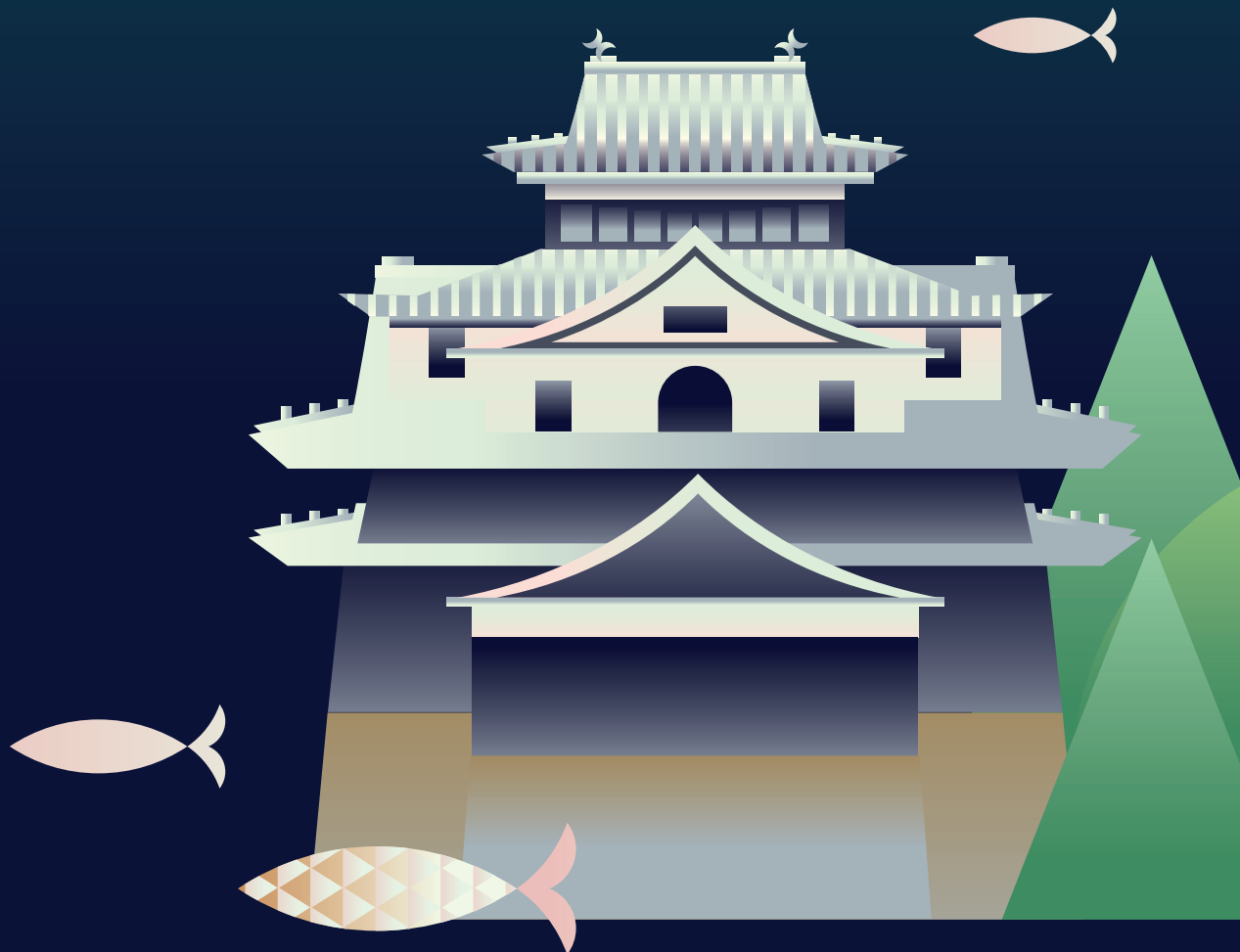


Applied Energy Symposium:

LOW CARBON CITIES & URBAN ENERGY SYSTEMS

SEPT 4-8, 2021 in MATSUE, JAPAN/VIRTUAL



i^ocaae

International Conference on Applied Energy

- **Welcome to CUE2021**
- **Program at a Glance**
- **Acknowledgments**
- **Committees**
- **Keynote Speakers**
- **Panel Sessions**
- **Speaker's Guide**
- **Oral Presentations**
- **ICAE2021 Introduction**
- **Research Sharing Platforms**

Welcome to CUE2021



Welcome to CUE2021-Applied Energy Symposium 2021: *Low carbon cities and urban energy systems.*

Cities are rapidly getting on top of the agendas of various initiatives worldwide aimed at decreasing the cost and carbon footprint of energy products, services and activities. The demands and pressure on energy infrastructure and resources obliges city infrastructure and consumers to adapt intelligently to ensure efficient, affordable and sustainable solutions.

Developing intelligent energy solutions for resilient urban systems is a global and complex challenge which involves interdisciplinary fields. With this as theme of the conference, CUE2021 aims to provide a premier international forum for all stakeholders including academia, industry and policy decision makers to present and share latest findings in all aspects across this domain, discussing how smart technologies and services can integrate the production and use of energy to support a more sustainable and resilient urban system.

CUE2021 is organized by Applied Energy Innovation Institute (AEii), and the international journal, Applied Energy in cooperation with several universities and organisations. Due to the COVID-19, the event will be held in virtual symposium with the new dates on Sept 4-8, 2021 for sharing the most recent progress of research RD&Ds in urban energy systems.

The conference will include keynotes and invited speeches, plenary sessions, oral presentations and poster sessions. All accepted papers will be published in Energy Proceedings, see www.energy-proceedings.org. Selected papers by the session chair and scientific committee from the conference will be recommended for the publication in a special issue of Applied Energy (<https://www.journals.elsevier.com/applied-energy>, IF=9.746), Advances in Applied Energy (<https://www.journals.elsevier.com/advances-in-applied-energy>) and Resources, Conservation & Recycling (<https://www.journals.elsevier.com/resources-conservation-and-recycling>, IF=10.204).

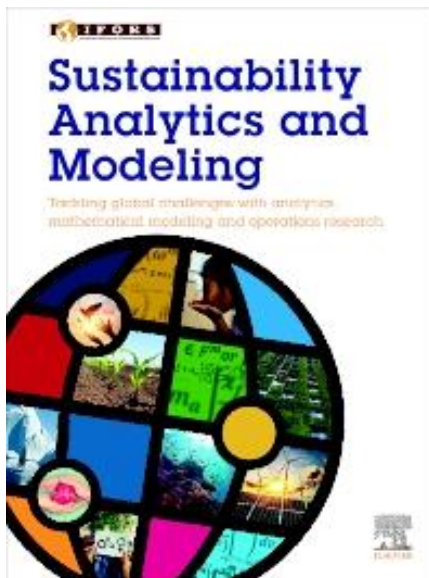
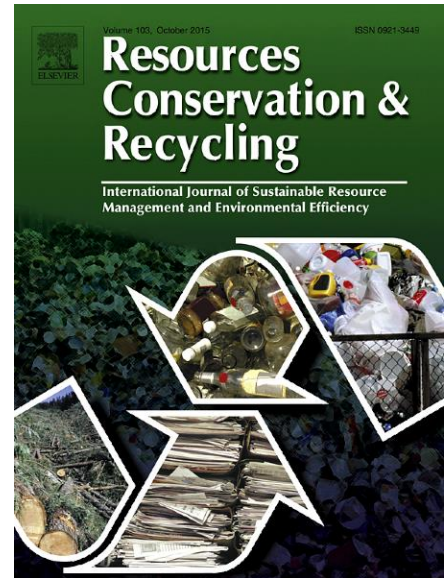
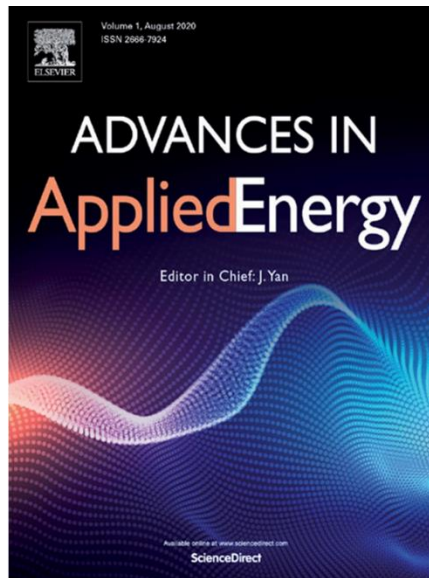
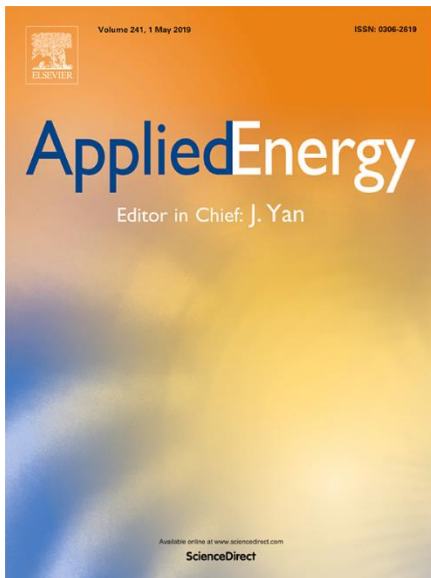
We are looking forward to meeting you.

