusetts Avenue)

C: Kresge Auditorium

E: Hart Nautical Gallery

G: Killian Court

I: McDermott Court

K: North Court

M: Ray and Maria Stata Center

O: MIT Museum

B: Julius Adams Stratton Student Center (W20)

D: MIT Chapel

F: Infinite Corridor

H: Hayden Memorial Library

J: MIT Media Lab and List Visual Arts Center

L: Koch Institute for Integrative Cancer Research

N: Barker Engineering Library/The Great Dome

Venue

MIT Stratton Student Center (Label B: **W20-Julius Adams Stratton Student Center** in the map of MIT)

84 Massachusetts Ave, Cambridge, MA 02139

The Closest Airport

Boston Logan International Airport (BOS)

The BOS airport is 4.4 Miles Away from the Conference Venue at MIT, about 17-minute drive.

Speaker's Guide

Oral Presentation

Length of presentation material should be in accordance with your allocated time. You are requested to **load your presentation files 20 minutes before the session starts.** In addition, the author or presenter of the oral presentation is kindly required to sign a **Media Release Form before the session starts for recording and further uploading to public media purpose.** Each oral presentation at the breakaway venues is limited to 20 minutes, which includes the questions and answers. Please refer to this program booklet for actual presentation times. Keynote presentation is 40 minutes. You are kindly requested to be present in the relevant presentation venue at least 10 minutes before the session starts.

Each presentation room is equipped with a laptop computer with a data projector. **PowerPoint is the standard presentation format.** The computers in the meetings rooms are provided to **Window-based PC Users.** Conference volunteers will be available to assist you in case you encounter difficulties with the IT equipment.

PowerPoint Template is available online: <http://applied-energy.org/aeab2019/paper%20submission>

Presentation Venues

The following table lists all the presentation venues with abbreviations, which are used in the detailed program in the late part of this booklet.

Sessions	Room
Opening Ceremony, Keynote Speeches, Banquet	W20-202 Sala De Puerto Rico
Panel Session, Session B1, Session C1	W20-201 West Lounge
Session A1, Session B2, Session C2	W20-308 Coffeehouse
Session A4, Session B3, Session C3	W20 PRDS 1&2
Session A3, Session B4, Session C4	W20-407
Session A2, Session B5, Session C5	W20-306 Twenty Chimney Room
Poster Sessions	W20-306 Mezzanine
Lunch	W20 BALCONY on 3rd Floor

Program at a Glance

Registration: May 22nd, 14:00-17:00; May 23rd, 7:30-12:00; May 24th 8:00-12:00					
May 22 nd					
14:00-17:00	Registration and MIT Campus Tour				
Day 1: May 23 rd					
9:00-9:02	Opening W20-202 Sala De Puerto Rico				
9:02-9:10	Mr. Scott Foster, Director of Sustainable Energy Division, United Nations Economic Commission for Europe (UNECE)				
9:10-9:50	Prof. Jerry M. Woodall. Electricity by Intermittent Power Requires Its Energy Storage				
9:50-10:30	Dr. Birol Dindoruk. Evolution of the Energy Mix and Its Implications				
10:30-11:00	Coffee break				
11:00-11:40	Prof. Daniel G. Nocera. A Sustainable and Renewable Cycle for Food and Fuels from Sunlight, Air and Water				
11:40-12:20	Prof. Jacopo Buongiorno. Nuclear Energy: A New Beginning?				
12:20-13:20	Lunch W20 BALCONY on 3rd Floor				
	Panel Session	Session A1	Session A2	Session A3	Session A4
Room	W20-201 West Lounge	W20-308 Coffeeshouse	W20 Twenty Chimney	W20-407	W20 PRDS 1&2
13:20-14:00	Panel 1*	72	225	5	296
14:00-14:20		25	20	12	299
14:20-14:40		109		17	
14:40-15:00		280**	138	48	34
15:00-15:40	Coffee break/Poster Session 1				
15:40-16:00	Panel 2***	149	159	70	91
16:00-16:20		71	165	137	297
16:20-16:40		102	219	209	145
16:40-17:00		173	84	258	78****
17:00-17:20		205	92	267	
17:20-17:40		252	195		
17:40-18:00		116	74		
19:00-21:30	Conference Banquet W20-202 Sala De Puerto Rico				

*Panel 1 ends at 14:30; **Paper 280 starts at 14:30; ***Panel 2 ends at 16:50; ****Paper 78 ends at 16:50

Program at a Glance

Day 2: May 24 th					
	Session B1	Session B2	Session B3	Session B4	Session B5
Room	W20-201 West Lounge	W20-308 Coffeeshouse	W20 PRDS 1&2	W20-407	W20 Twenty Chimney Room
8:00-8:40	207	194	201	295	281
8:40-9:00	2	143	44	49	51
9:00-9:20	15	152	56	104	251
9:20-9:40	121	153	64	120	129
9:40-10:20	Coffee break/Poster Session 2				
10:20-10:40	133	167	68	139	197
10:40-11:00	233	128	142	147	110
11:00-11:20	155	212	174	217	249
11:20-11:40	157	31	189	264	63
11:40-12:00	253	35	237	287	185
12:00-12:20	66	150	37	67	146
12:20-13:20	Lunch W20 BALCONY on 3rd Floor				
	Session C1	Session C2	Session C3	Session C4	Session C5
Room	W20-201 West Lounge	W20-308 Coffeeshouse	W20 PRDS 1&2	W20-407	W20 Twenty Chimney Room
13:20-14:00	77	136	265	298	282
14:00-14:20	108	32	28	19	254
14:20-14:40	82	62	36	141	80
14:40-15:00	134	206	65	178	50
15:00-15:40	Coffee break/Poster Session 3				
15:40-16:00	100	140	97	171	96
16:00-16:20	151	158	135	117	196
16:20-16:40	186	175	181	208	227
16:40-17:00	193	177	204	238	248
17:00-17:20	179	6	243	239	43
17:20-17:40	18	114	187	4	
17:40-18:00	240	218	270	113	

