UK-China Workshop on Energy and Climate Change Economics

(London + online)

Date: 3rd and 4th December 2021

UCL
THE BARTLETT
SCHOOL OF SUSTAINABLE
CONSTRUCTION

CEEP-BIT
北京理工大学能源与环境政策研究中心
Center for Energy & Environmental Policy Research,BIT
能源经济与环境管理北京市重点实验室
Beijing Key Laboratory of Energy Economics and Environmental Management

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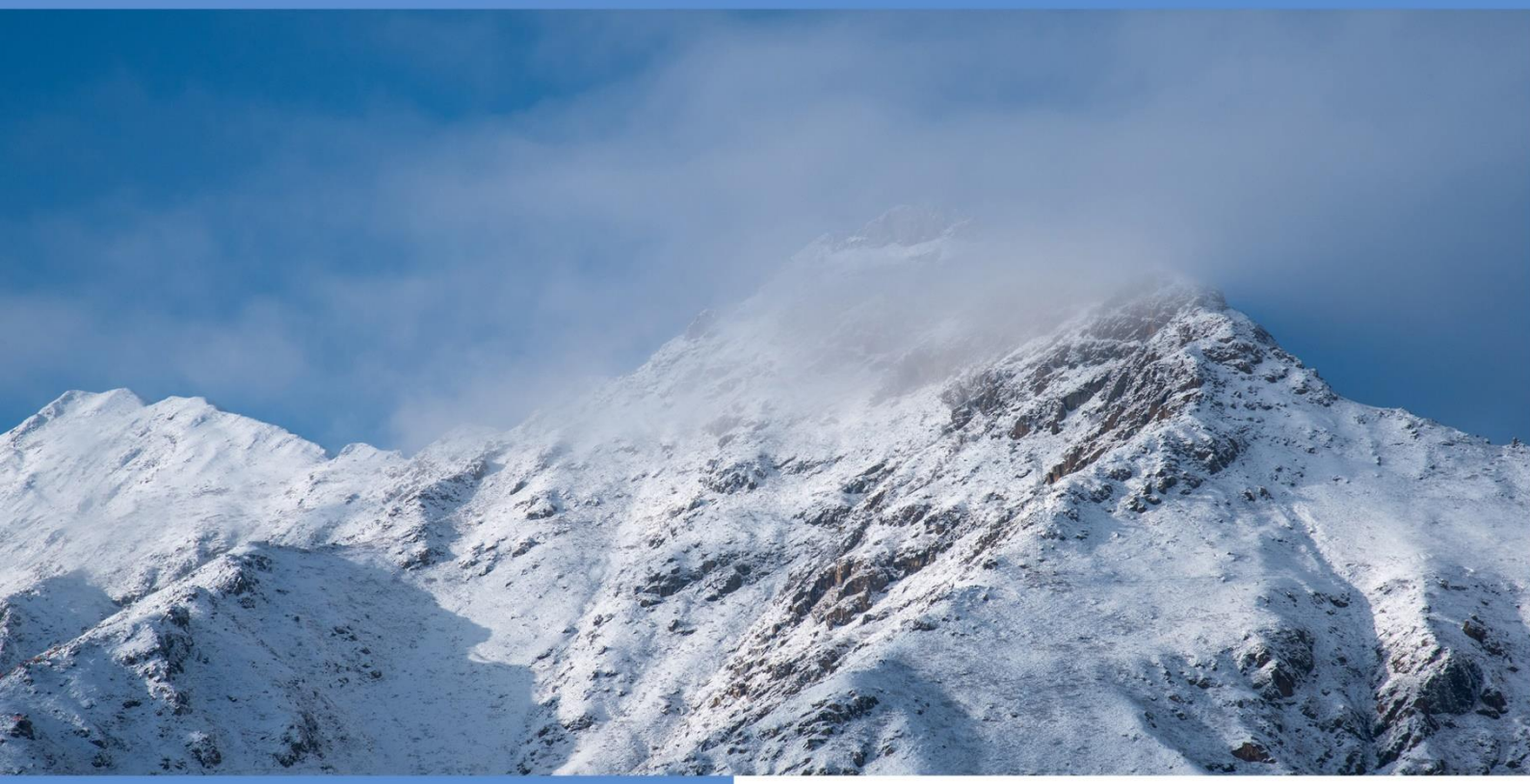

Hosted by:

- The Bartlett School of Sustainable Construction, University College London (BSSC-UCL)
- Center for Energy and Environmental Policy Research, Beijing Institute of Technology (CEEP-BIT)

Funded by:

- The British Council
- The National Natural Science Foundation of China

Chairs:

- **Hua Liao**, Beijing Institute of Technology
- **Zhifu Mi**, University College London

Background

International collaborations are critical in addressing the global challenges of climate change and achieving the goal of worldwide fossil energy reduction. The UK is the first major economy to legitimize net-zero emissions of all greenhouse gases by 2050. China, the second largest economy, has also announced its goals to reach carbon neutrality before 2060. The workshop will serve as a platform for researchers and practitioners to share the most recent ideas, outcomes, and practices on energy and climate change economics. It aims to form a sustainable collaboration mechanism between both sides.

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Contents

Safety & Precautions

COVID-19 On-site Safety

- Please wear a facing covering at all times whilst indoors on campus, unless you are medically exempt.
- Please regularly and thoroughly wash and/or sanitize your hands throughout the day.
- Do not travel if you have COVID-19 symptoms or are self-isolating.

Registration

Please register as a visitor at the Reception when entering the Conference Venue.

Contact information

In case of any inquiry, please contact **Xinlu Sun (+44 07529987506)**.

Agenda at a Glance

Date: 3rd December 2021

Venue: 102 - Drama Studio, UCL Institute of Education (IOE), 20 Bedford Way, London WC1H 0AL

Time	Topic	Venue
09:00-09:30 (London) / 17:00-17:30 (Beijing)	**Opening Session**	**102 - Drama Studio**
09:30-10:30 (London) / 17:30-18:30 (Beijing)	**Keynote Speech Session**	
10:30-11:00 (London) / 18:30-19:00 (Beijing)	**Coffee Break**	
11:00-12:00 (London) / 19:00-20:00 (Beijing)	**Keynote Speech Session**	
12:00-13:00 (London) / 20:00-21:00 (Beijing)	**Lunch**	
13:00-15:00 (London) / 21:00-23:00 (Beijing)	**Invited Speech Session**	
15:00-15:20 (London) / 23:00-23:20 (Beijing)	**Coffee Break**	
15:20-17:00 (London) / 23:20-01:00 (Beijing)	**Journal Editor Session**	
17:00-19:00 (London) / 01:00-03:00 (Beijing)	**Dinner**	

Date: 4th December 2021

Venue: 780/784/790, UCL Institute of Education (IOE), 20 Bedford Way, London WC1H 0AL

There will be three parallel sessions.

Time	Topic	Venue
09:00-09:20 (London) / 17:00-17:20 (Beijing)	**Parallel Session Chair Speech**	**780** **784** **790**
09:20-10:20 (London) / 17:20-18:20 (Beijing)	**Parallel Session Presentation**	
10:20-10:40 (London) / 18:20-18:40 (Beijing)	**Coffee Break**	
10:40-12:00 (London) / 18:40-20:00 (Beijing)	**Parallel Session Presentation**	
12:00-13:00 (London) / 20:00-21:00 (Beijing)	**Lunch**	
13:00-14:00 (London) / 21:00-22:00 (Beijing)	**Parallel Session Presentation**	
14:00-15:00 (London) / 22:00-23:00 (Beijing)	**Parallel Round-table Discussion**	
15:00-15:20 (London) / 23:00-23:20 (Beijing)	**Coffee Break**	**784**
15:20-16:20 (London) / 23:20-00:20 (Beijing)	**Presentation of Outcomes in Round-table Discussion**	
16:20-16:30 (London) / 00:20-00:30 (Beijing)	**Ending Remarks**	

Agenda

Date: 3rd December 2021

Venue: 102 - Drama Studio, UCL Institute of Education (IOE), 20 Bedford Way, London WC1H 0AL

Register Link: https://www.eventbrite.com/e/uk-china-workshop-on-energy-and-climate-change-economics-tickets-194274589527