Prof. Jinyue Yan
Editor-in-chief of Applied Energy
and Chair of CUE

Program at a glance

				Day 1-Sept. 4		Day 2-Sept. 5	
Time	Time	Time	Time	R1	R2	R1	R2
New York	CET	Beijing	Tokyo				
4:00	10:00	16:00	17:00	Opening (Room S)		Session 3 (Room A)	Session 4 (Room B)
4:10	10:10	16:10	17:10				
4:20	10:20	16:20	17:20				
4:30	10:30	16:30	17:30				
4:40	10:40	16:40	17:40				
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5:00	11:00	17:00	18:00				
5:10	11:10	17:10	18:10				
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7:40	13:40	19:40	20:40				
7:50	13:50	19:50	20:50				
8:00	14:00	20:00	21:00				
Time	Time	Time	Time	Day 3-Sept. 6		Day 4-Sept. 7	
New York	CET	Beijing	Tokyo	R1	R2	R1	R2
4:00	10:00	16:00	17:00			Session 5 (Room A)	Session 6 (Room B)
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Time	Time	Time	Time	Day 5-Sept. 8			
New York	CET	Beijing	Tokyo	R1	R2		
4:00	10:00	16:00	17:00	Session 7 (Room A)	Session 8 (Room B)		
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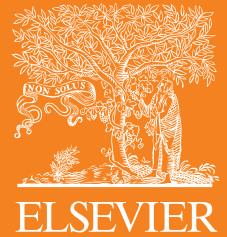
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Applied Energy covers a broad range of subjects from innovative technologies and systems of both fossil and renewable energy to the economic industrial and domestic use of energy.

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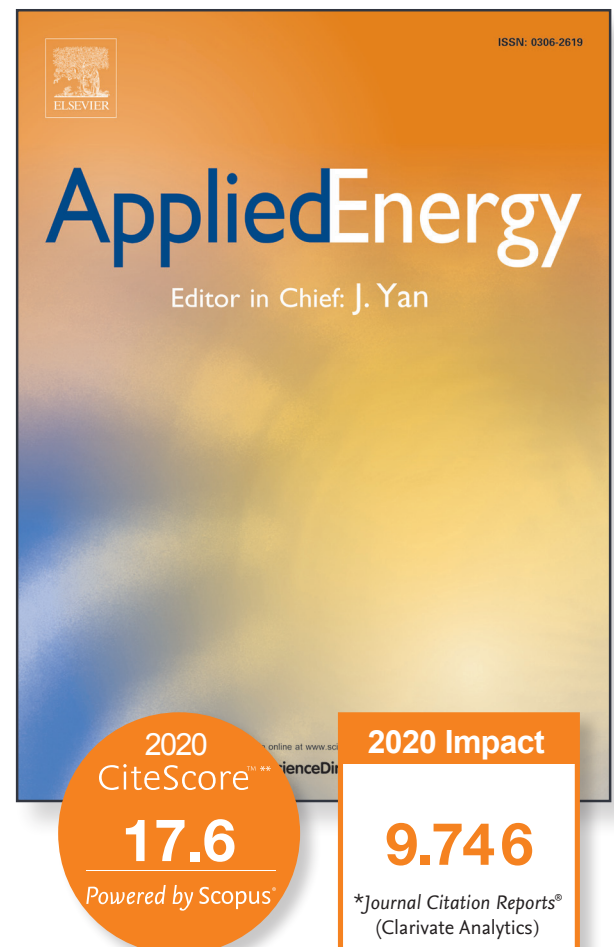
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Applied Energy Editors & Editorial Board Meetings: Virtual Meeting at ICAE2021

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Keynote Speakers



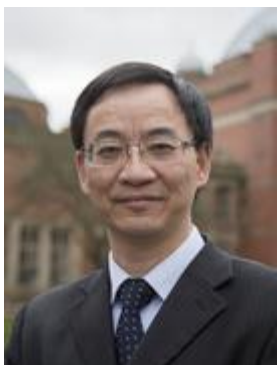
Prof. Andreas Löschel

Environmental/Resource
Economics and
Sustainability
Ruhr University Bochum

Nudging in order to save the climate - some field experimental evidence

Short Bio:

From September 2021, Andreas Löschel is Professor of Environmental/Resource Economics and Sustainability at the Ruhr University Bochum. Since 2011 he has chaired the Expert Commission of the German Government to monitor the energy transformation. He has been a Lead Author of the Intergovernmental Panel on Climate Change (IPCC) for the Fifth and Sixth Assessment Report and a member of the German National Academy of Science and Engineering (acatech). In the Frankfurter Allgemeine Zeitung (F.A.Z.) economist ranking Andreas Löschel has been several times among the 50 most influential economists in Germany.



Prof. Hongming Xu

Vehicle Research Centre
University of Birmingham

Intelligent Optimization of Energy Usage in Future Mobility Systems

Short Bio:

Professor Hongming Xu is Head of the Vehicle Research Centre at the University of Birmingham and 'Distinguished Visiting Professor' at Tsinghua University. With BEng and MEng degrees from Hefei University of Technology obtained in 1982 and 1984 respectively, he received his PhD from Imperial College in 1995. He was a Technical Specialist at JLR prior to joining UoB in 2005 and becoming professor in 2009. He has over 200 SCI journal papers and 200 conference publications including 90 SAE Papers with a Scopus H-index of 41 in powertrain research added by some 40 invited talks and keynotes. He is a Fellow of SAE International and IMechE.



Prof. Poh Seng (PS) Lee

Department of Mechanical
Engineering
National University of
Singapore

Pathways for Decarbonization of Data Center

Abstract:

COVID-19 pandemic situation has accelerated the pace of digitisation and caused a surge in demand for cloud-based services, 5G, artificial intelligence and the Internet of Things (IoT). Data centres, which store, process, and disseminate data, are the backbone enabling the global digital economy and are projected to grow at a CAGR of 15.1% from 2019-2025. However, data centres are also energy guzzlers: according to IEA, data centres are already accounting for 200 TWh per year in energy consumption, which is approximately 1% of the total electricity demand worldwide. Associated with this, the greenhouse gas emissions is approximately 2% of global total: nearly the equivalent of the entire global airline industry. Hence the growth of data centres should be done sustainably to manage the energy use and environmental impact. This talk will present an overview of the different pathways for the decarbonisation of data centres including innovative cooling techniques, green energy sources (renewable energy, hydrogen), AI/machine learning and modern IT infrastructure. Then, the speaker will introduce the Sustainable Tropical Data Centre Testbed (STDCT) initiative that he is leading to create a co-innovation platform for facilitating cooperation between the data centre industry stakeholders and educational institutions for the development of innovative data centre cooling solutions.

Keynote Speakers

Short Bio:

Dr. Poh Seng (PS) Lee is an Associate Professor of Mechanical Engineering at the National University of Singapore (NUS). He currently serves as the Executive Director of Energy Studies Institute, Director of Singapore Energy Centre, Director of Centre for Energy Research & Technology (CERT) and Programme Director of Cooling Energy Science & Technology Singapore (CoolestSG) national consortium. Prof Lee's research interests include high performance cooling techniques (in particular single and two-phase microchannel cooling), energy efficient air conditioning and low-grade waste heat recovery. He is a Fellow of American Society of Mechanical Engineers (ASME), Energy Institute (EI) and Institution of Engineers Singapore (IES). Prof Lee is passionate about translating R&D outcomes into innovations & enterprises and have founded CoolestDC Pte Ltd to commercialise his group's liquid cooling solution for sustainable tropical data centres.

Positive Energy Districts (PED) – An urban concept in energy use and infrastructure

Abstract:

There is a large variety of transformation concepts in energy use and infrastructure. These transformation concepts often consist of three components: energy production, renewable energy, and energy efficiency. Additionally, they are also the main components of Positive Energy Districts (PED). The PED concept has received attention in several European countries. It focuses on energy-efficient and energy-flexible urban areas or groups of connected buildings that produce net-zero greenhouse gas emissions and actively manages an annual local or regional surplus production of renewable energy. They require integrating different systems and infrastructures and interaction between buildings, the users, and the regional energy production, mobility, and ICT systems, while securing the energy supply and a good life for all in line with social, economic, and environmental sustainability. This presentation introduces the basic concept with barriers and opportunities for using PED as an urban transformation concept in energy use and infrastructure.

Short Bio:

Thomas Olofsson is Head of Department (Prefekt) of Applied Physics and Electronics at Umeå University. He is a professor in energy efficiency, with a focus on buildings. His research focuses on reducing building energy end-use with improved indoor comfort. The scope is to propose, implement and evaluate strategies for increased energy performance and thermal comfort, evaluations of building energy efficiency, and parameter identification. Methods include analytical models, such as simple regression models and more complex data-driven approaches, and physical simulations. Investigations also have a user and stakeholder perspective to map behavior, perception, adaptation, and attitudes. Studies include HVAC systems and indoor climate, building components, building construction systems, and district heating.