Day 1
May 23rd

Oral Presentations

Room W20-201 West Lounge Panel Session			
Time			
13:20-14:30	Panel 1: The Investment Path from the Traditional Energy Industry to New Energy Industry		
14:30-15:00	Dr. Ian Marius Peters. Accelerate X – Artificial intelligence to accelerate innovation in solar Energy		
15:40-16:50	Panel 2: Editors Forum of Energy Journals		
Room: W20-308 Coffeehouse Session A1: Battery & Geoenergy Session Chair: Xin Li, Harvard University; Dai Sheng, Georgia Institute of Technology			
Time	ID	Authors	Title
13:20-14:00	72	Prof. Edouard Asselin. Energy use and resource scarcity in the mining industry - The case for the mineral battery	
14:00-14:20	25	Shuangqi Li, Hongwen He, Jianwei Li, and Hanxiao Wang	Big data-driven cyber-physical system based lithium-ion battery modeling method with battery aging considered
14:20-14:40	109	Katharine Greco, Antoni Forner Cuenca, Kevin Tenny, Charles Tai-Chieh Wan, and Fikile Brushett	Deterministic electrode design to enable implementation of redox flow batteries for renewable energy storage
14:40-15:00	138	Keena Trowell, Sam Goroshin, David Frost and Jeffrey Bergthorson	Aluminum as a clean energy carrier
15:00-15:40	Coffee break/Poster Session 1		
15:40-16:00	149	Hyacinthe Randriamahazaka, Thuan Nguyen Pham Truong, Jalal Ghilane and Qing Wang	Redox active task-specific ionic liquids for hybrid electrochemical energy storage
16:00-16:20	71	Fengshou Zhang, Yi Fang, Li Zhuang, and Derek Elsworth	Implications of induced seismicity to deep geothermal energy: from laboratory scale to reservoir scale
16:20-16:40	102	Justin Montgomery	Understanding shale gas and tight oil productivity with machine learning
16:40-17:00	173	Yuchan Ahn, Prashanth Siddhamshetty, Kaiyu Cao and Joseph Kwon	Optimization framework for integration of shale gas supply chain network and dynamic model of hydraulic fracturing
17:00-17:20	205	Mohamad Salman, Pushpesh Sharma, Anand Selveindran and Konstantinos Kostarelos	Sequestering a GHG: EOR using associated gas
17:20-17:40	252	Beibei Liu, Hanshi Su, and Bing Zhang	How does climate change influence energy consumption of wastewater sector?
17:40-18:00	116	Feng An and Xiangyun Gao	The nation-based embodied carbon transmitting capabilities of global industries-based on network of network model
Room W20 Twenty Chimney Room Section A2: Future Materials in Energy Session Chair: Kevin Leonard, University of Kansas; Cheng Sun, Idaho National Laboratory			
Time	ID	Authors	Title
13:20-14:00	225	Dr. Cheng Sun. Materials research for nuclear energy systems	
14:00-14:40	20	Prof. Hailiang Wang. Electrochemical carbon dioxide utilization: materials design, cooperative catalysis, and device innovation	
14:40-15:00	48	Xining Zang, Sam Ingersoll, Cuiying Jian, Nicola Ferralis and Jeffrey Grossman	Laser ablation of graphitic system from natural carbonaceous materials
15:00-15:40	Coffee break/Poster Session 1		
15:40-16:00	159	Albert Liu and Michael Strano	From thermopower waves to asymmetric chemical doping – electrical energy generation using single-walled carbon nanotubes
16:00-16:20	165	Yanfei Xu, Jiawei Zhou, Daniel Kraemer, Zhang Jiang, Bai Song, Wen Chen, and Gang Chen	Turn polymer insulator into heat conductor
16:20-16:40	219	Yang Zhang, Tao Huang, Shengyuan Yang, Wei Weng, Fatemeh Zabih, Hao Yu and Meifang Zhu	Fiber-based wearable energy harvest and storage devices
16:40-17:00	84	Negar Nazari, Hooman Hosseini, Jyun-Syung Tsau, Karen Shafer-Peltier, Craig Marshall and Reza Barati Ghahfarokhi	Development of highly stable lamella using polyelectrolyte complex nanoparticles: an environmentally friendly scCO ₂ foam injection method for greenhouse gas management
17:00-17:20	92	Seokhwan Min and Jonghwa Shin	Creating energy out of thin air: smart radiative cooling materials
17:20-17:40	195	Abdallah Manasrah and Nashaat Nassar	Conversion of petroleum coke into value-added products using oxy-cracking technology
17:40-18:00	74	Leiqing Hu, Haiqing Lin, and Jun Cheng	Ultra-permeable polymeric membranes containing ZIF-8 nanoparticles for CO ₂ capture