Time	Topic	Speaker	Title and affiliation
Opening Session **Chair: Zhifu Mi**			
09:00-09:10 (London) 17:00-17:10 (Beijing)	Opening remarks	Christoph Lindner	Professor and Dean of The Bartlett Faculty at University College London (UCL)
09:10-09:20 (London) 17:10-17:20 (Beijing)	Opening remarks	Yi-Ming Wei	Professor and Vice President of Beijing Institute of Technology (BIT)
09:20-09:30 (London) 17:20-17:30 (Beijing)	Introduction on the workshop	Zhifu Mi	Associate Professor at The Bartlett School of Sustainable Construction (BSSC) at UCL
Keynote Speech Session **Chair: Zhifu Mi**			
09:30-10:00 (London) 17:30-18:00 (Beijing)	Going Nuclear: the importance of UNECE's recent announcement to achieving sustainable energy transitions	D'Maris Coffman	Professor and Director of The Bartlett School of Sustainable Construction (BSSC) at UCL
10:00-10:30 (London) 18:00-18:30 (Beijing)	The circular economy in China: achievements, challenges and potential implications for decarbonisation	Raimund Bleischwitz	Professor and Director of The Bartlett School of Environment, Energy and Resources (BSEER) at UCL
10:30-11:00 (London) 18:30-19:00 (Beijing)	**Coffee Break**		
11:00-11:30 (London) 19:00-19:30 (Beijing)	The China's Climate Change Integrated Assessment Model (C3IAM)	Qiao-Mei Liang	Professor and Vice-Director of Center for Energy and Environmental Policy Research (CEEP) at BIT
11:30-12:00 (London) 19:30-20:00 (Beijing)	The disamenity impact of solar farms: A Hedonic analysis	David Maddison	Professor and Director of the Birmingham Centre for Environmental and Energy Economics and Management (BCEEEM) at University of Birmingham
12:00-13:00 (London) 20:00-21:00 (Beijing)	**Lunch**		
Invited Speech Session **Chair: Peter Ye**			
13:00-13:20 (London) 21:00-21:20 (Beijing)	Net zero infrastructure development – the need for circular economy solutions	Patrick Schröder	Senior Research Fellow at Chatham House

Time	Topic	Speaker	Title and affiliation
13:20-13:40 (London) 21:20-21:40 (Beijing)	A multi-factor integrated model for carbon price forecasting: Market interaction promoting carbon emission reduction	Lu-Tao Zhao	Professor and Deputy Director of the Center for Energy and Environmental Policy Research at BIT
13:40-14:00 (London) 21:40-22:00 (Beijing)	Water 4.0: The digital transformation of the water sector	Evina Katsou	Professor and Course Director of the Water Engineering MSc at Brunel University
14:00-14:20 (London) 22:00-22:20 (Beijing)	Cleaner production and life cycle thinking in pulp and paper industry towards carbon neutrality	Yutao Wang	Professor and Executive Director of Fudan Tyndall Centre at Fudan University
14:20-14:40 (London) 22:20-22:40 (Beijing)	Resource resilient foundries: Transition to net zero	Konstantinos Salonitis	Professor and Head of Sustainable Manufacturing Systems Centre and the Deputy Director of the Manufacturing Theme at Cranfield
14:40-15:00 (London) 22:40-23:00 (Beijing)	Sustainable and just energy transitions in the global south	Chuan Liao	Assistant Professor at Arizona State University
15:00-15:20 (London) 23:00-23:20 (Beijing)	**Coffee Break**		
Journal Editor Session **Chair: D'Maris Coffman**			
15:20-17:00 (London) 23:20-01:00 (Beijing)	Introduction on journals and tips for academic publishing	Journal editors	Co-Editor, *Climate Change Economics* Co-Editor-in-Chief, *Energy and Climate Change* Co-Editor-in-Chief, *Journal of Cleaner Production* Co-Editor-in-Chief, *Structural Change and Economic Dynamics* Co-Editor-in-Chief, *World Development*
17:00-19:00 (London) 01:00-03:00 (Beijing)	**Dinner**		

Date: 4th December 2021

Venue: 780/784/790, UCL Institute of Education (IOE), 20 Bedford Way, London WC1H 0AL

There will be three parallel sessions.

Session I: Climate Change Economics and Policy

Chair: Andrew Sudmant

Time	Topic	Speaker	Venue
Parallel Session Chair Speech			**Room** 780 **Teams** https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZmVjN2FlNWQtYzhjMy00YTJjLWI2NjUtZTU4M2ZjZTEyMjU2%40thread.v2/0?context=%7b%22Tid%22%3a%221faf88fe-a998-4c5b-93c9-210a11d9a5c2%22%2c%22Oid%22%3a%227aa941de-8890-4425-ba0a-988bf17e1ba7%22%7d **Technical Support** Xinlu Sun
09:00-09:20 (London) 17:00-17:20 (Beijing)	Place-based prioritisation of GHG mitigation using socioeconomic predicators (Online)	Andrew Sudmant	
Parallel Session Presentation			
09:20-10:20 (London) 17:20-18:20 (Beijing)	Benefits of subsidence control for coastal flooding in China (Online)	Robert J. Nicholls	
	Changes in global trade patterns may contradict global mitigation efforts (Online)	Weiming Chen	
	An institutional economics framework to address climate change and a sustainable economy (Online)	Peter Bradley	
10:20-10:40 (London) 18:20-18:40 (Beijing)	**Coffee Break**		
10:40-12:00 (London) 18:40-20:00 (Beijing)	Engaging with business on climate change and sustainable development	Jing Gu	
	Extreme temperatures, mortality, and adaptation: Evidence from the county level in China (Online)	Chen Zhang	
	Nudging consumer behaviour towards climate-friendly choices: empirical evidence from the contexts of in-home and out-of-home consumption	Viachaslau Filimonau	
	Climate–related disclosureI in the UK financial sectors and its determinants (Online)	Mauricio Salgado-Moreno	
12:00-13:00 (London) 20:00-21:00 (Beijing)	**Lunch**		
13:00-14:00 (London) 21:00-22:00 (Beijing)	Choice Architecture 2.0 using Nudge Plus Embedding reflection in behavioural cues to promote climate friendly diets	Sanchayan Banerjee	
	Impact of city gas on mortality in China: national and regional estimates (Online)	Bingdong Hou	
	The near-miss effect of forest fires: Evidence from Western Australia	María Teresa González Valenci	
14:00-15:00 (London) 22:00-23:00 (Beijing)	**Parallel Round-table Discussion**		
15:00-15:20 (London) 23:00-23:20 (Beijing)	**Coffee Break**		**Room** 784 Find the Teams link in the Session II
15:20-16:20 (London) 23:20-00:20 (Beijing)	**Presentation of Outcomes in Round-table Discussion**		
16:20-16:30 (London) 00:20-00:30 (Beijing)	**Ending Remarks**		

Session II: Low-carbon transition and carbon neutrality

Chair: Konstantinos Salonitis

Time	Topic	Speaker	Venue
Parallel Session Presentation			**Room** 784 **Teams** https://teams.microsoft.com/l/meetup-join/19%3ameeting_YjA4MjViMDYtNmE4Mi00NmNmLWJkMTctNTUxYjAyYmNhY2Nk%40thread.v2/0?context=%7b%22Tid%22%3a%221faf88fe-a998-4c5b-93c9-210a11d9a5c2%22%2c%22Oid%22%3a%229f0ca88d-1a4e-4050-9feb-230c8462b68f%22%7d **Technical Support** Lu Cheng
09:00-10:20(London) 17:00-18:20 (Beijing)	Evaluating pathways to achieve carbon neutrality using 7see (Online)	Simon H. Roberts	
	Out of the window? Green monetary policy in China: Window guidance and the promotion of sustainable lending and investment (Online)	Simon Dikau	
	Welfare implications of revenue-neutral environmental taxation: Integrated tax-subsidy versus double-dividend (Online)	You Zhou	
	Sensitivity analysis of net zero pathways for UK industry	Ahmed Gailani	
10:20-10:40 (London) 18:20-18:40 (Beijing)	**Coffee Break**		
10:40-12:00 (London) 18:40-20:00 (Beijing)	Observing technology reserves of carbon capture and storage via patent data: Paving the way for carbon neutral (Online)	Jianing Kang	
	Global green corridors: A view of China's domestic and regional first movers' potential	Camilo Ernesto Velandia Perico	
	The triplet dynamics of carbon emission, economic complexity, and income inequality: Perspectives from a global panel study (Online)	Yite Zhu	
	Country-level carbon dioxide removal pathway towards the 1.5°C goals	Pu Yang	
12:00-13:00 (London) 20:00-21:00 (Beijing)	**Lunch**		
13:00-14:00 (London) 21:00-22:00 (Beijing)	Techno-economic analysis of integrated carbon capture and utilization with syngas production	Yuanting Qiao	
	Dynamic optimization modeling on regional environment-economy system: A study on optimal path of air pollution abatement (Online)	Tingru Yang	
	How will the future climate change affect the electricity system security in China? (Online)	Hao Chen	
14:00-15:00 (London) 22:00-23:00 (Beijing)	**Parallel Round-table Discussion**		
15:00-15:20 (London) 23:00-23:20 (Beijing)	**Coffee Break**		
15:20-16:20 (London) 23:20-00:20 (Beijing)	**Presentation of Outcomes in Round-table Discussion**		
16:20-16:30 (London) 00:20-00:30 (Beijing)	**Ending Remarks**		