Urban Systems Design for Low Carbon Urban Energy Districts: Tokyo, Shenzhen and Atlanta

Abstract:

Emerging technologies are changing how cities are perceived, analyzed, designed and constructed as a cyber-physical environment. To address complex urban problems, urban design is becoming data-driven. Cities are to be designed and redeveloped for being more adaptable and resilient to societal, urban and climate changes. The talk introduces smart urban districts in Tokyo, Shenzhen and Atlanta as living laboratories. The following questions will be addressed: how digital technologies fundamentally change the way we design cities, and how urban design enhances energy performance and sensuous quality in an urban environment, in which a city is seen as an urban sensing system. The presentation is structured by four components: 1) data-driven cities; 2) urban data analytics from a nexus



Prof. Thomas Olofsson

Department of Applied
Physics and Electronics

Umeå University



Prof. Perry Yang

Keynote Speakers

Eco Urban Lab

of energy, mobility and human perceptions; 3) decisions platform; 4) concluding remarks on smart urban systems design from model to implementation.

Georgia Institute of
Technology

Short Bio:

Perry Yang is Director of Eco Urban Lab at Georgia Institute of Technology. Yang's work focuses on incorporating data analytics into urban design to improve ecological and energy performance of cities. He published extensively in this area, including Urban Systems Design book he co-edited in 2020. He has been awarded more than ten prizes in international design competitions that include the 2009 World Games Park at Kaohsiung, featured by CNN as "an eco-friendly venue". Before joining Georgia Tech faculty, he was a SPURS Fellow at MIT from 1999 to 2000 and an assistant professor at National University of Singapore from 2001 to 2008.

Urban buildings and energy systems: opportunities and challenges for Energy Efficiency, Demand Flexibility, and Climate Resiliency

Abstract:

Cities consume over two-thirds of the world's energy and account for more than 70% of global CO2 emissions. Cities are facing challenges of aging infrastructure, impact of climate change and extreme weather events. Urban energy systems are interconnected systems of buildings, microclimate, transportation, energy generation and storage. This talk will introduce research on urban buildings and energy systems done at LBNL, focusing on modeling and simulation of urban buildings and energy systems to improve their energy efficiency, demand flexibility, and climate resiliency, leveraging emerging opportunities in urban sensing, big data, modeling and simulation, artificial intelligence, and exascale computing.



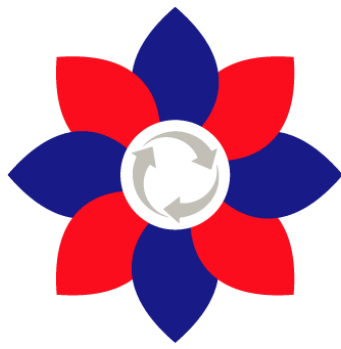
Dr. Tianzhen Hong

Building Technology &
Urban Systems Division

Short Bio:

Lawrence Berkeley National
Laboratory

Dr. Tianzhen Hong is a Senior Scientist and Deputy Head of the Building Technologies Department. He leads the Urban Systems Group and a team with research on data, methods, computing, occupant behavior, and policy for design and operation of low energy buildings and sustainable urban systems. He actively contributed to international collaborations such as the 10-year U.S.-China Clean Energy Research Center on Building Energy Efficiency, IEA EBC Annex 53, 66, 79, 80, and 81. One of his software toolkits, CBES, won the 2019 R&D 100 Award. He is an IBPSA Fellow and ASHRAE Fellow. He received B.Eng. and Ph.D. in HVACR, and B.Sc. in Applied Mathematics from Tsinghua University, China.



BBChina

*Master Program
on Bio-Based Circular Economy*

Interdisciplinary Higher Education for a resilient Circular Economy

*Capacity Building for bioproduct conversion,
bioenergy, Waste Recovery, Reuse, Recycling and
Conversion, low carbon solutions, and urban
energy systems*

Discussion Panel/Workshop at
CUE2021

The 7th Applied Energy Symposium 2021
Low carbon cities and urban energy systems

Monday, September 6, 2021

07:00 EST; 13:00 CET; 19:00 CST

*A Workshop organised by the BBChina Project: a Master
Program on Bio-Based Circular Economy for China.*

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Rostock



Traditio et Innovatio



cesie
the world is only one creature



Co-funded by the
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of the European Union

The Project "Master Program on Bio-Based Circular Economy: From Fields to Bioenergy, Biofuel and Bioproducts in China" (BBChina) is co-funded by the ERASMUS+ Programme of the European Union.

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Agreement number - 2017-2984/001-001 - Project reference number - 586083-EPP-1-2017-1-IT-EPPKA2-CBHE-JP

The global environmental challenges the world is facing need a multi-disciplinary approach. The Net-Zero targets to 2050-2060 set by the major economies are ambitious and anything but easy. Young generations are aware of being the first generation that could face the strongest effects of the climate crisis and, under the global movement “Fridays for Future”, ask the politics to leave the old paths and stand united behind the science.

Greta Thunberg said, “*You don’t have to listen to us. But you do have to listen to the united science*”.

Apart from acting, rapidly, to start tackling the climate challenge, the “United Science” has the primary role of providing the young generations with the tools to give force to their ideas.

However, how to kindle the fire in the minds of those who will take the burning baton of the climate challenges of the next decades, a baton inherited by their parents?

Circular Economy redefines the growth models, moving towards a sustainable approach decoupling economic activities from the consumption of finite resources. Circular economy is one of the main pillars of the solution, and cities are the environment where it can be best applied.

Starting from the results of the BBChina Project that set up a Master Program on Bio-Based Circular Economy in China, we open the discussion on how to best deal with such an interdisciplinary approach, share and compare experiences, and collect new ideas.

Panelists

Shashibhushan Biliangadi; *IIT Bombay, India*

Kedir Bushira; *Namibia University of Science and Technology, Namibia*

Sara Guerrini; *NOVAMONT Research Centre, Italy*

Patrik Klintenberg; *Mälardalen University, Sweden*

Jihong Li; *Nanjing University - School of Environment, China*

Jelena Mazaj; *CESIE, Italy*

Shan-Tung Tu; *East China University of Science and Technology, China*

Ying Xu; *Sichuan University, China*

Xinhai Yu; *East China University of Science and Technology, China*

Hua Zhang; *Tongji University, China*

Chair: Leonardo Nibbi; *University of Florence, Italy*



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Future Energy Center

The Future Energy Center (FEC) is an internationally competitive research environment at Mälardalen University (MDH), Sweden. FEC focus on renewable energy, resource efficiency and digitalisation – towards a sustainable future, in co-production with industry and society.

FEC meets the future challenges in energy and environmental systems by investigating and developing processes and systems for increased resource efficiency and digitalisation in the transition towards a renewable energy system. A core area is enhancing the flexibility, to accommodate intermittent renewable energies such as solar and wind, and to meet the growing need of capacity. Resource efficiency includes utilizing bioenergy sources and at the same time enabling recovery of other resources, as for example nutrients. Another important area is investigating possible process integrations for both increased flexibility and resource efficiency. Further, digitalisation concerns developing new mathematical methods for model based diagnostics, decision support, optimization and control. Different simulation tools and soft sensors built on e.g. spectral measurement techniques are

used in combination to develop new systems for optimization and control. Interdisciplinary work and the integration of research approaches from engineering and natural sciences with those in social sciences and humanities perspectives, as for example markets, big data handling and behaviour, are important to consider.

FEC conducts education within energy, building and environmental engineering at bachelor, master and postgraduate levels. Strategic collaboration with industry is an important part of the education. On-going activities include development of modern web-based education, which extends to the international market. Moreover, FEC participates in several research schools in collaboration with industry and the public sector.

THE FUTURE ENERGY CENTER PRODUCES OVER 100 publications per year, including in the top ranked journals Nature Energy and Nature Climate Change. FEC Professors are active in leading international communities and organises several international conferences together with other partners. FEC has 40+ ongoing projects, of which most are carried out in collaboration with industry and the public sector.



Today, the center comprises 8 professors, 20 senior researchers and about 30 graduate students. The research environment is characterised by a high level of cross-collaboration and communication that drives synergies in interdisciplinary work. International exchange including visiting professors and other researchers at FEC has been highly active over the past 10 years, with visiting professors from Canada, South Africa, Norway, India, and China etc. The Future Energy Center has an annual research budget of about 40 million SEK of which around 70% is external funding.

FEC HAS STRONG RELATIONSHIPS WITH INDUSTRY as well as with recognized national and international centers, including universities across the world. The collaborations with other international partners are carried out through international platforms, where activities connected to the ICAE conference is one important part. The research within FEC is an important part of the development of MDH's strategic collaboration with both private and public sector, partly based on strategic agreements with for example ABB and Bombardier Transportation. In addition, cooperation is carried out with several regional small and medium sized companies. There is also a strong development of energy related interests in industry in the Mälardalen region as for example the establishment of Northvolt Labs and Hitachi ABB Power Grids.