Day 1
May 23rd

Oral Presentations

Room W20-407			
Session A3: Electricity Markets, Energy Efficiency, and Demand Response			
Session Chair: Meng Tao, Arizona State University; Marcelo Matus, University of Chile			
Time	ID	Authors	Title
13:20-14:00	5	Prof. Eric Loth.	Extreme-scale wind-turbines and how to value offshore energy storage
14:00-14:20	12	Jiang Lin, Fredrich Kahrl, Jiahai Yuan, Xu Liu, and Weirong Zhang	Challenges and strategies for electricity market transition in China
14:20-14:40	17	Hans Auer and Audun Botterud	Resource adequacy with increasing shares of wind and solar power: a comparison of European and U.S. electricity market designs
14:40-15:00	34	Meng Shen	Prediction of household electricity consumption and effectiveness of concerted intervention strategies based on occupant behaviour and personality traits
15:00-15:40	Coffee break/Poster Session 1		
15:40-16:00	70	David Timmons and Ming Lin	The economics of energy efficiency and conservation in a variable renewable energy system
16:00-16:20	137	Zhen Dai and William Yuan	Impacts of leed standards on the energy performance of large buildings inferred from city-level building energy benchmarking data
16:20-16:40	209	Rojiar Haddadian, Arash Khalilnejad, Tian Wang, Shreyas Kamath, Arafath Nihar, Roger French and Alexis Abramson	EDIFES: energy diagnostics investigator for efficiency savings
16:40-17:00	258	Patrick Brown and Francis O'Sullivan	The value of solar power across U.S. electricity markets
17:00-17:20	267	Sui Zhang, Jianjun Huang, Jie Yang, Dahyoh Lim, Xiaoxu Ma, Bo Long, Bin Pan, Jingfan Wang, Yinghao Song, Jia Liu, and Xinsheng Mao	An optimal dispatch model with dynamic power curve for integrated energy system
Room W20 PRDS1&2			
Session A4: Innovation Today 1			
Session Chair: Semdia Silveira, KTH Royal Institute of Technology in Stockholm; Zhu Liu, Tsinghua University			
Time	ID	Authors	Title
13:20-14:00	296	Prof. Alex Slocum.	Symbiotic offshore resource development systems
14:00-14:40	299	Prof. Dabo Guan.	Declines in China' provincial energy consumption and their drivers
14:40-15:00	279	Scott Auerbach	Interdisciplinary learning via real-world energy problems: the agonies and ecstasies of the UMass icons program
15:00-15:40	Coffee break/Poster Session 1		
15:40-16:00	91	Jinhui Yan	Isogeometric multi-phase fluid-structure interaction of offshore wind and tidal energy
16:00-16:20	297	Alex Slocum, P. Doron, J. Karn	Models for addressing climate change including effects on society
16:20-16:40	145	Amanda Ahl, Masaru Yarime, Shauhrat Chopra, Kumar Nallapaneni, Tanaka Kenji and Daishi Sagawa	Exploring blockchain and new ways forward in the energy sector: a case study in Japan
16:40-16:50	78	Xi Liu, Huibin Du, and Xin Zhang	The water-CO2 trade-offs driven by energy demand in China
19:00-21:30	Conference Banquet W20-202 Sala De Puerto Rico		

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Oral Presentations

Room W20-201 West Lounge			
Session B1: Decarbonation			
Session Chair: Sarah Jordaan, Johns Hopkins University; Peta Ashworth, The University of Queensland			
Time	ID	Authors	Title
8:00-8:40	207	Dr. Charles Forsberg.	Nuclear energy futures for a low-carbon world with wind and solar: nuclear co-generation with heat storage to buy-sell electricity and assured peak power
8:40-9:00	2	Meng Tao	Sustainability of solar photovoltaic technologies
9:00-9:20	15	Razi Nalim	Cost reduction & scale expansion for structural carbon – a path to environment decarbonization
9:20-9:40	121	Ian Scott, Audun Botterud, Pedro Carvalho and Carlos Santos Silva	Renewable support policy evaluation: the importance of uncertainty
9:40-10:20	Coffee break/Poster Session 2		
10:20-10:40	133	Nasrin Khalili and Lanh Nguyen	In pursuit of sustainability: a systemic socio-techno-economic approach toward meeting carbon footprint reduction goals: decentralization of the accounting and financing electricity use
10:40-11:00	223	Fernando Galdon and Stephen Wang	Optimising user engagement in highly autonomous virtual assistants to improve energy management and consumption
11:00-11:20	155	Amir Namin, Matthew Eckelman, Sagar Kamarthi and Jacqueline Isaacs	A comparative analysis of economic and environmental trade-offs of roof-mounted solar plants for manufacturing locations in the U.S.
11:20-11:40	157	Alexandre Ayoub, Anatole Gaigneux, Niccolo Le Brun, Salvador Acha, Romain Lambert, and Nilay Shah	The development of a carbon roadmap investment strategy for carbon-intensive food retail industries
11:40-12:00	253	Andrew M. Bergman, Anatoly Rinberg and David A. Weitz	Idea generation and feasibility assessments for new CO ₂ direct air capture technologies: a systematic comparative approach
12:00-12:20	66	Junyu You, William Ampomah, Qian Sun, Robert Scott Balch and Martha Cather	Design and optimization of CO ₂ -wag projects using an artificial-intelligence assisted computational framework
Room W20-308 Coffeehouse			
Session B2: Bioenergy			
Session Chair: Lee Lynd, Dartmouth College; Scott Auerbach, University of Massachusetts Amherst			
Time	ID	Authors	Title
8:00-8:40	194	Prof. Lee Lynd	Decarbonization using cellulosic biofuels
8:40-9:00	143	Charles Jia, Evan Ling Yang, Aldrich Ngan, and Donald Kirk	Finding biocarbon feasible
9:00-9:20	152	Kevin Kung, Sonal Thengane and Ahmed Ghoniem	Effective start-up and shutdown strategies for continuously operated biomass torrefaction reactor
9:20-9:40	153	Semida Silveira	The role of bioenergy in a circular bio-based economy
9:40-10:20	Coffee break/Poster Session 2		
10:20-10:40	167	Farshid Salimijazi, Jaehwan Kim, Alexa Schmitz, Andrew Bocarsly and Buz Barstow	What could the conversion efficiency of solar electricity and carbon dioxide to biofuels by microbes be?
10:40-11:00	128	John Hannon and Charles Wyman	Novel catalytic conversion of renewable ethanol into gasoline, diesel, and jet fuel blendstocks and higher value chemicals (BTEX) to partially mitigate climate change
11:00-11:20	212	Daniel Schwalbe-Koda and Rafael Gómez-Bombarelli	From isomorphism to polymorphism: graph similarity drives OSDA-free zeolite transformations
11:20-11:40	31	Guoqing Jian, Mohammed Kawelah, Ayrat Gizzatov, and Amr I. Abdel-Fattah	A new lab-on-chip microfluidic device for fast prescreening of CO ₂ foam producing chemicals towards more efficient utilization of CO ₂
11:40-12:00	35	Miao Wang, Mohammad Rahimi, Amit Kumar, Subrahmaniam Hariharan, Wonyoung Choi, and T. Alan Hatton	Flue gas CO ₂ capture via electrochemically mediated amine regeneration: system design and performance
12:00-12:20	150	Kevin Leonard	Pressure-dependent reaction rates for electroreduction of CO ₂ in CO ₂ expanded electrolytes.