Session III: Energy Economics and Policy

Chair: Mengqiu Cao

Time	Topic	Speaker	Venue
Parallel Session Chair Speech			**Room** 790 **Teams** https://teams.microsoft.com/l/meetup-join/19:meeting_NDBkNGJiNjctZDJmNC00ODc4LWE4MTYtODY1YTgxMzcyMzYz@thread.v2/0?context=%7B%22Tid%22:%221faf88fe-a998-4c5b-93c9-210a11d9a5c2%22,%22Oid%22:%22364be08d-9a82-452b-92ac-bb8e22d6e34b%22%7D **Technical Support** Yan Chen
09:00-09:20 (London) 17:00-17:20 (Beijing)	Banning diesel vehicles in London: Is 2030 too late?	Mengqiu Cao	
Parallel Session Presentation			
09:20-10:20 (London) 17:20-18:20 (Beijing)	Does temperature change the energy efficiency gap: Evidence from air conditioner purchase in the United States	Pan He	
	Substitution strategies for cooking energy: To use gas or electricity? (Online)	Hui Li	
	Evaluation of PV power generation projects in China: A real option approach (Online)	Yifei Lei	
10:20-10:40 (London) 18:20-18:40 (Beijing)	**Coffee Break**		
10:40-12:00 (London) 18:40-20:00 (Beijing)	Non-price energy conservation and household energy consumption in Bangladesh	Shaikh Eskander	
	Fuel economy standards and regulatory loopholes: A bunching analysis on China (Online)	Jingwen Wu	
	Addressing public health risks and climate change concerns from road transport-related emissions in Lagos State – designing a novel approach	Babatunde Anifowose	
	Comparing expert elicitation and model-based probabilistic technology cost forecasts for the energy transition (Online)	Jing Meng	
12:00-13:00 (London) 20:00-21:00 (Beijing)	**Lunch**		
13:00-14:00 (London) 21:00-22:00 (Beijing)	Life cycle assessment of nanoparticle synthesis methods for large scale environmental applications	Peyman Babakhani	
	Hydrogen technology foresight and economic analysis of green hydrogen in China (Online)	ShuoXu	
	Energy demand scenarios compatible with China's 2060 climate neutrality targets	Gabriel D Oreggioni	
14:00-15:00 (London) 22:00-23:00 (Beijing)	**Parallel Round-table Discussion**		
15:00-15:20 (London) 23:00-23:20 (Beijing)	**Coffee Break**		**Room** 784 Find the Teams link in the Session II
15:20-16:20 (London) 23:20-00:20 (Beijing)	**Presentation of Outcomes in Round-table Discussion**		
16:20-16:30 (London) 00:20-00:30 (Beijing)	**Ending Remarks**		

Organisers

University College London (UCL)

University College London (UCL) is a public research university in London, England, and a constituent college of the federal University of London. It is the third largest university in the United Kingdom by total enrolment, and the largest by postgraduate enrolment. Established in 1826 as London University, UCL was the first university institution to be established in London, and the first in England to be entirely secular and to admit students regardless of their religion. In the most recent Research Excellence Framework rankings for research power, UCL was the top-rated university in the UK as calculated by Times Higher Education, and second as calculated by The Guardian/Research Fortnight. UCL is a member of numerous academic organisations, including the Russell Group, and is part of UCL Partners, the world's largest academic health science centre, and the "golden triangle" of research-intensive English universities. As of 2020, 34 Nobel Prize winners and three Fields medallists have been affiliated with UCL as alumni, faculty or researchers.

Bartlett School of Sustainable Construction (BSSC)

The Bartlett School of Sustainable Construction (BSSC) is a world-class centre of learning and research in the economics and management of projects, in construction and beyond. Its vision is to be recognised globally as a centre of excellence in the management of projects and construction economics. BSSC is part of The Bartlett, the global faculty of the built environment in the heart of London. The Bartlett has recently been ranked the top institution in the UK for Architecture / Built Environment Subjects in the renowned QS World Rankings. The Bartlett also has the most top-rated research in its field in the UK, according to the Government's Research Excellence Framework (REF2014). As projects grow in size and scope, the study of how to manage and finance them grows in relevance. BSSC deals with skills that are transferable and honed for modern, project-based organisations. BSSC's experience in these disciplines reaches back 40 years, to when BSSC established its original degree programme. Today, in this field, the team of academics is one of the most accomplished to be found; their research consistently informs teaching, here and elsewhere, and received a 4* rating in the last Research Assessment Exercise.

Beijing Institute of Technology (BIT)

Beijing Institute of Technology (BIT) is a public university with a traditional focus on science and technology but developing into other areas such as management and humanities. The Institute emphasises ethics in scholarship, discovery of truth, and contribution to mankind through profound academic accomplishments. BIT was founded in 1940 in Yan'an, Shaanxi Province and was relocated to Beijing in 1949. The following year, the main campus and the Departments of Maths, Physics and Chemistry of the Institute Franco-Chinois were merged with BIT. BIT has always formulated its strategies in light of national strategic needs and global developments in science and technology and education, and in accordance with its own strengths and missions. Engineering, materials science, chemistry, physics and mathematics are the five disciplines in BIT that are ranked among the top 1% in Essential Science Indicators (ESI) global ranking. High-level achievements have been made in navigation control, injury prevention and safety, mechanical and vehicle engineering, materials science, and information systems and warfare.

Center for Energy and Environmental Policy Research (CEEP)

The Center for Energy & Environmental Policy Research, Beijing Institute of Technology, was founded in 2009. The current director of CEEP-BIT, Prof. Yi-Ming Wei, established a CAS-CNPC Joint Center for Energy and Environmental Policy in 2006, and held the founding director. The core research team then joined BIT and kept on contributing to research, education and international communication in the fields of energy and environmental policy. According to the statistical analysis from RePEc in October 2021, CEEP-BIT ranks 11th globally in the field of Environmental Economics at IDEAS and 7th globally in the field of Energy Economics at IDEAS. CEEP-BIT conducts research on energy economics, climate policy and environmental management armed with qualitative and quantitative tools, aiming to provide scientific basis for public and private decisions in strategy planning and management that needed to cope with China's increasing demand for energy as well as the challenges of adapting to and mitigating climate change. CEEP also serves as a professional education center and a platform for international exchange in the area of energy and environmental policy research.

Chairs

Hua Liao

Hua Liao is currently Deputy Director and Professor at Centre for Energy and Environmental Policy Research, Beijing Institute of Technology. He is the author/co-author of over 100 papers and books. His research has focused on the economics of energy, environment and climate change including integrated assessment modelling, energy planning etc. He is currently the editorial member of several journals such as *Energy and Climate Change*. He is the principle investigator of several research projects supported by National Natural Science of Foundation of China, and Ministry of Science and Technology. He has been awarded by the Young Scholar of Changjiang Program of the Ministry of Education of China (2015) and the National Natural Science Fund for Distinguished Young Scholars (2019).

Zhifu Mi

Zhifu Mi is an Associate Professor in Climate Change Economics at UCL, and a Visiting Senior Fellow at Grantham Research Institute on Climate Change and the Environment at LSE. He has published papers in leading journals, such as *Lancet*, *Science Advances*, *Nature Energy*, *Nature Food*, and *Nature Sustainability*. He has been leading research grants funded by the EPSRC, Royal Society, and British Council. He was awarded the 2018 World Sustainability Award for his leading research in the methodological developments and applications of carbon footprint. In addition, his research was awarded the 2018 Top 50 Earth and Planetary Sciences Articles in *Nature Communications*, 2017 Best Early Career Articles in *Environmental Research Letters*, and 2016 Highly Cited Original Papers in *Applied Energy*. He is a Co-Editor-in-Chief of *Structural Change and Economic Dynamics* and an Executive Editor of *Journal of Cleaner Production*.