Applied Energy Symposium:

**LOW CARBON CITIES
& URBAN ENERGY SYSTEMS**

SEPT 4-8, 2021 in MATSUE, JAPAN (Virtual)

www.applied-energy.org/cue2021**Panel Discussion****BIPVs and applications in urban energy systems****Sept. 6th 8:30pm–10:30pm (GMT+9)**Chair: Yiqun Pan, yiqunpan@tongji.edu.cn
(Prof. Dr. IBPSA Fellow, Tongji University, Shanghai)Co-chair: Jinqing Peng, jqpeng@hnu.edu.cn
(Prof. Dr., Hunan University, Changsha)

In order to achieve the 2°C climate goal of the Paris Agreement, the world must reach carbon neutralization, that is, net zero CO₂ emission by 2050. The building sector accounts for 40% of the total carbon emissions. The development of renewable energy in buildings and urban systems are of great significance for achieving carbon neutralization. The BIPV (Building Integrated Photovoltaic) is one of the technologies to integrate photovoltaic on the outer surface of building envelopes to generate power. For urban energy systems, other sources of renewable energy, such as wind energy, tidal energy, geothermal energy, etc can also contribute to sustainable urban planning, design, and development. To further facilitate technology innovations in the BIPV and other renewable energy applications, this workshop “BIPV & Renewable energy applications in urban systems” is designed in the CUE2021-Applied Energy Symposium, dedicated to low carbon cities and urban energy systems. This workshop is organized and chaired by Prof. Yiqun Pan and Prof. Jinqing Peng. Researchers are welcome to join the workshop and submit a paper to the workshop. Please do not hesitate to contact us by email xxx (email of yours) if you have any further questions.

Panel Discussion (Sept. 6th)

Invited presentation

Machine Learning-based Robust Model Predictive Control for Building Energy Systems

Fengqi You, Cornell University

Abstract

This presentation will introduce a novel robust model predictive control (RMPC) framework based on machine learning for automatic control of indoor climate of multi-zone building systems considering thermal comfort and uncertain weather forecast errors. The uncertainty space is on the basis of historical weather forecast error data, which are captured by a group of disjunctive uncertainty sets using k-means clustering algorithm. Machine learning approaches are used to construct each basic uncertainty set and reduce the conservatism of resulting robust control actions for the temperature and relative humidity of each zone in the building under disturbances. Based on the proposed dynamic model and data-driven disjunctive uncertainty set, a learning-based RMPC framework is further developed and its feasibility and stability are ensured. The proposed framework is applied to a multi-zone building located in Ithaca, New York, USA. We further extend the framework to smart greenhouse control by accounting for the dynamic control models of greenhouse and data-driven uncertainty sets for ambient temperature, solar radiation, and humidity. A training-calibration procedure is implemented to ensure an appropriate performance guarantee of the RMPC. A case study of controlling temperature, humidity, and CO₂ concentration of a semiclosed greenhouse in New York City is presented.

Short Bio

Fengqi You is the Roxanne E. and Michael J. Zak Professor at Cornell University. He also serves as Chair of PhD Studies in Cornell Systems Engineering and Associate Director of Cornell Energy Systems Institute. His research focuses on novel computational models, optimization algorithms, statistical machine learning methods, and multi-scale systems analytics tools for smart manufacturing, digital agriculture, energy systems, and sustainability. He has published more than 200 peer-reviewed journal articles, and has an h-index of 65. He has received over 20 national/international awards over the past five years. He is currently an editor of Computers & Chemical Engineering, a consulting editor of AIChE Journal, an associate editor of AAAS journal Science Advances and of IEEE Transactions on Control Systems Technology, and an editorial board member of several journals (e.g. ACS Sustainable Chemistry & Engineering and Industrial & Engineering Chemistry Research). For more information about his research group: www.peese.org

COLLECTiEF: Collective Intelligence for Energy Flexibility

Vahid Nik, Lund University

Abstract

Collective Intelligence (CI) is a form of distributed intelligence that emerges in collaborative problem solving and decision making. In COLLECTiEF we will enhance, implement, test and evaluate an interoperable and scaleable energy management system based on CI that allows easy and seamless integration of building equipment into a collaborative network within and between existing buildings and urban energy systems with reduced installation cost, data transfer and computational power while increasing data security, energy flexibility and climate resilience. This is done through developing software and hardware packages to install and smart up buildings and their equipment on a large scale, while maintaining simple and robust communication with the energy grid.

Short Bio

Dr. Nik is an Associate Professor at the Division of Building Physics, Lund University in Sweden. His background is Mechanical Engineering, focused on Energy Conversion and Fluid Dynamics. He got his PhD in Building Physics from Chalmers in 2012. Before joining Lund University in 2014, he was a

postdoctoral researcher at Solar Energy and Building Physics Laboratory, EPFL, Switzerland. His research interests are climate change adaptation and resilience, building and urban physics, urban energy systems, and integration of renewable energy sources. He has more than 60 peer-reviewed publications and together with his team, they have developed several pioneering methods for the impact assessment of climate change on buildings and energy systems. Dr. Nik has been leading and contributing to several national, European and international research projects and collaborations.

CityLearn: Demand Response using Multi-Agent Reinforcement Learning

Zoltan Nagy, University of Texas at Austin

Abstract

Reinforcement learning (RL) has gained popularity in the research community as a model-free and adaptive control paradigm for the built environment, especially for building energy control. RL has the potential to enable inexpensive plug-and-play building controllers that can be implemented without necessitating potentially expensive control models (unlike model predictive control), and to coordinate multiple buildings for demand response, load shaping, and load shifting. In this presentation, Dr. Nagy will give an overview of CityLearn, an OpenAI Gym environment to facilitate development of Multi-Agent Reinforcement Learning controllers to study interacting buildings, and building-grid interaction.

Short Bio

Dr. Nagy is an assistant professor in the Department of Civil, Architectural, and Environmental Engineering at the University of Texas at Austin, directing the Intelligent Environments Laboratory since 2016. A roboticist turned building engineer, his research interests are in smart buildings and cities, in particular in control systems for zero emission building operation, and the application of machine learning and artificial intelligence for the built environment for a sustainable energy transition. He has received several Best Paper awards from the CISBAT conference, Building & Environment journal, as well as a Highest Cited Paper award from Applied Energy. He organized and chaired the first workshop on Reinforcement Learning for energy management in buildings and cities (RLEM'20) at ACM BuildSys'20.

Understanding rooftop PV panel semantic segmentation of satellite and aerial images for better using machine learning

Haoran Zhang, Tokyo University & Mälardalen University

Abstract

The photovoltaic (PV) industry boom and increased PV applications call for better planning based on accurate and updated data on the installed capacity. Compared with the manual statistical approach, which is often time-consuming and labor-intensive, using satellite/aerial images to estimate the existing PV installed capacity offers a new method with cost-effective and data-consistent features. Previous studies investigated the feasibility of segmenting PV panels from images involving machine learning technologies. However, due to the particular characteristics of PV panel semantic-segmentation, the machine learning tools need to be designed and applied with careful considerations of the issue formulation, data quality, and model explainability. This work investigated the characteristics of PV panel semantic-segmentation from the perspective of computer vision. The results reveal that the PV panel image data has several specific characteristics: highly class-imbalance and non-concentrated distribution; homogeneous texture and heterogenous color features; and the notable resolution threshold for effective semantic-segmentation. Moreover, this work provided recommendations for data obtaining and model design, aiming at each observed character from the viewpoints of recent solutions in computer vision, which can be helpful for future improvement of the PV panel semantic-segmentation.

Short Bio

Haoran Zhang is a researcher in the Center for Spatial Information Science at the University of Tokyo, and also works as a researcher at the Future Energy Center at Mälardalen University in Sweden, and Senior Scientist at Locationmind Inc. in Japan. His research includes smart supply chain technologies,

GPS data in shared transportation, urban sustainable performance, GIS technologies in renewable energy systems, and smart cities. He is author of hundreds of journal articles and Editorial Board Member of several international academic journals. He has Ph.D.'s in both Engineering and Sociocultural Environment and was awarded Excellent Young Researcher by Japan's Ministry of Education, Culture, Sports, Science and Technology.

A comparative study of several typical solar energy harvesting pavements

Tao Ma, Shanghai Jiao Tong University

Abstract

Dr. Tao Ma is currently an Associate professor at School of Mechanical Engineering, Shanghai Jiao Tong University. His research is mainly related to fundamental research and applications of solar photovoltaic technologies. He has published over 70 peer-reviewed papers with an h-index of 27, including 10 ESI highly cited papers and 2 ESI hot papers. He received several awards during his early career stage, such as the Excellent Young Scientist Award in 'Energy and Built Environment' and Outstanding PhD Thesis Award. He is also an editorial member of several journals including Applied Energy.

Short Bio

Road pavements that can absorb abundant solar radiation have tremendous potential in solar energy utilization. In this study, three solar energy harvesting technologies on pavements including pavement-integrated photovoltaic (PIPV) module, pavement-integrated solar thermal (PIST) module, and pavement-integrated photovoltaic thermal (PIPVT) module, are considered and compared based on the weather condition in Shanghai. The operating performance such as electricity and heat yields of the modules are evaluated, and the influence on the urban heat island effect is also investigated. Compared with the conventional pavement module, all three solar energy harvesting pavement modules have lower maximum asphalt average temperatures that can decelerate the thermal aging of asphalt concrete.