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Oral Presentations

Room W20 PRDS 1&2			
Session B3: Distributed Energy Resources and Microgrids			
Session Chair: Audun Botterud, Massachusetts Institute of Technology; Frank A. Felder, Rutgers University			
Time	ID	Authors	Title
8:00-8:40	201	Prof. Mehrdad Ehsnai.	Engineering and socio-economic aspects of sustainable energy
8:40-9:00	44	David Vance, Ali Razban, Peter Schubert and Robert Weissbach	Developing a PV and energy storage sizing methodology for off-grid transactive microgrids
9:00-9:20	56	Subba Reddy B and Umanand L	Development of energy monitoring system for a typical micro-grid
9:20-9:40	64	Sadrul Ula, Jubair Yusuf, and A S M Jahid Hasan	Development and deployment of an integrated microgrid incorporating solar PV, battery energy storage and EV charging
9:40-10:20	Coffee break/Poster Session 2		
10:20-10:40	68	Konstantinos Spiliotis, Kris Baert and Johan Driesen	DC vs AC nanogrid backbones for office dwelling with building-integrated PV in Belgium
10:40-11:00	142	Philipp Trotter	A low-carbon way to increase energy access: how to scale mini-grids in developing countries
11:00-11:20	174	Marija Ilic and Jaddivada Rupamathi	Toward operationally-feasible and efficient integration of distributed energy resources
11:20-11:40	189	Jorge Ramos-Ruiz, Bin Wang, Le Xie, and Prasad Enjeti	Power electronics intelligence at the grid edge to achieve high PV penetration
11:40-12:00	237	Joao G. I. Cypriano and Luiz C. P. Silva	The sustainable campus project: an 'a + b' transformation in the university of Campinas
12:00-12:20	37	Thillainathan Logenthiran	Energy management system for smart homes on internet of things and multi-agent system
Room W20-407			
Session B4: Energy Storage Analysis			
Session Chair: Yanfei Xu, University of Massachusetts Amherst; Magnus Korpas, Norwegian University of Science and Technology			
Time	ID	Authors	Title
8:00-8:40	295	Dr. Aoife Foley	Decarbonisation, mysticism and the sustainable energy transition
8:40-9:00	49	Bolun Xu, Magnus Korpas, Audun Botterud and Francis O'Sullivan	Large-scale grid integration of energy storage via efficient control algorithm design
9:00-9:20	104	Jinwoo Park, Inkyu Lee and Il Moon	A novel design of thermal energy storage systems: lng cold energy recovery
9:20-9:40	120	Paolo Gabrielli and Marco Mazzotti	Robust and optimal design of multi-energy systems with seasonal storage through uncertainty analysis
9:40-10:20	Coffee break/Poster Session 2		
10:20-10:40	139	Songshan Guo and Jihong Wang	The modeling and optimization of distributed network based on source-limit infrastructure
10:40-11:00	147	Jihong Wang	Modeling and simulation software tool development for compressed air and thermal energy storage in supporting technology scale up
11:00-11:20	217	Junpeng Zhan	An accurate bilinear cavern model for compressed air energy storage
11:20-11:40	264	Apurba Sakti	Techno-economic case-studies of storage systems with: i) augmented models of lithium-ion battery chemistries to evaluate tradeoffs for offshore wind*, ii) hybrid systems employing gas turbines and storage using generator-level data across the US.
11:40-12:00	287	Pv Aravind and Theo Woudstra	Towards ultra-high efficiencies, reversible power plants, and negative emissions
12:00-12:20	67	Nan Wang and Keigo Akimoto	The strategy of delivering ccs projects: lessons from three-decade pilot and demonstration experience

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Oral Presentations

Room W20-306 Twenty Chimney Room			
Session B5: Nuclear Energy & Energy Performance			
Session Chair: Koroush Shirvan, Massachusetts Institute of Technology; Hohyun Lee, Santa Clara University			
Time	ID	Authors	Title
8:00-8:40	281	Prof. Koroush Shirvan	Acceleration of innovative nuclear fuel development for sustainability of the existing fleet
8:40-9:00	51	Byungchan Han, Choa Kwon, and Kwanpyung Lee	First-principles study on thermodynamic stability of uo2 with he gas incorporation via alpha-decay
9:00-9:20	251	Daniel Stack, Charles Forsberg, and Daniel Curtis	Performance of firebrick resistance-heated energy storage for industrial heat applications and round-trip electricity storage
9:20-9:40	129	Miryana Hémadi	Functional nanomaterials based on carbon dots for the extraction of radioactive metals from wastewater
9:40-10:20	Coffee break/Poster Session 2		
10:20-10:40	197	Kang Pyo So, Ju Li and Michael Short	A structural revolution in materials with one-dimensional nanomaterials
10:40-11:00	110	Said Al-Hallaj and Michael Pintar	Netenergy thermal energy storage
11:00-11:20	249	Marcelo Matus, Carlos Matamala, Ericka Osses, Juan San Martin and Bárbara Silva	Accelerating coal displacement by scaling integrated solar districts in high solar radiation regions and boosting carbon revenues global impact
11:20-11:40	63	Changyu Qiu and Hongxing Yang	Investigation on the overall energy performance of a novel vacuum semi-transparent photovoltaic glazing in cold regions of China
11:40-12:00	185	You Zhou, John Lemmon and C.C. Chan	A new principle of smart energy from eco-system perspective
12:00-12:20	146	Yuan Yi, Wei Xie, and Zhi Zhou	Data-driven stochastic optimization for power grids scheduling under high wind penetration
12:20-13:20	Lunch W20 BALCONY on 3rd Floor		
Room W20-201 West Lounge			
Session C1: Energy Systems and Transportation			
Session Chair: Charles Forsberg, Massachusetts Institute of Technology; David Timmons, University of Massachusetts - Boston			
Time	ID	Authors	Title
13:20-14:00	77	Prof. Kaushik Rajashekara.	Advances in transportation electrification for CO2 Emission Reduction
14:00-14:20	108	Wonjae Choi, Eunji Yoo, Jae Jun Jang, Eunsu Seol, Myungsoo Kim, and Han Ho Song	Well-to-wheel greenhouse gas emissions of current (2017) and future (2030) passenger vehicle pathways: a South Korean case study
14:20-14:40	82	Peter Godart and Douglas Hart	Aluminum-powered climate change resiliency
14:40-15:00	134	Kakali Mukhopadhyay and Surabhi Joshi	Climate resilience and nationally determined commitments: mapping regional resonance for India
15:00-15:40	Coffee break/Poster Session 3		
15:40-16:00	100	Bo Zhao, Ruo-Qian Wang, and Shengxian Cao	Decoupling energy from water: an optimization and global sensitivity analysis of the cleaning cycle dynamics for thermal power plants
16:00-16:20	151	Peta Ashworth and Michele Ferguson	Can message framing on environmental behaviours make the difference for ccs and other technology acceptance
16:20-16:40	186	Joe Sagues, Sunkyu Park, Hasan Jameel, and Daniel Sanchez	Enhanced carbon dioxide removal from coupled direct air capture-bioenergy systems
16:40-17:00	193	Alberto Gomez-Barea, Montserrat Suarez-Almeida, and Ahmed Ghoniem	New concepts for large-scale integration of biomass gasification with concentrated solar energy for renewable energy carriers
17:00-17:20	179	Rui Zhu, Man Sing Wong, Linlin You, Paolo Santi, Janet Nichol, Hung Chak Ho, Lin Lu, and Carlo Ratti	The effect of urban morphology on the solar capacity of three-dimensional cities
17:20-17:40	18	Lu Ding and Kunio Yoshikawa	100 hours' continuous operation of a distributed power generation system based on carbonized biomass gasification
17:40-18:00	240	Byungkwon Park, Bernard Lesieutre and Christopher DeMarco	Optimal network topology for node-breaker representations with ac power flow constraints