Opening Speakers

Christoph Lindner

Christoph Lindner is Dean of The Bartlett Faculty of the Built Environment and Professor in Urban Studies at UCL. Christoph is an urban and cultural theorist. His work spans the humanities, social sciences, and art and design fields, including architecture, visual culture, geography, media studies, and urban planning and design. He has served on numerous editorial and advisory boards, including for the journals *Francospheres*, *Places Journal,* and *Journal of American Culture*, as well as the Centre for the GeoHumanities at Royal Holloway University of London and the Faculty of Arts at Aarhus University in Denmark. His work has been funded by the Arts and Humanities Research Council, British Academy, Netherlands Organization for Scientific Research, and Graham Foundation for Advanced Studies in the Fine Arts.

Yi-Ming Wei

Yi-Ming Wei is a Distinguished Professor of Energy and Environmental Economics and the vice president of Beijing Institute of Technology (BIT). He is the Founding Director of the Centre for Energy and Environmental Policy Research at BIT. He is also the Founding Director of Beijing Key Laboratory of Energy Economics and Environmental Management. His recent research and teaching focus on Energy Policy and Energy Economics, CO_2 emission and Climate Policy, Energy and Climate Policy Modelling. He has performed over 40 research projects for various China governmental agencies including NDRC, MOST, NEA, NSFC, CNPC, SGCC and CAS, and such international organizations as the World Bank, EU-FP7. He published 20 books and over 300 papers in peer review Journals including *Nature Climate Change*, *Climatic Change*, *Energy Economics*, *Ecological Economics*. He has been awarded by the National Natural Science Fund for Distinguished Young Scholars (2004), and Chair Professor of Changjiang Scholar program of the Ministry of Education of China (2008).

Keynote Speakers

D’Maris Coffman

D’Maris Coffman is the Director of The Bartlett School of Sustainable Construction and the Professor in Economics and Finance of the Built Environment at UCL. She is Editor-in-Chief and Coordinating Editor of Elsevier's *Structural Change and Economic Dynamics* and on the honorary editorial boards of the *Journal of Cleaner Production*, *Economia Politica,* and the editorial boards of *Frontiers of Engineering Management* and the *Chinese Journal of Population, Resources and Environment*. She is a Fellow of Goodenough College, where several of the school's doctoral students are residential members. In 2020-21, she is a Visiting Professor at the University of Milan (Statale). She is also a Guest Professor at Beijing Institute of Technology and a Visiting Professor of Renmin University of China. Before coming to UCL in 2014, she spent six years as a fellow of Newnham College where she variously held a junior research fellowship (Mary Bateson Research Fellowship), a post as a college lecturer and teaching fellow, and a Leverhulme ECF.

Raimund Bleischwitz

Raimund Bleischwitz is the Director of the UCL Bartlett School of Environment, Energy and Resources (BSEER) and Chair in Sustainable Global Resources at the UCL Institute for Sustainable Resources. He is Co-I on two UKRI Circular Economy Centres on metals and construction materials starting January 2021, and he is member of the DEFRA Resources and Waste Targets Expert Group. He has been PI of an international collaboration project on the circular economy and resource efficiency with a special focus on China ('SINCERE'). He is also Visiting Adjunct Professor at UNU-Flores in Dresden, Germany, Global Fellow at the Smart Prosperity Institute (SPI), Canada, and Affiliate Professor at the Shanghai Jiao Tong University (SJTU) in China. His research resulted in more than 300 publications, e.g. in *Nature*, *Nature Sustainability*, *Global Environmental Change*. His recent book is the Routledge Handbook of the Resource Nexus. In January 2022 he will become Scientific Director of the Leibniz Centre for Tropical Marine Research (ZMT) in Bremen, Germany.

Qiao-Mei Liang

Qiao-Mei Liang received her PhD degree in Management Science and Engineering from Chinese Academy of Sciences in 2007. Currently, she is a professor and doctoral supervisor in School of Management and Economics, Beijing Institute of Technology (BIT). She is also the Vice-Director of Centre for Energy & Environmental Policy Research, BIT. She was awarded by Excellent Young Scientist Foundation of National Natural Science Foundation of China (NSFC) in 2014. Besides, she was also selected for the "Program for New Century Excellent Talents in University" by the Ministry of Education (MOE), and the program of "Beijing-funded Plan for Talents". She has been long engaged in the study and research of management science. Her main research interest is Energy Economic Complex System Modelling and Energy & Environmental Policy.

David Maddison

David Maddison is Professor of Economics at the University of Birmingham and Director of the Birmingham Centre for Environmental and Energy Economics and Management (BCEEEM). He is a former chairperson of the Department of the Environment Food and Rural Affairs (DEFRA) Economics Advisory Panel and co-editor of the journal *Climate Change Economics*. He is an acknowledged expert in the fields of environmental, agricultural and natural resource economics.

Invited Speakers

Patrick Schröde

Patrick Schröder is a Senior Research Fellow in the Environment and Society Programme at Chatham House. He specializes in research on the global transition to an inclusive circular economy with a specific focus on collaborative opportunities between key countries, circular economy policy analysis, closing the investment gap and building an evidence base for trade in the circular economy. Prior to joining Chatham House in 2018, he was Research Fellow at the Institute of Development Studies, University of Sussex. He worked as consultant for the EU, Asian Development Bank, UNEP, GIZ and other multilateral organisations. He holds a PhD in Environmental Studies from Victoria University of Wellington. In 2021 he started a new PhD research project on circular design solutions for digital technologies at The Centre for Sustainable Design, UCA.

Lu-Tao Zhao

Lu-Tao Zhao received the PhD degree in management science and engineering from Chinese Academy of Sciences, Beijing, China, 2012. Meanwhile, he is supported by the China Scholarship Council to work as a visiting scholar from Aug. 2016 to Aug. 2017 in Adelphi University, USA. He is a professor in School of Management and Economics and deputy director of the Centre for Energy and Environmental Policy Research, BIT, Beijing, China. His current research interests include energy economy, price forecasting and risk management. He published over 20 papers in peer review journals.

Evina Katsou

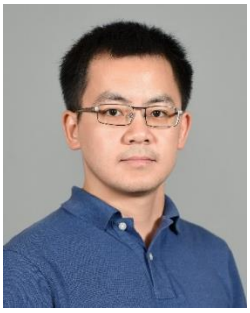
Evina Katsou is Professor and Course Director of the Water Engineering MSc at Brunel University. Evina leads the Water & Environmental Engineering group with 20 researchers. Authored 90 journal publications, 12 book chapters with over 100 presentations, invited talks and patent on biopolymers recovery. She leads the Transformation Tools group of the Cost Action on Circular Cities and co-leads the SMART-WATER group of the ICT4Water Cluster-EC. She is a member of the drafting team of the new ISO standards on Circular Economy. She leads 11 national and international projects focusing on the smartification of the water industry. Her research is focused on: (1) Sustainable resource recovery from wastewater and safe reuse; (2) Data analytics, knowledge discovery and process modelling; and (3) Circularity & sustainability measurement and assessment.

Yutao Wang

Yutao Wang is a full professor in environmental system engineering at the Department of Environmental Science and Technology of Fudan University. His research interests include environmental system engineering and carbon neutrality, cleaner production, circular bio-based economy, ecological capital and products. He has published over 100 research papers on the journals such as *Nature Communications*, *Environmental Science & Technology*, *Renewable and Sustainable Energy Reviews*, *Applied Energy*, *Resources, Conservation and Recycling*, *Journal of Cleaner Production*, *Journal of Industrial Ecology*, *Energy*, *Science of Total Environment*, *Journal of Environmental Management*. He has been awarded the Outstanding Young Scholar Grant by the National Natural Science Foundation of China, and the Newton Advanced Fellow by the British Academy. He has been the chief scientist for National Key R&D project of China. He serves as the Co-EiC of the *Journal of Cleaner Production*, Executive Director of Fudan Tyndall Centre, and the former president of Chinese Society of Industrial Ecology (2020-2021).