Discussion

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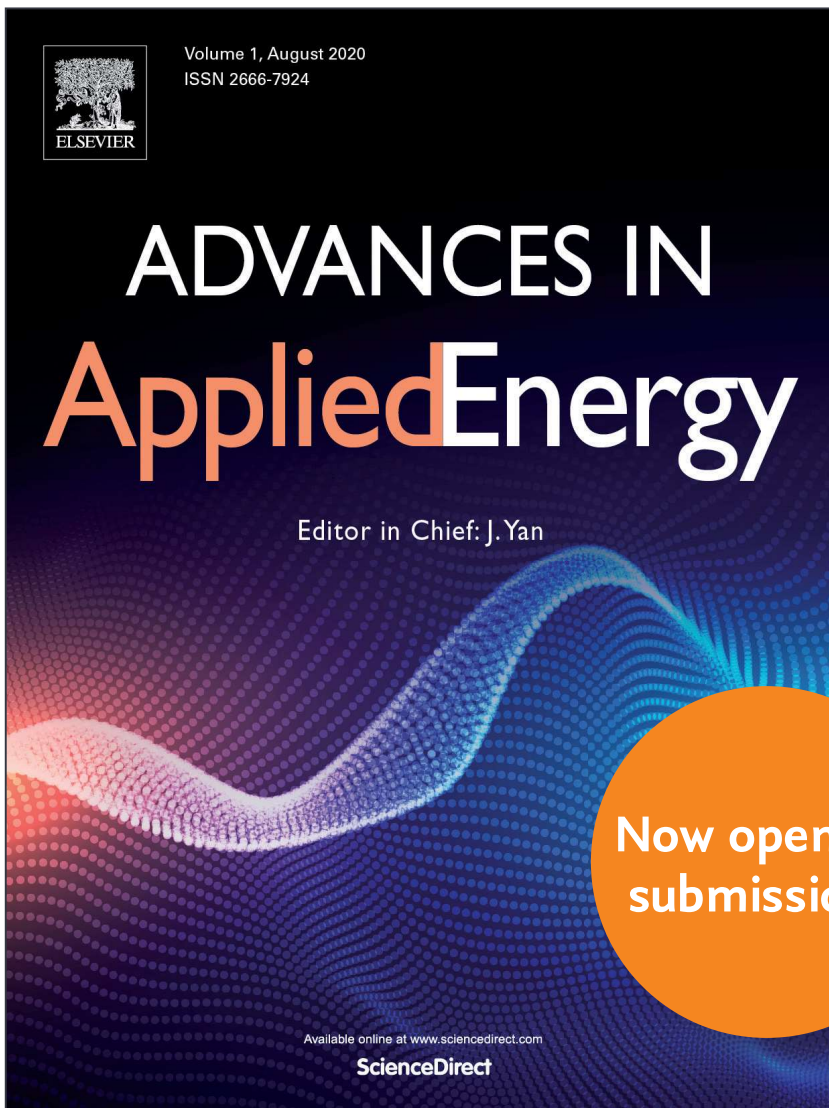
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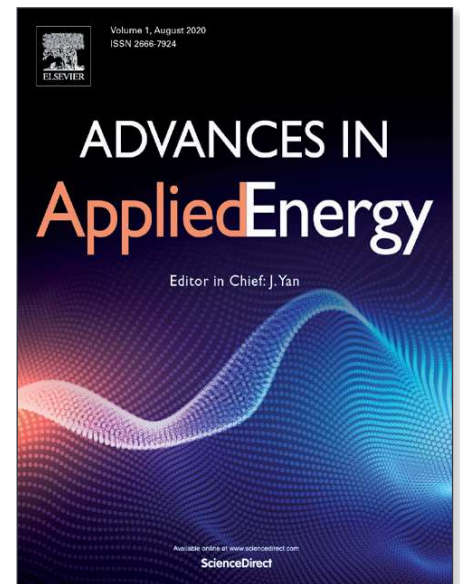
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Zoom link

Room S (Open for public):

<https://us02web.zoom.us/j/81960519505?pwd=My9QWHZGZkZFdU9iV2h6c3hNaGd5dz09>

17:00-17:30	Opening (Room S)		
17:30-18:20	Keynote 1: Prof. Poh Seng Lee (Room S)		
18:20-18:30	TEA/COFFEE BREAK		
Session 1 (Room A) Session Name: Artificial intelligence and big data in energy systems Session Chair: Yuntian Chen, Peng Cheng Laboratory; Xiaodan Shi, The University of Tokyo; Keping Yu, Waseda University, Japan			
Time	Paper ID	Author	Paper Title
18:30	37	Wuxia Zhang, Paige Wenbin Tien, John Calautit and Yupeng Wu	Building Occupancy Prediction Through Machine Learning for Enhancing Energy Efficiency, Air Quality and Thermal Comfort: Review and Case Study
18:42	38	Wuxia Zhang, John Kaiser Calautit and Neveen Hamaza	The Impact of Occupancy Energy Use Behaviour of High-Rise Dwellings In Southeast China
18:54	41	Zhicheng Xu, Jun Wang and Peter Lund	Research of the peak current in lithium-ion battery application with AI
19:06	54	Zu Wang, John Kaiser Calautit, Shuangyu Wei, Paige Tien and Liang Xia	Real-time building heat gains prediction and HVAC setpoint optimization: an integrated framework
19:18	60	Paige Wenbin Tien, Murtaza Mohammadi, Fangliang Zhong, John Kaiser Calautit, Jo Darkwa and Christopher Wood	Deep learning-based occupancy behaviour approach towards the improvement of the indoor air quality within building spaces
19:30	3	Xiaoyu Jin and Fu Xiao	Synthetic minority oversampling based machine learning method for urban level building EUI prediction and benchmarking
19:42	49	Wei He, Jifang Zhang, Chenchen Pei, Xinqiao Wang, Hailong Li and Baoyin Lv	Optimal thermal match for internal and external cooling water cycles in data server cooling system
19:54	87	Xiaoyan Ma, Shurong Li, Changgeng Zhang and Yunfei Mu	A Thermoelectric Coupling Dynamic Energy Consumption Model of Data Center in MATLAB/SIMULINK Environment
20:06	100	Qiong Zhang, Jinyu Chen, Tomohiko Ihara and Haoran Zhang	Usage Behavior-based Cost Comparison for the Next-generation Vehicles in Japan
20:18	117	Zhengbing Li, Yongtu Liang, Weilong Ni, Qi Liao, Lichao Li and Haoran Zhang	The potential of multiproduct pipelines for sustainable biofuel transport
20:30	63	Yun Bin Choh, Wentao Yang and Xiaonan Wang	Integration of Blockchain-Based Peer-To-Peer Energy Markets in Industrial Water-Energy-Network
20:42	99	Jinyu Chen, Xiaodan Shi, Zhiyao Tang, Wenjing Li, Yuhao Yao, Peiran Li, Qing Yu, Xuan Song, Ryosuke Shibasaki and Haoran Zhang	ElecNet: transformer-based urban electricity profile prediction model
20:54	78	Hao Zhang, Yongrui Zhang, Ran Zhai, Jie Yan, Yuan Yang and Han Wang	Study on the Time-shifting Characteristics of Natural Wind with Multi Spatial and Temporal Scales
Session 2 (Room B) Session Name: Urban energy systems Session Chair: Alaa Krayem, Mälardalen University; Yingru Zhao, Xiamen University			
Time	Paper ID	Author	Paper Title
18:30	85	Lingfei Qi, Mingkun Jiang and Jinyue Yan	Zero-energy snow removal system for track switch based on air forced field
18:42	61	Yufan Qiu and Xinwei Shen	Correlation Analysis of Demographic Data and Power System's Load Profile in a Smart City
18:54	4	Ming Fang and Jianxiao Zou	Exergy analysis of an integrated polymer electrolyte membrane fuel cell test system
19:06	24	Huang Yuan, Lin Jian, Xie Meina, Wu Nianyuan, Xie Shan and Zhao Yingru	Combining state space demand modeling with design optimization for integrated energy systems planning
19:18	43	Zihao Li, Weiqi Li, Yuxiang Wang, Boyu Guo and Zheng Li	Carbon Neutrality in Provincial Energy System: A Case Study of 2060 Sichuan Province
19:30	72	Fengjuan Wang, Jinyue Yan and Jiuping Xu	Resilience evaluation framework towards urban power system