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Oral Presentations

Room W20-308 Coffeehouse Session C2: Energy Transition Session Chair: Audun Botterud, Massachusetts Institute of Technology; Ruiqian Wang, Rutgers University			
Time	ID	Authors	Title
13:20-14:00	136	Prof. Ettore F. Bompard.	Electrification as a means for the energy transition: a long-term multi-focus perspective for Italy
14:00-14:20	32	Aleksis Xenophon and David Hill	Adaptive recalibration strategies for refunded emissions payment schemes
14:20-14:40	62	Sarah Jordaan, Qingyu Xu, and Ben Hobbs	Grid-scale life cycle greenhouse gas implications of electricity storage and carbon pricing options
14:40-15:00	206	Magnus Korpås and Audun Botterud	CO ₂ -factors for electricity: an overview of calculation methods and why it matters for development of sustainable energy technologies
15:00-15:40	Coffee break/Poster Session 3		
15:40-16:00	140	Mehdi Jafari, Chiara Delmastro, Daniele Grosso, Ettore Bompard and Audun Botterud	Electrify Italy: role of renewable energy sources
16:00-16:20	158	Peta Ashworth and Linwei Ma	People power in the a + b transition
16:20-16:40	175	Denes Csala	Energy transitions implications of diminishing energy potentials observed in wind turbine projects deployed across the world
16:40-17:00	177	Robert Stiller, Brady McLaughlin, and Abigail Mechtenberg	A cost-effective way to achieve 100% reliable renewable energy using complexity
17:00-17:20	6	Juliet Simpson and Eric Loth	Rethinking LCOE using the cost of valued energy
17:20-17:40	114	Makoto Shimizu, Asaka Kohiyama, Kana Konno and Hiroo Yugami	Effective solar energy conversion via photon management in thermophotovoltaics
17:40-18:00	218	Yasser Sabry and Diaa Khalil	Mems FTIR spectrometer for environmental monitoring of greenhouse gases and air pollution
Room W20 PRDS 1&2 Session C3: Hydrogen Session Chair: Yu Huang, University of California, Los Angeles; Sili Deng, Massachusetts Institute of Technology			
Time	ID	Authors	Title
13:20-14:00	265	Prof. Yu Huang	From extended surface to Nanocatalysts: Design at small scale for a big future
14:00-14:20	28	Saif Al Ghafri	Hydrogen export industry in Australia: requirements of further technical research
14:20-14:40	36	Shaohui Guo, Xuanhua Li, and Bingqing Wei	Achieving record high solar-to-hydrogen conversion efficiency with steamed water
14:40-15:00	65	Laurens Van Hoecke, Sammy W. Verbruggen and Silvia Lenaerts	Chemical hydrogen carriers for a transition towards cleaner fuel in the maritime shipping industry
15:00-15:40	Coffee break/Poster Session 3		
15:40-16:00	97	Ziyang Lu, Nasir Uddin, Liming Wang, Guohua Jia, and Zongyou Yin	Liquid carriers for H ₂ fuel
16:00-16:20	135	Xiao-Yu Wu, Yu-Dong Chen and Ahmed F. Ghoniem	Design and cost analysis of perovskite oxygen permeable membrane reactors for hydrogen and syngas co-production
16:20-16:40	181	Eunae Cho	Hydrogen energy storage system (HESS) – electrocatalysts for oxygen reduction reaction and oxygen evolution reaction
16:40-17:00	204	Espen Flo Bødal, Magnus Korpås, Dharik Mallapragada, and Audun Botterud	Towards large scale hydrogen production: centralized versus local production
17:00-17:20	243	Emre Gençer, Dharik Mallapragada, and Patrick Insinger	Cost-effectiveness of continuous H ₂ production using integrated PV-electrolysis-storage systems
17:20-17:40	187	Hao-Cheng Wang, Cheng-Si Tsao, Yu-Che Lin, Chung-Hao Chen, and Kung-Hwa Wei	Hydrogen plasma treatment of the mose ₂ for high-efficiency organic solar cells
17:40-18:00	270	Drew Pomerantz	Optimized inspection of upstream oil and gas methane emissions using airborne lidar surveillance