Konstantinos Salonitis

Konstantinos Salonitis is Professor and Head of Sustainable Manufacturing Systems Centre and the Deputy Director of the Manufacturing Theme at Cranfield. He sits in the Steering Committee at the UK-Jiangsu 20+20 World Class University Consortium. He led the development of the Sino-UK programme on Aerospace Manufacturing with Nanjing University of Aeronautics and Astronautics (NUAA). He is a visiting professor at both NUAA and Jiangsu University. His research is in the areas of sustainable manufacturing, modelling and simulation of manufacturing processes and systems and lean and green management of manufacturing. He is leading the Sustainable Manufacturing Systems Centre (SMSC) at Cranfield University. In SMSC fundamental science and thought leadership on the technological, economic and social context are applied to identify ways forward for commercial success and sustainability. Activities are tailored to the centre's industry partner needs and include applied research, technology transfer, teaching, consultancy and short courses. Konstantinos has published more than 250 research papers in major international journals and internationally referred conferences and authored four books. He is a Chartered Engineer, a Fellow of the IMechE and a member of the Technical Chamber of Greece. He is also a Fellow of the Higher Education Academy.



Chuan Liao

Chuan Liao is an interdisciplinary sustainability and environmental scientist. His research interest lies at the intersection of environment and development. He has worked on topics that include land tenure and land use change, community-based natural resources management, dryland sustainability, and sustainable energy transition. His research includes both theoretical and empirical work, and he has carried out research in East Africa and Central Asia. His recent work has appeared in *Science*, *Nature Food*, *Development and Change*, among other journals. He holds a PhD in Natural Resources and Environment from Cornell University.

Invited Speech Session Chair

Peter Ye

Zhen Ye (Peter) is an associate professor in infrastructure economics and finance at UCL. Until recently, he was course director of MSc infrastructure investment and finance programme at UCL. Peter holds a concurrent university chair professorship in finance with Xiamen University. He received his MBA from Chicago Booth and was part of emerging leaders programme at Harvard Kennedy School. He also had a PhD in applied economics and LLM in international law from Hertfordshire and Newcastle in the UK. Prior to UCL, Peter has held senior academic appointment with Coventry University, Hull and Hertfordshire business school, and delivered global Executive MBA in Bahrain, China, Oman, Qatar and Singapore. Internationally, he has held visiting professorship and research fellowship with Peking University, Guangdong University of Finance and Economics, China's National Accounting Institute, and Shanghai Jiaotong University.

Parallel Session Chairs

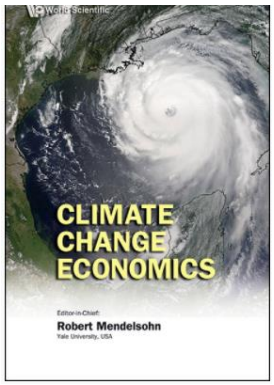
Andrew Sudmant

Andrew Sudmant is a Research Fellow at Leeds University and a Fellow at the Place-based Climate Action Network and the Priestley Centre. His work focuses on the economics of climate action in cities, urban typologies, and place-based climate action. He is works for the Climate Smart Cities research program led by Professor Andy Gouldson and is an associate at the Centre for Climate Change Economics and Policy. At the Climate Smart Cities program mini-Stern review studies are conducted by consulting with regional development authorities, national and municipal governments and partner universities to identify cost-effective climate change mitigation measures in cities. With this work the Climate Smart Cities program not only explores the case for green growth but the opportunity for climate change mitigation policies to enhance energy security and public health, raise employment, stimulate investment and improve public finances.

Mengqiu Cao

Mengqiu Cao is a Senior Lecturer in Transport, and Urban Planning at the School of Architecture and Cities, University of Westminster. He was awarded his PhD at the University College London (UCL). He works in both academia and industry, specialising in an interdisciplinary research field, which is primarily a mixture of transport analysis and urban studies. In addition, he has also worked with public authorities and international funding organisations. He has served as the UK Ambassador for the Association of European Transport.

Journals



Climate Change Economics

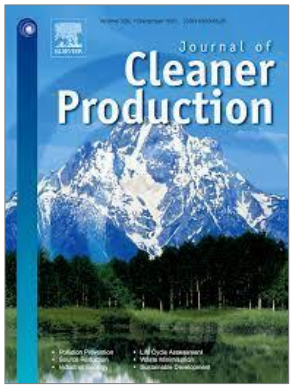
Climate Change Economics (CCE) publishes theoretical and empirical papers devoted to analyses of mitigation, adaptation, impacts, and other issues related to the policy and management of greenhouse gases. CCE is specifically devoted to papers in economics although it is understood that authors may need to rely on other fields for important insights. The journal is interested in papers examining the issue at every scale from local to global and papers from around the world are encouraged. CCE is also interested in both original research and review papers and welcomes comments discussing previous articles.

Website: https://www.worldscientific.com/worldscinet/cce

Energy and Climate Change

Energy and Climate Change is an interdisciplinary journal covering the intersection of energy and climate-related fields, spanning the physical and social sciences, with the aim of identifying real solutions and strategies. Energy and Climate Change aims to promote rapid communication and dialogue among scientists, engineers, economists, and policy makers working in the areas of energy and climate change. The journal provides a forum for innovative and systematic interdisciplinary research on topics such as energy generation, transport, and storage, the causes of climate change, climate impacts on energy systems, energy and climate policies, innovation, behaviour and societal changes, and climate communication strategies. This journal welcomes contributions that support and advance the UN's sustainable development goals, in particular SDG 7 (Affordable and clean energy) and SDG 13 (Climate Action).

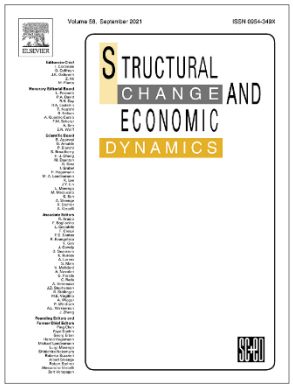
Website: https://www.journals.elsevier.com/energy-and-climate-change



Journal of Cleaner Production

The Journal of Cleaner Production is an international, transdisciplinary journal focusing on Cleaner Production, Environmental, and Sustainability research and practice. Through the published articles, it aims at helping societies become more sustainable. 'Cleaner Production' is a concept that aims at preventing the production of waste, while increasing efficiencies in the uses of energy, water, resources, and human capital. The Journal of Cleaner Production serves as a platform for addressing and discussing theoretical and practical cleaner production, encompassing environmental, and sustainability issues in corporations, governments, education institutions, regions, and societies.

Website: https://www.journals.elsevier.com/journal-of-cleaner-production



Structural Change and Economic Dynamics

Structural Change and Economic Dynamics (SCED) publishes articles about theoretical and applied, historical and methodological aspects of structural change in economic systems. The journal publishes work analysing dynamics and structural change in economic, technological, institutional and behavioural patterns. Articles might examine the effects of the incorporation of new technologies and infrastructures, aspects of international economic integration and development, the changing configuration of employment and income distribution, interdependence between environmental and economic change, instability and crisis. An important aim is to facilitate communication among researchers who are actively engaged in the study of the various aspects of structural change and the dynamics of economic systems from an analytical or policy point of view. SCED encourages articles that apply econometric and statistical techniques to the above themes. The journal also publishes pure theoretical research on the structural dynamics of economic systems, particularly in the fields of multisectoral, complex and dynamical analysis.

Website: https://www.sciencedirect.com/journal/structural-change-and-economic-dynamics

World Development

World Development is a multi-disciplinary monthly journal of development studies. It seeks to explore ways of improving standards of living, and the human condition generally, by examining potential solutions to problems such as: poverty, unemployment, malnutrition, disease, lack of shelter, environmental degradation, inadequate scientific and technological resources, trade and payments imbalances, international debt, gender and ethnic discrimination, militarism and civil conflict, and lack of popular participation in economic and political life. Contributions offer constructive ideas and analysis, and highlight the lessons to be learned from the experiences of different nations, societies, and economies. World Development recognizes 'development' as a process of change involving nations, economies, political alliances, institutions, groups, and individuals. Development processes occur in different ways and at all levels: inside the family, the firm and the farm; locally, provincially, nationally, and globally. The goal is to learn from one another, regardless of nation, culture, income, academic discipline, profession or ideology. The aim is to set a modest example of enduring global cooperation through maintaining an international dialogue and dismantling barriers to communication.

Website: https://www.journals.elsevier.com/world-development

Abstracts

Abstracts for Keynote Speeches

Keynote Speech I

Title: Going Nuclear: the importance of UNECE's recent announcement to achieving sustainable energy transitions

Speaker: D'Maris Coffman (University College London, UK)

Abstract: In view of the recent UNECE report acknowledging that nuclear energy is a necessary and appropriate part of any realistic transitions pathway to Net Zero in energy, this talk reconsiders the case for nuclear and concludes that it represents the best vehicle for realising high growth decarbonisation pathways while also permitting meaningful climate adaptation especially in the Global South. Ultimately whereas nuclear energy is often considered a threat to global security, the likelihood is that its use in high and middle income countries would be conflict reducing in decadal time scales and would promote climate justice more effectively than any other single contributor to the energy mix. The geopolitics, global governance and political economic dimensions are also discussed.