Sept. 4

Tokyo Time

19:42	116	Xueyu Tian and Fengqi You	Optimal Design of Future Campus Energy Systems for Carbon-Neutrality
19:54	46	Hao Sun, John Calautit and Carlos Jimenez-Bescos	An Evaluation on the effect of thermal mass to modulate overheating in the cold climate in China and the role of shading devices and night ventilation
20:06	76	Xiaodi Wang and Jinyue Yan	Market Oriented Transmission Expansion Planning
20:18	80	Alaa Krayem, Fredrik Wallin and Jinyue Yan	Open Urban Data Portal for Collaborative Research and Innovation
20:30	90	Hewen Zhou, Yu Zhang, Yunqi Sun and Qing Yang	The comprehensive assessment of energy - environment - economy of typical agrivoltaic systems in China
20:42	33	Yumin Liang, Yiqun Pan and Mingya Zhu	Assessment of operational carbon emission reduction potential of green building technologies
20:54	88	Qingnan Cai, Denlin Fang and Bin Chen	Assessment of PM2.5-related health impact and social vulnerability to air pollution for China provinces during 2000~2019
21:06	40	Liwei Sun, Jing-Chun Feng and Si Zhang	The Carbon Footprint of Pacific Oyster Pacific Farming in China
21:18	110	Huiting Guo and Dan Song	Industrial transformation and mitigation scheme of cement production chain in China
21:30	106	Jiaxiang Zou and Bin Chen	Water-energy nexus for a sustainable urban water supply system-a case study of Beijing

Session 3 (Room A)

Session Name: Nexus in urban energy system

Session Chair: Chuang Wen, University of Exeter; Huai Su, China University of Petroleum-Beijing

Time	Paper ID	Author	Paper Title
17:00	71	Shuo Wang, Changzheng Hu, Qie Sun, Hailong Li and Ronald Wennersten	A Method to Assess the CO2 Capture Potential from a Biomass-fired CHP
17:12	114	Yan Yang, Haoping Peng, Hongbing Ding and Chuang Wen	A new concept of mitigating CO2 emission using nonequilibrium condensation in transonic flows
17:24	62	Runyao Huang, Hongtao Wang and Xiaohang Ni	Evaluating the potential of energy neutrality of wastewater treatment plants based on comprehensive water-energy efficiency and energy self-sufficiency rate
17:36	18	Boqiang Lin and Hengsong Zhao	Measuring Policy Uncertainty under Climate Change
17:48	25	Boqiang Lin and Rui Bai	Are residents willing to pay for garbage recycling: Evidence from a survey in Chinese first-tier cities
18:00	50	Wei He, Zihan Cai, Chenchen Pei, Xinqiao Wang, Hailong Li and Jian Liu	Impact of series circuit layout on the output power performance of thermoelectric generator
18:12	86	Shixue Wang and Yanzhe Li	NUMERICAL SIMULATION OF THE INFLUENCE OF GAS CHANNEL SIZE ON THE PERFORMANCE OF THERMOELECTRIC GENERATOR
18:24	15	Huaqing Qi, Hongru Zhang, Zhaoyou Zhu and Yinglong Wang	A new hydrogen production process of sludge plasma gasification with integrated carbon sequestration system

Session 4 (Room B)

Session Name: Energy management, policy and economics

Session Chair: Xiaonan Wang, National University of Singapore; Jie Yan, North China Electric Power University

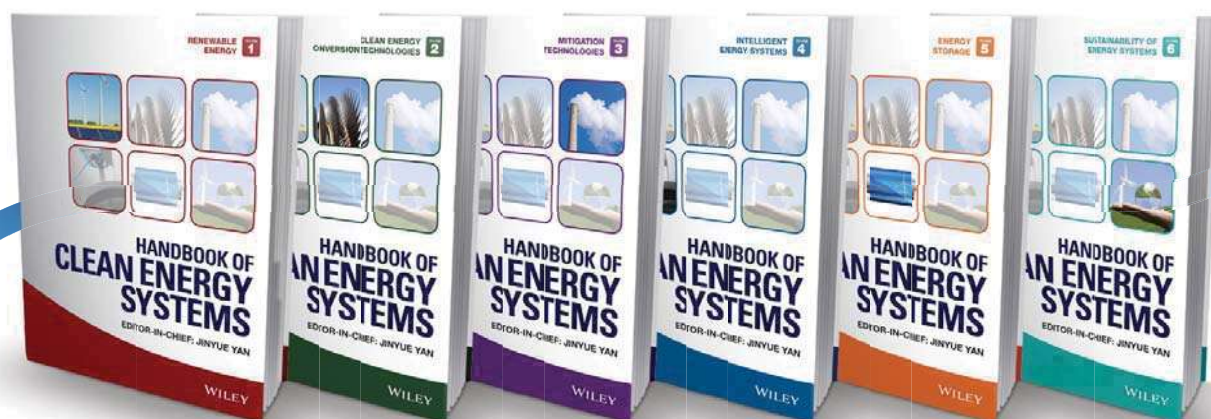
Time	Paper ID	Author	Paper Title
17:00	7	Zhongjue Yu, Yong Geng, Alvaro Calzadilla and Raimund Bleischwitz	CHINA'S UNCONVENTIONAL CARBON EMISSIONS TRADING MARKET: THE IMPACT OF A RATE-BASED CAP IN THE POWER GENERATION SECTOR
17:12	14	Boqiang Lin and Yicheng Zhou	Does economic growth target set by local governments drive energy consumption in China?
17:24	17	Boqiang Lin and Rongxin Wu	Environmental regulation and influence on energy-environmental performance: Evidence on the Porter Hypothesis from China's iron and steel industry
17:36	28	Boqiang Lin and Chunxu Guan	Imported food consumption intention shifting during COVID-19: Turning a problem into an opportunity?
17:48	34	Vincent Li, Manu Suvarna and Xiaonan Wang	How COVID-19 Impacted Electricity Demand in New York
18:00	35	Boqiang Lin and Tong Su	Monetary policy drives economic prosperity: innegligible influence of energy
18:12	36	Xin Cao, Zhi Li, Chang Liu and Yihan Wang	Prediction of the temporal and spatial evolution trend of China's energy consumption at provincial level
18:24	48	Sujin Lee, Leebom Jeon and Steven Jige Quan	Impacts of social distancing restrictions for the COVID-19 on residential building energy in Seoul
18:36	59	Gordon Huang, Jiawei Chen, Xiaoyue Zhang, Yanyan Liu, Dengcheng Han and Sichen Gao	Development of A Non-Deterministic SMR-Embedded Energy Systems Planning Model - Canadian Case Studies
18:48	94	Yanli Li, Xinyi Ke, Zhongxin Guo, Zitong Wang, Shanshan Qu, Mingkun Jiang and Jinyue Yan	Study on Environmental and Economic Benefits of Photovoltaic integration with Iron and Steel Plants in Hebei Province
19:00-19:10	TEA/COFFEE BREAK		
19:10-20:00	Keynote 2: Prof. Thomas Olofsson (Room S)		
20:00-20:50	Keynote 3: Prof. Hongming Xu (Room S)		

Sept. 6

Tokyo Time

19:30-20:20	Keynote 4: Prof. Andreas Löschel (Room S)
20:20-20:30	TEA/COFFEE BREAK
20:00-21:30	Panel 1: Interdisciplinary Higher Education for a resilient Circular Economy (Room B)
20:30-22:00	Panel 2: BiPVs and applications in urban energy systems (Room S)

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Session 5 (Room A)

Session Name: Building energy system

Session Chair: Minda Ma, Tsinghua University; Zhang Bai, China University of Petroleum (East China)

Time	Paper ID	Author	Paper Title
17:00	5	Lulu Hu and Yingwen Liu	Investigation on oscillations characteristics of self-excited thermoacoustic system forced by acoustic wave
17:12	65	Zhichen Wei, John Calautit and Yupeng Wu	Investigation of the effect of envelope on building heating energy flexibility under MPC control strategy
17:24	16	Puneet Saini, Frank Fiedler, Xingxing Zhang and David Larsson	HEAT RECOVERY POTENTIAL FROM PV MODULES: A SIMULATION CASE STUDY FOR A SWEDISH RESIDENTIAL BUILDING CLUSTER
17:36	32	Zuxun Xiong, Xinwei Shen, Qinglai Guo and Hongbin Sun	A Low carbon Building-level Integrated Energy System Planning Method Considering Fuel Cell and Multiple Energy Storage
17:48	55	Michele Salvestroni, Leonardo Nibbi, Gianmarco Paone, Giacomo Pierucci and Maurizio De Lucia	Conversion of Existing District Heating into Solar District Heating
18:00	66	Zhang Bai, Yu Yuan, Qibin Liu, Bo Zheng and Wenxin Hu	Enhanced demand response flexibility of applying thermochemical recuperation in a combined cooling, heating and power system
18:12	2	Lu Chen and Dong Liu	Performance improvement control methods for solar-air source heat pump systems based on meteorological k-means clustering
18:24	6	Yi Huang, Hongwei Tan, Yongsong Zhu and Li'An Hu	Energy Evaluation Method and Index Analysis of Hospital Building
18:36	10	Shufan Zhang, Zhili Ma and Minda Ma	Operational CO2 mitigation evaluation in commercial buildings of the top emitters
18:48	11	Xiwang Xiang, Xin Ma, Zhili Ma and Minda Ma	Historical and prospective trajectories of operational carbon in China's commercial buildings: an assessment via LASSO-GWO approach

Session 6 (Room B)