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Oral Presentations

Room W20-407			
Session C4: Renewable Energy			
Session Chair: Buz Barstow, Cornell University; Kangpyo So, Massachusetts Institute of Technology			
Time	ID	Authors	Title
13:20-14:00	298	Prof. Asegun Henry	Sun in a box: Thermal energy grid storage using multi-junction photovoltaics
14:00-14:20	19	Richard Johnson and Martin Mayfield	Practical routes for the integration of rooftop PV in the UK, and their economic and environmental costs
14:20-14:40	141	John McDowell, Penny Jeffcoate, Lars Johanning, Tom Bruce, and Weichao Shi	Increasing the accuracy of initial feasibility studies - utilising numerical models to estimate the lcoe of floating tidal energy platforms
14:40-15:00	178	Julia Sokol, Carolyn Sheline, Fiona Grant, and Amos Winter	Cost-optimized solar-powered drip irrigation systems
15:00-15:40	Coffee break/Poster Session 3		
15:40-16:00	171	Julian Osorio, Mayank Panwar, Chrys Chrystostomidis, Rob Hovsopian, Alejandro Rivera-Alvarez, Manish Mohanpurkar, Sayonsom Chanda and Herbert Williams	Harnessing offshore renewable energy sources via energy carriers for waste heat recovery and thermal efficiency improvement
16:00-16:20	117	Ian Mathews	Economically sustainable growth of perovskite manufacturing
16:20-16:40	208	Ying Yang and Jinyue Yan	Identifying potential rooftop area for building-integrated photovoltaics and government subsidy evaluation in Sweden
16:40-17:00	238	Walid El Khattam, Hafez El Salmawy, and Ahmed Sallam	Investigating a new methodology for evaluating the wind farms capacity credit in Egypt
17:00-17:20	239	Mohamed Atef, Amr Elbanhawy and Mahmoud Abo El-Nasr	A novel methodology to compare optimized CCHP and solar-CCHP systems based on overall system-comparison
17:20-17:40	4	Jos Haverkort	Towards ultimate limit solar cells
17:40-18:00	113	Islam Genina, Andrew Tsang, Phillip Dixon, Coby Unger, and Danielle Gleason	InSanimator: when poop is a renewable source of energy. case study for an off-grid system to safely transform human fecal sludge into energy
Room W20-306 Twenty Chimney Room			
Session C5: Innovation Today 3			
Session Chair: Michael Short, Massachusetts Institute of Technology; Charles Q. Jia, University of Toronto			
Time	ID	Authors	Title
13:20-14:00	282	Prof. Peter Bauer	Sustainability in electric transportation: minimizing transportation energy
14:00-14:20	254	Xiaofan Li, Changwei Liang, Robert Parker and Lei Zuo	The dynamics and optimum design of a self-react wave energy converter with mechanical power take-offs
14:20-14:40	80	Han Fengtao, Chen Chao and Li Yaru	A compound parabolic concentrator with double collector tubes and its application in near zero energy consumption building
14:40-15:00	50	Hongyang Zou, Huibin Du and Gang He	An agent-based analysis of the impact of carbon emission trading on power sector: prospects of China's low-carbon electricity
15:00-15:40	Coffee break/Poster Session 3		
15:40-16:00	96	Soonseok Song, Weichao Shi, Yigit Demirel, and Mehmet Atlar	The effect of biofouling on the tidal turbine performance
16:00-16:20	196	Arash Ostovar and Nashaat Nassar	Novel methods to advance small-scale LNG production (SSLNG)
16:20-16:40	227	Jessica Orrego-Hernandez, Zhihang Wang, Ambra Dreos and Kasper Moth-Poulsen	Molecular solar thermal energy storage systems
16:40-17:00	248	Anurag Panda, Niklas Mannhardt, Stanley Pomichter, Jessica Horowitz and Vladimir Bulović	Deployment of lightweight and flexible solar panels on e-rickshaws for last-mile energy access
17:00-17:20	43	Xiaoshu Lu, Tao Lu and Jianjia Li	A nove heat recovery strategy for data centers: a case study

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Poster Presentations

Poster Session 1: Room W20-306 Mezzanine Display Time: 14:00-16:30, May 23rd; Present Time: 15:00-15:40, May 23rd		
ID	Authors	Title
16	Xingyu Liu, Weiguo Pan, and Ruitang Guo	Synthesis of bi2o3/g-c3n4 heterojunction for enhanced photocatalytic CO2 reduction with z-scheme mechanism
21	Yongping Sun, Jingbo Cui, Haishan Yu, and Xi Liu	The clean development mechanism and firm innovation in renewable energy: evidence from China
22	Chuanwen Zhao, Yafei Guo, Jian Sun and Ping Lu	Dual function materials for CO2 capture and catalytic conversion to synthetic natural gas
26	Weiyu Li and Lixin Tian	Eco-innovation diffusion in multiplex networks
27	Saif Al Ghafri	Novel high-pressure thermophysical properties data of complex mixtures and their application to liquified natural gas (LNG) energy industry
29	Hao Lu and Li-Zhi Zhang	Experimental investigation of dust particle deposition reduction on solar cell covering glass by super-hydrophobic coatings
33	Youwang Huang and Meiqian Chen	A general exergy cost allocation method based on energy level(g-ecael) for cascade utilization of multiple exergy streams
37	Thillainathan Logenthiran	Energy management system for smart homes on internet of things and multi-agent system
40	Qiu Mo, Fang Liu, and Jiaxin Deng	Modelica-based dynamic optimization model for multi-energy micro-grid
42	Tailu Li, Nan Meng, and Jialing Zhu	Cycle configuration and heat source temperature level on the available temperature range of orc for hydrothermal geothermal power generation
47	Ming Feng and John Yilin Wang	The conceptual trajectory engineering design for geothermal power plant
52	Tao Xu, He Meng, Jie Zhu, Wei Wei, He Zhao, and Zijin Li	Energy storage optimal configuration with life-cycle cost–benefit analysis
53	Ning Qi, Lin Cheng, Liting Tian, and Yuxiang Wan	Key technologies of optimal configuration of generalized energy storage resources
54	Yiyi Zhang, Jiaqi Wang, Hanbo Zheng, Jiefeng Liu, Jiake Fang, and Shengren Hou	Multi-objective optimization for power generation mix focusing on reducing carbon emission and mitigating water scarcity
57	Qing Guan, Haizhong An, and Kaiming Wang	Functional trade patterns in the international photovoltaic trade: revealed by network motifs
59	Shuangqi Li, Hongwen He, Jianwei Li, and Hanxiao Wang	Big data driven deep learning algorithm based lithium-ion battery SOC estimation method: a hybrid mode of c-bms and v-bms
61	Haiying Sun, Xiaoxia Gao and Hongxing Yang	Wake effect measurements on a complex-terrain wind field
75	Meng Tao	A zinc↔zinc oxide loop for sustainable storage of solar electricity
76	Jun Cheng, Niu Liu, and Leiqing Hu	Polyethyleneimine entwine thermally-treated zn/co zeolitic imidazolate frameworks to enhance CO2 adsorption
86	Gautam Raiker, Subba Reddy B and Umanand L	Development of peltier based cooling and thermoelectric generation storage system
132	Lijie Zhu	Drivers and barriers for renewable energy investments with case studies
3	Wais Alemi	Afghanistan energy 2019
10	Jiangfeng Guo, Zhang, Cui and Huai	The heat transfer analysis of low temperature recuperator in supercritical CO2 brayton cycle
73	Laith M. Halabi and Saad Mekhilef	Describing the operational behavior of a grid connected PV system: case study in Malaysia
169	Xiaoli Zhang, Xueqin Cui, Ke Wang, and Ji Zou	Committed CO2 emissions of coal-fired power plants would jeopardize china's equitable low carbon transition
182	Jianfeng Gao, Ying Yu, Shaotong Zhou, Xiaodong He, Yan Wang, and Juanhua Jin	Research on leak detection and location of submarine oil and gas pipeline
184	Ying Yu, Mahmoud El-Halwagi, Jianfeng Gao and Genmin Zhu	Research on efficient integration design of shale & high sulfur natural gas utilization process
190	Zijun Lu, Sandrine Dourdain and Stéphane Pellet-Rostaing	Understanding the mechanisms at the basis of uranium extraction processes for optimized nuclear production energy