Abstracts for Keynote Speeches

Keynote Speech II

Title: The circular economy in China: achievements, challenges and potential implications for decarbonisation

Speaker: Raimund Bleischwitz (University College London, UK)

Abstract: China has wide-ranging ambitions for a circular economy (CE) and has been pursuing comprehensive CE policies for almost twenty years. In 2020, the Chinese government announced the target of reaching carbon neutrality by 2060 as the national response to climate change. This paper aims to understand the achievements and challenges of the CE policy development and implementation in China as well as its implications for decarbonisation. China's success in doubling resource productivity from 1990 to 2016 with achievements in a more circular manufacturing throughout many provinces offers lessons for a deep decarbonisation of industry. This paper develops a scope and propositions based on reviews of the recent literature and relevant policies. It provides a critical reflection on the CE implementation in China, enriched by experts feedbacks. This paper identifies multi-level indicators and upscaling niches as key factors for China's success in shifting towards a CE. However, many CE projects in China fail to sustain. We identify limitations to progress further resulting from implementation gaps between early majorities and mass markets and coordination challenges through regional and sectoral differences as main barriers to a deep transformation. There are, however, more expected synergies with decarbonisation for the years ahead on efficiency improvements, indicators, upscaling and urban policies that could be undertaken while deeper transformations can gradually emerge. This paper provides final reflections and an outlook on evidence-oriented policy learning for a CE and decarbonisation in China.

Keywords: Circular economy; climate change; carbon neutrality; policy development; China

Abstracts for Keynote Speeches

Keynote Speech III

Title: The China’s Climate Change Integrated Assessment Model (C3IAM)

Speaker: Qiao-Mei Liang (Beijing Institute of Technology, China)

Abstract: China's Climate Change Integrated Assessment Model (C3IAM) is dedicated to assessing the impact of climate policies under the possible future development of complex dynamic systems. C3IAM takes into account factors such as global multi-regional and multi-sectoral economic development, greenhouse gas emissions, abatement cost, and climate damage. In particular, it reveals in depth China's socio-economic and technological characteristics, and dynamically captures large-scale and long-term optimal economic growth, as well as climate change mitigation and adaptation behaviors.

Abstracts for Keynote Speeches

Keynote Speech IV

Title: The Disamenity Impact of Solar Farms: A Hedonic Analysis

Speaker: David Maddison (the University of Birmingham, UK)

Abstract: Photovoltaic solar farms are utility-level ground-mounted arrays of interconnected panels converting sunlight into electricity. Little is known about the extent of any disamenity impact from photovoltaic solar farms, despite numerous examples of communities objecting to their construction. This paper analyses the disamenity impact of photovoltaic solar farms on households in England and Wales revealed by changes in property prices. Using a property fixed-effects model we find that properties ⩽750m south of a >5MW operational solar farm suffer a 5.4 percent reduction in relative prices. The impact of solar farms ⩽5MW or >750m, or situated south of properties is statistically insignificant.

Abstracts for Invited Speeches

Invited Speech I

Title: Net zero infrastructure development – the need for circular economy solutions

Speaker: Patrick Schröder (Chatham House, UK)

Abstract:. Global infrastructure developments are high on the political agenda and a crucial building block in the net-zero transition. For example, in 2021 G20 governments have announced USD3.2 trillion in infrastructure stimulus investments as a pandemic response. In the climate change context, according to the IEA, investments in low-carbon energy infrastructure will have to rise to $5 trillion or 4.5 percent of GDP by 2030 and stay there until at least 2050 to reach net zero CO_2 emissions by 2050.

Yet, to achieve global sustainability objectives including the SDGs, it is necessary that these massive infrastructure investments are aligned not only with climate net zero objectives, but also that they integrate circular economy principles and solutions to (i) reduce the hard-to-abate emissions that renewable energy deployment cannot address; and (ii) maximise infrastructure spend efficiency by minimising the use of high-impact primary resources as much as possible.

Building infrastructure according to circular principles brings numerous benefits beyond mitigating carbon emissions. These include: (i) regenerating natural capital and reducing local pollution; (ii) increasing the use of infrastructure as carbon sink, through more bio-based materials and longer physical asset life-times; (iii) addressing inequalities through increased demand for labour-intensive repair and maintenance activities; (iv) improving efficiency of development spending, offering cheaper essential products and access to services for those most in need; (v) enabling low-income countries diversify out of ‘resource trap’ and develop leapfrog solutions; (vi) critical infrastructure supply chain resilience.

Abstracts for Invited Speeches

Invited Speech II

Title: A multi-factor integrated model for carbon price forecasting: Market interaction promoting carbon emission reduction

Speaker: Lu-Tao Zhao (Beijing Institute of Technology, China)

Abstract: Reasonable carbon price can effectively promote the low-carbon transformation of economy. However, the nonlinear characteristics in carbon price make them challenging to predict accurately. An integrated prediction model is proposed using an improved grey model and an extreme learning machine to solve this problem. European Union Allowances futures price are applied for empirical analysis. The results show that the prediction performance of this model is better than the 10 benchmark models, and the T-bill, Stoxx50, S&P clean energy index and Brent oil price in the financial and energy markets are helpful in the carbon price's prediction. T-bill affects carbon price frequently, Stoxx50 has a negative correlation with the carbon price. Under normal circumstances, the S&P clean energy index is positively correlated with the carbon price. However, when the economic situation is depressed, resulting in a short-term negative correlation between them. The method not only improves the accuracy of carbon price forecast, but also the application of the improved GM explains the reasons for the change of carbon price, which is helpful to promote the realization of carbon neutralization by market-oriented means.

Abstracts for Invited Speeches

Invited Speech III

Title: Water 4.0: The digital transformation of the water sector

Speaker: Evina Katsou (Brunel University, UK)

Abstract: The Wastewater Treatment Plants of the future are climate neutral systems that efficiently and economically recover and recirculate valuable resources, energy and materials. One of the main ambitions of the Water Utilities is to reach net-zero carbon emissions. Advanced and affordable monitoring and control tools are paving the way for effective data analytics and intelligent decision making. We are introducing new methods and techniques to find trends and patterns in data and derive insight about the processes. This insight is combined by domain knowledge to create powerful tools for decision optimisation in water and wastewater systems. Decision support systems (DSS) are particularly useful to deal with this increasing complexity and help stakeholders in their decision-making. This work reviews the DSS developed under European Union research programmes. Besides, it identifies the limitations and barriers preventing the implementation of DSS at the operational and management level in the water sector. Finally, it provides directions for developing DSS tools to support stakeholders in decision-making for more holistic and efficient management of water resources. In this seminar, I will be presenting some of the R&D work, I have conducted to date and will be pursuing towards Digital and Intelligent Water systems of the future (Water 4.0).

Abstracts for Invited Speeches

Invited Speech IV

Title: Cleaner production and life cycle thinking in pulp and paper industry towards carbon neutrality

Speaker: Yutao Wang (Fudan University, China)

Abstract: Papermaking is one of the four great inventions of ancient China, which plays an important role in human history. Today, with the development of living standards, paper products have become more diversified to meet the increasing demands. But pulp and paper industry is an energy-water intensive sector and contributes more than 2% GHG emissions of the whole industrial sectors according to IEA. However, there are trade-offs when considering the whole lifecycle of paper as well as the regional differences in raw materials structure, technology, energy mix, etc. From the lifecycle perspective, this sector has its advantages to become a low-carbon sustainable industry, while facing the challenge of multiple trade-offs. In this talk, it will explore pathways towards carbon neutrality for pulp and paper industry based on cleaner production approach and life cycle thinking.

Abstracts for Invited Speeches

Invited Speech V

Title: Resource resilient foundries: Transition to net zero

Speaker: Konstantinos Salonitis (Cranfield University, UK)

Abstract: Foundries sector is among the most energy intensive manufacturing sectors. The focus has always been to manufacture things “faster, cheaper and better”, and not necessarily on energy and resource efficient way. The energy and resource efficiency of the casting processes has not been widely investigated. A new casting concept is proposed, where the focus is in minimizing the use of resources. Such approach focuses in the use of high-quality feedstock, only melting what is required and only when it is required. Recycling of internal scrap is not necessarily acceptable but an aim for higher yields is. Applying counter gravity casting methods to improve yield and give enhanced quality is encouraged as is the recovery of low-grade heat from solidification. In the present paper a toolbox is presented for that can be used by foundries for improving their resource efficiency. The toolbox is composed of a number of tools that are able to help monitor, visualize and predict the use of resources. Finally, it is complemented by a decision making tool that allows foundries to decide from alternative solutions.