Session Name: Energy efficiency in buildings

Session Chair: Jinqing Peng, Hunan University; Wandong Zheng, Tianjin University

Time	Paper ID	Author	Paper Title
17:00	31	Zeming Zhao, Hangxin Li and Shengwei Wang	Identification and comparison of key design parameters of high-rise and low-rise zero/low energy buildings in subtropical regions
17:12	44	Parth Bansal and Steven Jige Quan	Building Characteristics, Urban Contextual Form and Energy Use in Seoul – A Local Climate Zones Typology Approach
17:24	52	Shuangshuang Meng, Zhihao He and Ning Mao	Influence of Horizontal Tube Bundle Arrangement on Flow and Heat Transfer Properties of Oily Wastewater Spray Falling Film
17:36	73	Zihui Liu, Xiaohu Yang, Xu Liu and Zhan Liu	Evaluation on branching fins towards improving latent heat thermal storage
17:48	74	Tingting Jiang, Shijun You, Huan Zhang, Yaran Wang and Wandong Zheng	Numerical simulation of the aluminum column-wing type refrigerant-direct radiant cooling system
18:00	97	Mostafa Ibrahim and Shinji Kambara	2D-NUMERICAL SIMULATION OF H2 PERMEATION THROUGH PD- MEMBRANE
18:12	84	Sujie Liu, Huan Zhang, Zhimeng Qi, Shijun You and Wandong Zheng	Experimental study and thermal analysis on an integrated solar-air source heat pump system
18:24	103	Li Zhu and Jiqiang Zhang	Global Sensitivity Analysis of Peak Cooling Load Applied to A High-rise Office building at the Early Stage
18:36	112	Yu Han, Yan Yang and Chuang Wen	Nanoparticle-based phase change materials integrated into solar collector heating system for net-zero buildings
18:48	109	Na Li, Donghyuk Yi, Parth Bansal and Steven Jige Quan	Urban Form Typology and Building Energy Use: Empirical Investigation in Seoul
19:00-19:10	TEA/COFFEE BREAK		
19:10-20:00	Keynote 5: Perry Yang (Room S)		
20:00-20:50	Keynote 6: Tianzhen Hong (Room S)		

Session 7 (Room A)

Session Name: Climate change and policy options

Session Chair: Tong Xu, University of Cambridge; Rui Zhu, The Hong Kong Polytechnic University

Time	Paper ID	Author	Paper Title
17:00	22	Yibing Zhao, Can Wang and Wenjia Cai	Carbon Pricing Policy, Revenue Recycling Schemes and Income Inequality: A multi-regional CGE assessment for China
17:12	39	Yue Yan, Cuixia Gao, Mei Sun and Zhilong Guo	Renewable energy investment and carbon emissions under carbon cap-and-trade mechanisms and renewable portfolio standards
17:24	45	Wang Yuxiang, Li Weiqi, Li Zihao and Li Zheng	Scenarios Analysis on the Regional Pathway under the Target of Carbon Peak and Carbon Neutrality : a Case Study of Sichuan Province
17:36	47	Abdullah Abdulhameed Bagasi and John Kaiser Calautit	Investigation of the novel integration of mashrabiya and heat transfer devices for buildings in hot climates
17:48	58	Leonardo Nibbi and Jelena Mazaj	Interdisciplinary Higher Education for a Resilient Circular Economy: the BBChina Project
18:00	70	Tianhong Zheng, Ke Qu and John Kaiser Calautit	Evaluating and predicting Urban Heat Island Changing for a Subtropical City Centre by a new Urban Weather Generator workflow (a case study in Osaka, Japan)
18:12	83	Rui Zhu	An economically feasible optimization of photovoltaic provision using real electricity demand: A case study in New York City
18:24	102	Cai Ouyang, Cuncun Duan and Bin Chen	The spatial regulation of wastewater treatment plants in the Beijing-Tianjin-Hebei region based on a hybrid model
18:36	101	Shize Qin, Lena Klaaßen, Ulrich Gellersdörfer, Christian Stoll and Da Zhang	Bitcoin's future carbon footprint
18:48	93	Bo Ren, Huajiao Li and Jianglan Shi	Extended abstract: Decoupling Relationship between Output, Energy Consumption and Carbon Emissions in the Science and Technology Sector- A Global Value Chain Perspective

Session 8 (Room B)

Session Name: Low carbon city indicators & renewable energy applications

Session Chair: Qi Liao, China University of Petroleum-Beijing; Jinyu Chen, The University of Tokyo

Time	Paper ID	Author	Paper Title
17:00	42	Li Zhu, Mengying Cao and Baoquan Yin	The Rational Assessment of Low-carbon Transformation for Post-mining Town: A Case Study of Wuhai
17:12	105	Keling Liu and Bin Chen	Spatial-Temporal Evolution of Ecological Security in Beijing based on Emergetic Ecological Footprint
17:24	108	Yan Li and Bin Chen	Spatiotemporal pattern of CO2 emissions in Beijing from 1997 to 2017
17:36	104	Xiangdi Ge, Hui Hou and Yifan Wang	Power Transaction Strategies Based on Stackelberg Game Model and Smart Contract Between PV Users and Electric Power Aggregator
17:48	13	Jia Liu and Hongxing Yang	Study on hybrid renewable energy systems for a net-zero energy commercial building sector in Hong Kong integrated with energy storage of pumped hydro and hydrogen taxis
18:00	51	Tongling Li, Hao Yu, Wenfei Li, Jiaojiao Zhuang, Shuangshuang Meng and Ning Mao	Numerical study on effects of sudden heat flux increase on flow pattern in straight microchannel for CPV cooling
18:12	92	Yanli Li, Ziyi Yu, Lingfei Qi, Mingkun Jiang and Jinyue Yan	A Decision-making Framework for the Site Selection of PV Deployment along High-speed Railway
18:24	115	Ning Zhao and Fengqi You	Renewable Power Systems Transition for New York State using a Multi-Scale Bottom-Up Planning Framework
18:36	89	Senji Li, Wenbo Gu, Salman Ahmed and Tao Ma	Comparative study and performance assessment of solar energy harvesting pavements
18:48	95	Mengqi Hu and Ying Kong	Are compact cities lower carbon? Empirical evidence from 49 high-tier Chinese cities

TEA/COFFEE BREAK

Session 9 (Room A)

Session Name: Energy storage & materials for renewable and sustainable energy

Session Chair: Xiaohu Yang, Xi'an Jiaotong University; Masoume Shabani, Mälardalen University

Time	Paper ID	Author	Paper Title
19:10	9	Chen Wang, Xiaosong Zhang, Lu Xue and Xiaohui She	A compact liquid air energy storage using pressurized cold recovery with enhanced energy density for cogeneration

19:22	12	Xu Liu, Xuqing Yang, Zhan Liu and Xiaohu Yang	Thermodynamic analysis of a novel liquid carbon dioxide energy storage system with low pressure storage and cold recuperator
19:34	27	Boqiang Lin and Zhiwei Liu	Palliative or Surgery : Thermal Power System and Battery Energy Storage System in Supporting Low Carbon Transition in China
19:46	57	Xiyuan Chen, Zhao Lu, Liyu Zhang, Rongjie Duan, Yi Che and Liwen Jin	A comparative study on fluid flow and temperature distributions in microchannel heat sink with different I-type header shapes for high TDP CPUs
19:58	75	Hanxue Yang, Guanhua Zhang, Zhiqiang Liu, Xiaoyu Yan, Wei Lu and Zilong Wang	An experimental investigation on the control mechanism and heat transfer enhancement of composite phase change materials
20:10	96	Ruifei Ma, Jingchao Liu, Peng Wu and Yelin Deng	Optimizing the configuration of the Battery Energy Storage System in Microgrid Considering orderly and non-orderly EV charging
20:22	107	Masoume Shabani, Fredrik Wallin, Erik Dahlquist and Jinyue Yan	Techno-economic evaluation of a battery system integrated into a residential grid-connected PV system considering battery degradation
20:34	20	Lin Qiu, Fengcheng Li, Ning Zhu, Yanhui Feng, Xinxin Zhang and Xiaohua Zhang	The optimal solution to increase across-tube heat transfer channel through polyethylene bridge
20:46	91	Dong In Kim, Ji Won Lee, Rak Hyun Jeong, Seong Park, Ki Hwan Hwang, Sang Hoon Nam and Jin-Hyo Boo	Performance enhancement of perovskite solar cell using Al-TiO ₂ thin film as electron transporting buffer layer
20:58	8	Xiaoxin Yan, Haibo Zhao, Yanhui Feng, Lin Qiu, Xinxin Zhang and Taku Ohara	Excellent heat transfer and thermal energy storage performance of erythritol/graphene composite phase change materials
21:10	69	Hai Zhang, Wantao Yang, Yifei Zhang, Lilin Hu, Yang Zhang, Atsushi Ishikawa and Zhihong Liu	Concept and Validation of Electric Energy Storage by a Fluidized Bed
21:22	111	Wenjing Zhu and Bin Chen	Energy-pollutant nexus for wastewater treatment in China based on multi-regional input-output analysis
21:34	118	Delin Fang, Wenjie Zhang, Zhihan Zheng, Qingnan Cai and Bin Chen.	Carbon neutrality analysis of sewage treatment plant in China