Day 2
May 24th

Poster Presentations

Poster Session 2: Room W20-306 Mezzanine Display Time: 9:00-11:30, May 24th; Present Time: 9:40-10:20, May 24th		
ID	Authors	Title
88	Sheng Li, Song He, and Dandan Wang	Hydrogen production through a chemical regenerative coal gasification
167	Farshid Salimijazi, Jaehwan Kim, Alexa Schmitz, Andrew Bocarsly and Buz Barstow	What Could the Conversion Efficiency of Solar Electricity and Carbon Dioxide to Biofuels by Microbes be?
90	Xun Suo, Shuqiang Zhao, Yanfeng Ma, and Jinshan Liu	Multi-energy power system power supply coordination planning based on complex adaptive system theory
94	Yewei Chen, Jianjun Sun, Pan Yu, Xiaoming Zha, Chaoliang Wang, and Feng Xu	Research on evaluation and partition method of distribution network flexibility
95	Jinzhou Zhao, Na Wei, Haitao Li, Shouwei Zhou, Anqi Liu, Ping Guo, Kaisong Wu, Jun Zhao, Guorong Wang, and Ning Wang	The world's first experimental simulation technology and system of solid fluidization exploitation of marine non-diagenetic natural gas hydrate
99	Yafei Guo, Jian Sun, Chuanwen Zhao and Ping Lu	Structure-property relationship of magnesium-based CO ₂ sorbents synthesized with different methods
101	Jia-Ning Kang and Yi-Ming Wei	A technology selection model of carbon capture and storage from a learning perspective: a case study of China's power sector
105	Bo Bai and Xiaoming Ma	The regional effectiveness evaluation of photovoltaic poverty alleviation project in China
106	Wei Hu	Optimized operation of cascade reservoirs considering complementary characteristics
112	Wenjing He and Pei Li	Study on simulation and optimization of physical environment in Jinan new city of China
118	Jing Zhang, Yongqian Liu, Jie Yan, and Guoliang Lv	Simulating the daily profile of EV charging load based on user's travel mode
122	Jin-Wei Wang and Yi-Ming Wei	A patent roadmap for carbon capture and storage technologies: results from t-distributed stochastic neighbor embedding and bass diffusion model
123	Peiqi Liu, Xiang Li, Kehan Wu, and Dapeng Hu	Mechanism and performance of over-expansion gas wave refrigeration
124	Qianmiao Yang and Lei Zhang	Calculation model and analysis of life-cycle environmental impacts of building envelopes
125	Wenbin Zhang, Boxiang Wang, and Changying Zhao	Near-field radiative heat transfer enhanced by strongly-coupled surface polaritonic modes
144	Xiaowen Kang	The "tech-embedded-market" research framework: applied in feed-in-tariff (fit) policy design for solar power
154	Sida Feng, Haizhong An, Huajiao Li, and Yabin Qi	Defining the global role of countries in electric vehicle industry from economic and technological aspects
162	Sui Guo, Huajiao Li, Haizhong An, Bowen Sun and Sida Feng	Identifying lead-lag relationship between steel materials and steel product price in China's construction industry
188	Xiangjie Chen and Rui Xie	Consumption-based formation mechanism and driving factors of China province-level carbon emission intensity
191	Bola Ju and Jieun Rhee	Geographical implication of the new energy system in transition through the case study of international urban cooperation network
192	Li Zhang, Yingqi Liu, and Ari Kokko	Business model innovation path from the perspective of sociotechnical transition: analysis of China's new vehicle industry
198	Song He, Lin Gao and Sheng Li	Coal based hydrogen production process with CO ₂ recovery
156	Wenchao Ma, Bin Liu, Nicholas Themelis and Guanyi Chen	Waste plastics contributions to an alternative energy: production of liquid fuel and power generation
222	fernando Galdon and Stephen Wang	Edge intelligence in distributed energy grid
228	Kwong Ho Chan, Ming Su, Nan Xu, and Chunguang Wang	Operation optimization for energy saving
255	Sara Yazdani and Mehdi Ferdowsi	Effect of virtual inertia on dc-link capacitor condition monitoring in a PV-statcom
257	Jose Huertas, Carlos Rivera-Solorio, Miguel Gijon and Favio Solano	Improving energy efficiency of thermal equipment by evaporative cooling