Abstracts for Invited Speeches

Invited Speech VI

Title: Sustainable and just energy transitions in the global south

Speaker: Chuan Liao (Arizona State University, USA)

Abstract: Energy transitions are taking place at an unprecedented pace in the Global South, and facilitating sustainable and just transitions can lead to far more rapid advances in societal wellbeing that would otherwise be infeasible. As attention devoted to sustainable and just energy transition increases, more systematic knowledge about the drivers and impacts of sustainable energy transition is of utmost importance. This presentation examines the emerging discussions in the energy transition literature that highlight the importance of understanding and theorizing the diversity, determinants, impacts, and interactions of energy transitions. Through the energy justice framework, the presentation will address the distributional, recognitional, and procedural issues of energy transition, and investigate where does injustice occur, who is ignored, and whether is the transition process fair.

Abstracts for Parallel Session I

Climate Change Economics and Policy

Speech I

Title: Place-based prioritisation of GHG mitigation using socioeconomic predicators

Speaker: Andrew Sudmant (Leeds University, UK)

Abstract: Climate action priorities set by national government are unlikely to match the climate action priorities of communities whose emissions profiles differ from the nation's. The homogeneity of emissions across people and places is therefore a factor in the effectiveness of national climate action programs. Using a dataset of 33,000 community GHG footprints made-up of 12 emissions sources, this analysis assesses the consequences of priority areas for climate action being set at different geographic levels. Results show that setting priorities for climate action at a local level can lead to an increase in the coverage of a climate action plan by more than 25% for a significant number (5%) of communities. We also show that income and deprivation are strong predictors of the extent to which a climate plan is improved by local prioritisation. This suggests that higher income communities' outsized role in generating emissions could bias climate action plans towards their emissions, leaving poorer communities behind.

Abstracts for Parallel Session I

Speech II

Title: Benefits of subsidence control for coastal flooding in China

Speaker: Robert J. Nicholls (University of Southampton, UK; University of East Anglia, UK)
Co-author: Jiayi Fang (East China Normal University, China; Ministry of Emergency Management & Ministry of Education, China; University of Southampton, UK)

Abstract: Land subsidence is impacting large populations in coastal Asia via relative sea-level rise. This paper quantitatively assesses the risks and possible response strategies for China to 2050, focusing on urban areas where subsidence is largest. Using observed subsidence rates as scenarios, flood impacts are assessed with the Dynamic and Interactive Vulnerability Assessment (DIVA) model framework. Land area, population and assets exposed to the 100-year coastal flood event by 2050 are approximately 20%-39%, 17%-37% and 18%-39% higher than assuming climate change only scenarios. Realistic subsidence control measures can reduce most of this growth in exposure, leading to 7% more exposed land, 6% more population and 7% more assets than due to climate change alone. This emphasizes that subsidence control, combined with upgraded coastal protection, is a plausible and desirable adaptation response for coastal China.

Abstracts for Parallel Session I

Speech III

Title: Changes in global trade patterns may contradict global mitigation efforts

Speaker: Weiming Chen (Beijing Institute of Technology, China)

Abstract: The increasing importance of trade has stimulated a hot debate on how trade affects the environment. The literature has decomposed the impact of trade on the environment into the scale, technique, and composition effects. While the analysis of the composition effect has focused on the trade-induced changes in the structure of economic activity within individual countries, this study addresses the overlooked question whether observed changes in global trade patterns help or hinder global efforts on climate change mitigation and environmental protection. We employ a global multi-regional input-output modeling approach to quantify the impacts of changing global trade patterns on carbon emissions, land use and water consumption between 2004 and 2014. The results show that if the trade patterns in 2004 had stayed the same, global CO_2 emissions and water consumption in 2014 would be 844 million tons (3.4%) and 57 billion m3 (1.7%) lower, whereas global land use would be 14 million hectares (0.2%) higher than the actual figures. In other words, trade patterns became less carbon and water efficient but more land efficient between 2004 and 2014.

Abstracts for Parallel Session I

Speech IV

Title: An institutional economics framework to address climate change and a sustainable economy

Speaker: Peter Bradley (University of the West of England, UK)

Abstract: Although policy actions are being taken by many governments around the world to address energy, climate change policies and sustainable development, the application of institutional economics to such issues is arguably still in its infancy. In the literature, there are a wide range of institutional economics frameworks deployed to explore aspects of sustainable development, but the majority focus on common pool resources or social ecological systems, often with a high focus on extractive parts of the economy, not consumption and upstream provision choices that drive the extraction. The current paper presents an institutional economics framework to address sustainable production and consumption. The framework is relevant and applicable to energy, climate change policy. The research draws on literature, theory, evidence, and experiential knowledge to construct the framework. The resulting framework leads to an institutional economics understanding of embeddedness for exploring sustainable production and consumption; an extended and wider conceptualisation of value and resources in the light of sustainable production and consumption; an exploration of governance structures (markets and organisations) as value and values articulating institutions. The paper concludes by setting out that an institutional economics approach to sustainable consumption and production entails a 'cultural shift' towards more sustainable consumption; innovation in governance structures (for both markets and firms) towards sustainable production (and consumption); alongside changes in the institutional environment (including law) to create a selection environment where sustainable production and consumption can flourish.

Abstracts for Parallel Session I

Speech V

Title: Engaging with business on climate change and sustainable development

Speaker: Jing Gu (Institute of Development Studies, UK)
Co-authors: Anthony Carty (Beijing Institute of Technology, China) and Danielle Green (Climate and Sustainable Development Networks Lead, DITCHLEY Foundation)

Abstract: The Covid-19 pandemic and climate change have demonstrated the interconnection of the world, as well as the interconnection of challenges of the world. Sustainable climate governance is needed now more than ever to prioritise development strategies of differ-ent states and work on common shared challenges. Business plays a critical role in global climate politics. For businesses to act on climate change, they need to hear a combination of messages that convey urgency but also an optimism that they can make a difference. To what extent do business exert influence over climate decision-making processes? How business actors may affect the legitimacy, justice, and effectiveness of the global climate governance? Recent studies observe the increased presence and in-fluence of business over climate negotiations while also recognising the limits of their political influence. This article critically examines the role of business in global climate governance. It explores the nature of the distinction between traditional inter-state cli-mate governance and sustainable climate governance. It also outlines the multifaceted roles played by business within the United Nations Framework Convention on Climate Change. It then sets out the institutional changes which are necessary for the achieve-ment of sustainable climate governance.

Abstracts for Parallel Session I

Speech VI

Title: Extreme temperatures, mortality, and adaptation: Evidence from the county level in China

Speaker: Chen Zhang (Chengdu Library and Information Center, Chinese Academy of Science, China)

Abstract: Rising temperatures are known to cause adverse health outcomes due to increased occurrence of extreme heat days. Yet knowledge on the magnitude of this effect in developing countries is limited due to data availability and reliability issues. Collecting data for 2,872 counties in China, we estimate the effects of daily temperatures on the monthly mortality rate. Over a two-month exposure window, the results indicate that an additional day for which the maximum temperature exceeds 38°C increases the monthly mortality rate by about 1.7% on average relative to if that day's maximum temperature had been in the range 15-21°C. This is a larger effect than what is observed for extremely cold days. Improved dwelling conditions are found to reduce the effect of hot days on mortality rates and improved local healthcare infrastructure reduces the effect of cold days. The effects of extreme temperatures are found to be larger in China than those reported in an earlier study of the United States.

Abstracts for Parallel Session I

Speech VII

Title: Nudging consumer behaviour towards climate-friendly choices: empirical evidence from the contexts of in-home and out-of-home consumption

Speaker: Viachaslau Filimonau (Surrey University, UK)

Abstract: Consumer behaviour contributes significantly to carbon footprint. To enable global progress towards zero carbon economy, urgent changes to consumer behaviour are necessitated. The principles of behavioural economics can be applied to architect positive changes to consumer behaviour as consumers can be nudged towards climate benign choices. The potential of consumer choice architecture to nudge pro-environmental consumer choices has been recognised. However, limited empirical research has attempted to prove the viability of its application in various contexts of at-home and out-of-home consumption. This paper reports on two experimental studies designed to nudge climate-friendly consumption choices at home and away. Study 1 tested the intervention in the form of immediate feedback given to consumers on the amount of water used when showering at home. Study 1 demonstrated the reduction in water use (circa 15% per shower on average) in subsequent instances of using showers. Study 2 tested the intervention in the form of restaurant menu re-design. Study 2 indicated the reduction in consumer uptake of burgers (by circa 25%), i.e. the most carbon-intense menu item from the viewpoint of direct and embodied carbon emissions. The paper provides empirical evidence to showcase the viability of consumer choice architecture as a facilitator of climate-friendly choices at home and away.