Session 10 (Room B)

Session Name: EV and eco-traffic & integrated energy networks and microgrids

Session Chair: Wenlong Shang, Beijing University of Technology; Haoran Ji, Tianjin University

Time	Paper ID	Author	Paper Title
19:10	29	Huicui Chen and Lebin Chu	Diagnosis and prediction of local gas starvation in proton exchange membrane fuel cells based on machine learning method
19:22	30	Kong Yan and Xu Nan	Global optimization energy management based on "Cyber-physical system - Dynamic Programming" (CPS-DP)
19:34	64	Zhao Lu, Liyu Zhang, Xiyuan Chen, Rongjie Duan, Xiaohu Yang and Liwen Jin	Experimental investigation on heat generation behaviors of the high-capacity lithium-ion battery with different charging conditions
19:46	67	Bin Zhang, Hanxiao Zhou, Xiaolei Zhao, Jun Gao and Shengxi Zhou	Energy harvesting from train vibration caused by track irregularity
19:58	68	Qiaobin Fu, Zhenhui Xu, Kenichi Takai and Tielong Shen	Parking-based EV Collective Charging Control Strategy Design: a Mean-field Game Approach
20:10	81	Rui Zhu, Dániel Kondor, Cheng Cheng, Xiaohu Zhang, Paolo Santi, Man Sing Wong and Carlo Ratti	Optimization of scooter-sharing services using a solar-charging based real-time shareability network
20:22	21	Xianxu Huo, Jun Zhang, Yan Qi, Lei Wu, Ziheng Dong and Kai Hou	Reliability Evaluation of Integrated Energy System with Energy Synthetic Utilization
20:34	23	Xunhu Yin, Chengjin Ye, Minglei Bao, Xiacong Sun and Yi Ding	Scheduling Strategy for Internet Data Centers in Heat and Electricity Integrated Energy System
20:46	26	Luyao Liu, Chenyu Su, Qie Sun, Qingxi Huang and Ronald Wennersten	DUAL-STAGE OPTIMAL SCHEDULING FOR A GRID-CONNECTED MICROGRID
20:58	79	Jianing Luo, Shengwei Wang and Hangxin Li	A quantitative approach of microgrid performance assessment at the planning stage
21:10	56	Bin Shuai, Quan Zhou, Huw Williams, Yanfei Li and Hongming Xu	IMPACT OF EXPLORATION-TO-EXPLOITATION RATIO ON ENERGY SAVING POTENTIAL OF PLUG-IN HYBRID VEHICLES CONTROLLED BY REINFORCEMENT LEARNING
21:22	77	Jingyu Cao, Ling Zheng, Jinqing Peng, Zhanying Zheng, Mingke Hu, Qiliang Wang and Gang Pei	Influence of working medium on the characteristics of two-phase loop thermosyphon under high internal flow resistance

Welcome to **ICAE2021, the 13th International Conference on Applied Energy!**

Due to the COVID-19 pandemic, the ICAE2020 was held in the form of a virtual conference though it was originally planned in Bangkok, Thailand. Therefore, we decide to hold ICAE2021 using the same selected venue at the United Nations Conference Centre (UNCC) in Bangkok, Thailand on **Nov. 29- Dec. 2, 2021**. The theme of ICAE2021 is "*Sustainable Energy Solutions for a Post-COVID Recovery towards a Better Future*". ICAE2021 will include keynotes and invited speeches, plenary sessions, dedicated workshops, and oral and poster presentations on various topics (but not limited to):

- » Renewable Energy
- » Clean Energy Conversion Technologies
- » Mitigation Technologies
- » Intelligent Energy Systems
- » Energy Storage
- » Energy Sciences
- » Energy Management, Policy, Economics & Sustainability

Key dates:

- » **Deadline for draft paper: Sep. 15, 2021**
- » Review: Sep. 10 – 25, 2021
- » Notification of acceptance: Sep. 25, 2021
- » Deadline for final paper: Nov. 10, 2021
- » Online registration close: Nov 15, 2021
- » Conference: Nov. 29– Dec. 2, 2021

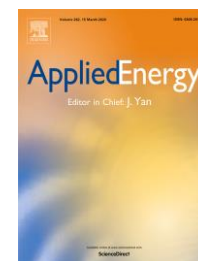
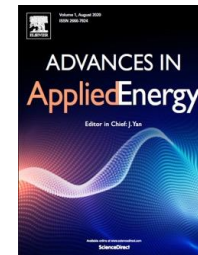
For more information, please visit www.applied-energy.org,
or contact: icae2021@applied-energy.org

Please contact us if you would like to propose and organize a session, a panel, a workshop, or a special forum in the Conference.

All papers will be peer-reviewed, and accepted papers are required to be presented orally at the Conference. Selected papers from ICAE2021 will be recommended by the Scientific Committee for further consideration of publication in prestigious journals including Applied Energy, Advances in Applied Energy and other journals.

I look forward to meeting you at ICAE2021 in Bangkok!

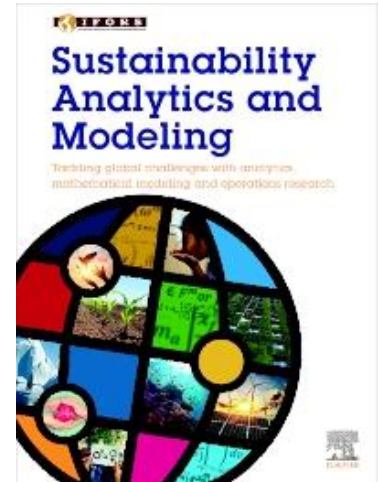
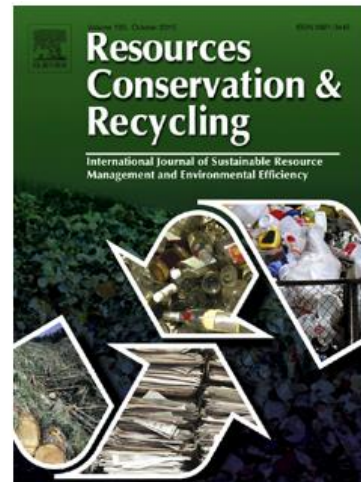
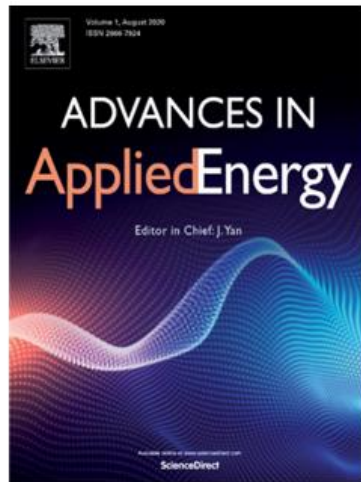
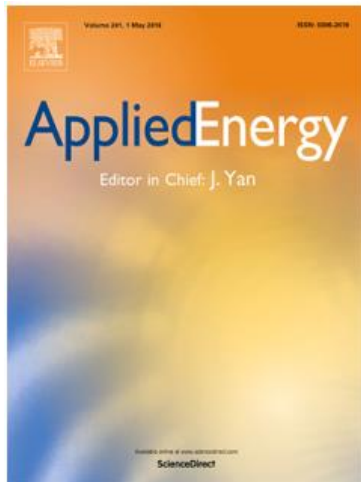
Prof. J. Yan, Chair of ICAE2021 and
Editor in Chief of Applied Energy, Advances in Applied Energy



CALL FOR PAPERS
Deadline of Draft Paper
Sept. 15, 2021

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Selected best papers from the conference will be considered for publication in a special issue jointly in *Applied Energy*, *Advances in Applied Energy*, *Resources Conservation & Recycling* and *Sustainability Analytics and Modeling*.



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Call for Courses/Partners

Background and objective

- **Open Course: Energy (OC:E)** is a not-for-profit platform of online open courses focused on energy-related areas.
- The **objective** of OC:E is to provide an effective, dynamic, and flexible platform for free online learning to disseminate knowledge and improve people's skills relating to energy science and engineering.
- OC:E will establish an online platform at enarXiv.org with links to each specific open course to facilitate open course learning.
- OC:E was initiated and developed based on the existing Applied Energy network, with 50K+ professors, scientists, engineers in energy fields, participating as scientists, researchers, teachers, students, authors, reviewers, readers, speakers, and audiences at the Journals of Applied Energy, Advances in Applied Energy, the International Conferences such as International Conference on Applied Energy (ICAE: applied-energy.org), CUE, REM etc, Energy Proceedings (energy-proceedings.org), energy preprint platform (enarXiv.org), UNiLABs, and summer schools, etc.

Approach

To join OC:E as a partner, the partner is required to offer at least one online open course in the format of (but not limited to) real time lectures, course video recordings, course presentation slides, or other materials.

OC:E will further develop new courses involving the collaboration of partners on the platform.

Please find the attached template for the course description to be filled in by each prospective partner.

Further contact information

Email: oce-info@applied-energy.org

www.applied-energy.org/cue2021