Day 2
May 24th

Poster Presentations

Poster Session 3: Room W20-306 Mezzanine Display Time: 14:00-16:30, May 24th; Present Time: 15:00-15:40, May 24th		
ID	Authors	Title
202	Zhiwei Wang, Tingzhou Lei and Ashwani K. Gupta	Co-gasification characteristic of waste tire and forestry waste under CO ₂ atmosphere
203	Zhuoqun Gao, R. Richard Geddes, and Tao Ma	Macroeconomic and environmental effects under the trend of energy use transformation in China's auto industry based on DCGE model
211	Huibo Bi, Wen-Long Shang, and Yanyan Chen	An energy-efficient intelligent transportation framework with reward-based incentive mechanisms
213	Wen-Long Shang, Huibo Bi, and Yanyan Chen	Analysis of energy conservation and emission reduction of urban transport based on cooperative vehicle infrastructure systems(CVIS) technology
215	Kuanrong Qiu	An orc-based micro-chp system using combined solar energy and natural gas
226	Yanqin Li	Kinetic simulation of methane combustion reaction: from mechanism to application
241	Joao G. I. Cypriano, Hader A. D. Azzini and Joao L. Juca	Load disaggregation development project: a nilm proposal for energy usage changes
242	Mohammad Sadegh Modarresi, Le Xie, Aurora Vargas, Bilal Saad Abada, Shankar Chellam and Bruce McCarl	Water energy nexus for life: case study of Texas Colonias
244	Jiehui Yuan, Xunmin Ou and Wenli Yuan	Energy transition of a city rich in renewable energy: a conceptual framework
250	Xue Liu, Yong Ding and Hao Tang	Benchmarking energy efficiency for hotel buildings in China
259	Xiaowen Kang	The "tech-embedded-market" research framework: applied in explanation for locked-dilemma for energy transition
263	Wan Anping	Intelligent control system design for vertical mill based on data mining
268	Xiaojing Lv	Thermo-electric of SOFC/GT distributed power system with biomass-derived fuels
269	Jun Li	Sand transportation in single wedge shape of fracture
274	Guangsi Shi	A novel approach combining artificial neural network and model predictive control for path tracking in autonomous mining vehicles
284	Xinglong Ju and Feng Liu	Wind farm layout optimization based on self-informed genetic algorithm with participation decisions from landowners
286	Luyi Zhang, Hongqing Song, Jiulong Wang, Xuyang Guo, Pengguang Sun, Li Du and Huifang Fan	Numerical investigation on techno-economic multi-objective optimization of geothermal reservoir development: a case study of China
288	Zhe Sun, Baojun Bai, Jingyang Pu, and Yizhou Wu	Synthesis and functionalization of a clay-embedded, self-healing preformed particle gel for enhanced oil recovery
289	Haitao Zhao, Tao Wu, and Xiang Gao	2d transition-metal dichalcogenides containing materials for hg0 capture from coal-derived flue gas
290	Yuanda Hong, Wu Deng, Collins I. Ezeh, Sung-Hugh Hong, and Zhen Peng	Modeling optimum retrofit package measures for existing low-rise office building prototypes in Shanghai
246	Renfeng Yang	Further study on relative permeability parameter variation rule
273	Yang Hao, Yu Wu, Pan Li, and Jing Tao	Numerical study on heat extraction rate of supercritical CO ₂ in enhanced geothermal system
266	Pobitra Halder, Szal Kundu, Savankumar Patel, Rajarathinam Parthasarathy, Jorge Paz-Ferreiro and Kalpit Shah	Synthesis of low-cost and environmentally friendly ionic liquids and their applications on the pre-treatment of Australian Rice Husk
276	Xinqian Lu, Zeyu Lin, Fanhua Zeng, Xiang Zhou, and Siyuan He	Characterization of foamy oil and gas-oil flow for heavy oil/propane system in pressure depletion tests
278	Nishant Modi, Bhargav Pandya, and Jatin Patel	Thermo-economic evaluation of an ionic solution based solar absorption cooling system
283	Biao Shu, Runjun Zhu, Jingqiang Tan, Shaohe Zhang, and Ming Liang	Experimental evolution of permeability in a single granite fracture for high-temperature geothermal energy production
127	Asif Hasan Rony and Maohong Fan	Solar chemical looping pyrolysis of corn stover
220	Yanli Liu	A Reliability Assessment Method of Cyber-Physical Distribution System

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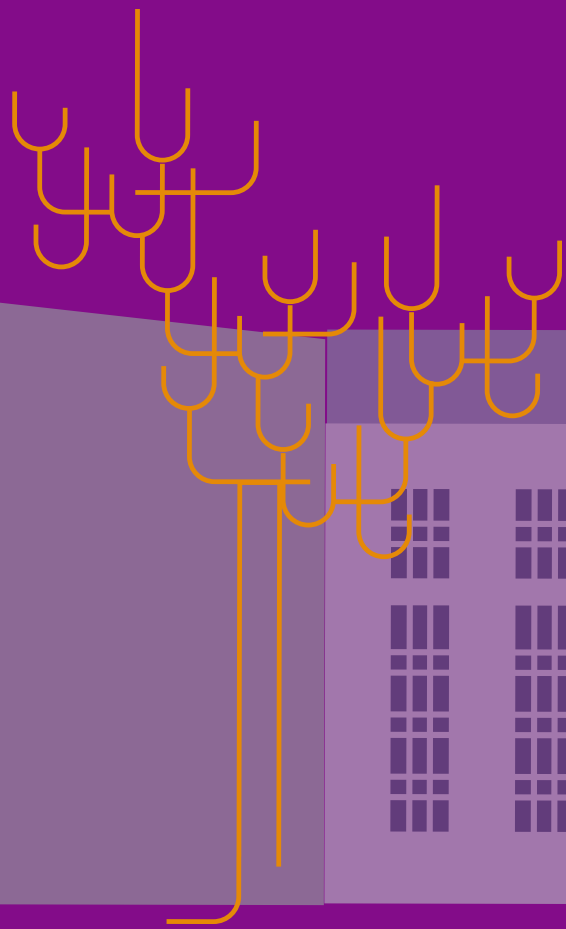
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