Keywords: Behavioural economics; Consumer choice architecture; Carbon footprint; Water use; Food consumption

Abstracts for Parallel Session I

Speech VIII

Title: Climate–related disclosureI in the UK financial sectors and its determinants

Speaker: Mauricio Salgado-Moreno (Humboldt-Universität zu Berlin, Germany)

Abstract: We investigate climate-related, voluntary disclosures in the UK banking and insurance industries. In a first step, we establish a novel dataset describing firm-level climate-related financial disclosures in line with TCFD recommendations. To generate our dataset from textual corporate reports we employ Natural Language Processing (NLP) techniques and a (supervised) Machine Learning approach. We then analyse if climate-related policy publications by financial regulators in the UK affect firms' decisions to voluntary disclose in line with TCFD, and what are the main determinants of firms' disclosure incentives. We find that climate-related disclosures by UK banks and insurers are increasing over time (with a significant jump in 2019), but that there exists vast heterogeneity in disclosure levels across firms and sectors. Additionally, we find that only some of the policy publications had a significant impact on firms' decisions to disclose climate-related information, and that total assets are the most important determinants of firms' disclosure incentives.

Abstracts for Parallel Session I

Speech IX

Title: Choice Architecture 2.0 using Nudge Plus Embedding reflection in behavioural cues to promote climate friendly diets

Speaker: Sanchayan Banerjee (London School of Economics and Political Science, UK)

Abstract: The use of behavioural insights, prominently nudges, in designing climate policies has increased tremendously in the last decade. But mitigating climate change calls for more than nudging. Citizens must own their agency to respond to this urgency. In this paper, I test the role of reflection in scaling up behavioural climate policies. To this aim, I present evidence from an online survey experiment with 3074 UK respondents to evaluate reflexive policies like nudges and rules, reflective policies like thinks and goal implementation plans, and hybrid policies like nudge pluses (Banerjee and John, 2021) in promoting intentions for climate-friendly diets. First, I find all behavioural climate policies are significantly effective in promoting intentions for climate friendly diets. Nonetheless reflection is most effective when it is combined with a nudge: nudge pluses offer an additional 0.14 (0.10) standard deviation units decrease in intended carbon emissions over standalone nudges (reflection). Second, I find flexitarians are more responsive to behavioural climate policies. Third, I do not find evidence of negative behavioural spillovers, measured by participants' charitable donations. This experiment is the first randomised, systematic evaluation of reflection in behavioural climate policies to scale-up our efforts in mitigating (dietary) emissions.

Keywords: Nudge; Think; Boost; Nudge Plus; Sustainable Diets

Abstracts for Parallel Session I

Speech X

Title: Impact of city gas on mortality in China: national and regional estimates

Speaker: Bingdong Hou (Beijing Wuzi University, China)

Abstract: Developing the natural gas industry is considered an effective way to reduce pollution and improve human health. To verify whether the expansion of city gas consumption can effectively decrease mortality rate in China, this report assesses the impact of three different types of city gas on mortality by employing panel data from 30 provinces in China during the period of 2001–2018. Furthermore, the regional difference in the influences of gas consumption on mortality rate is analyzed from the perspective of economic development, spatial distribution, and development of the natural gas industry. The empirical results indicate that the expansion of city gas decreases Chinese mortality rate effectively. Analysis of the impact of different types of gas consumption reveals that a 1% increase in coal gas supply results in boosting mortality by 0.008%. Meanwhile, LPG and natural gas are employed to inhibit mortality. Based on the heterogeneity analysis, the impact of city gas supply on mortality has a scale effect.

Abstracts for Parallel Session I

Speech XI

Title: The near-miss effect of forest fires: Evidence from Western Australia

Speaker: María Teresa González Valenci (University of Birmingham, UK)

Abstract: The near-miss effect of a forest fire is the pure information effect arising from an update on forest fire risk perception after the occurrence of a forest fire event. This effect takes place in an area where the event very nearly happened but, by chance, did not, i.e., located adjacent to the burn scar but far enough to be free from direct impacts. Our research aims to identify and measure the capitalisation of pure information effects, if any, into property prices for the devastating Waroona Fire of 2016 in the Peel and South West Regions of Western Australia (WA). To capture this capitalisation and control for observed time-constant differences between properties inside and outside the near-miss area, we are using the hedonic price method (HPM) within a difference-in-difference (DID) framework.

Keywords: Near-miss; Wildfire; Australia; Hedonic; Differences-in-differences

Abstracts for Parallel Session II

Low-carbon transition and carbon neutrality

Speech I

Title: Evaluating pathways to achieve carbon neutrality using 7see

Speaker: Simon H. Roberts (Brunel Univeristy, UK)
Co-author: Colin J. Axon (Brunel Univeristy, UK)

Abstract: A range of methods with differing approaches are needed to develop national pathways to achieve carbon neutrality. We present 7see, a national system dynamics model for modelling pathway scenarios to 2050 of economics, employment, energy and emissions. It uses national accounts for GDP as its basis and is calibrated from historical national accounts. Unlike other energy systems modelling methods, 7see accounts for physical (thermodynamic) limits to the rate of change of infrastructure.

The use of scenarios is wide ranging to inform policy development, and forming a business-as-usual scenario helps to understand possible effects of different policy interventions. However, the term BAU is frequently misused. We show how 7see BAU scenarios can be developed by examining the historical behaviour of relationships between components of an economy.

A key question of any scenario is how fast a nation can transition without creating economic turmoil and maintaining low unemployment. In scenarios generated by 7see, we can test wide ranges of policy options for their combined draw on national investment (gross fixed capital formation) while at the same time always maintaining a healthy economy. Our methodology can be a key tool for developing physically plausible plans for Nationally Determined Contributions of any developed economy.

Abstracts for Parallel Session II

Speech II

Title: Out of the window? Green monetary policy in China: Window guidance and the promotion of sustainable lending and investment

Speaker: Simon Dikau (London School of Economics and Political Science, Grantham Research Institute on Climate Change and the Environment, UK)

Abstract: Chinese monetary and financial authorities have been among the pioneers in promoting green finance. This article investigates the use of one specific monetary policy tool, namely window guidance, by the Peoples' Bank of China (PBC) and the China Banking Regulatory Commission (CBRC) to encourage financial institutions to expand credit to sustainable activities and curb lending to heavy-polluting industries. We investigate window guidance targets for the period 2001-2020 and find that 'green' targets were included by the CBRC from at least 2006 and by the PBC from 2007 to discourage lending to carbon-intensive and polluting industries and/or to increase support to sustainable activities. In 2014, both authorities stopped discouraging lending to carbon-intensive/polluting industries through window guidance. Sustainable objectives were subsequently also removed from the PBC's list of window guidance priority sectors at the start of 2019, ending the practice of green window guidance in China. Sustainability-enhancing window guidance targets were replaced and formalised through new 'Guidelines for Establishing the Green Financial System', reflecting efforts to move away from controls-based towards market-based policy instruments. Based on this analysis, the article draws four lessons for the design of green finance policies for other countries that seek to enhance sustainable finance and mitigate climate change and related risks.

Abstracts for Parallel Session II

Speech III

Title: Welfare implications of revenue-neutral environmental taxation: Integrated tax-subsidy versus double-dividend

Speaker: You Zhou (Beijing Institute of Technology, China)

Abstract: This paper examines welfare implications of two environmental taxes that result in a fixed aggregate tax revenue: the double-dividend and the integrated tax-subsidy. The former alters existing distortionary taxes (e.g., labour tax), while the latter changes the environmental tax of relatively clean goods based on an adjustment of the environmental tax on more carbon-intensive goods. A general equilibrium framework is constructed to theoretically and numerically compare welfare effects of the two revenue-neutral policies. We decompose the welfare effect of both policies into three component sub-effects: Pigouvian, revenue-recycling, and tax-interaction. The 2016 Canadian economy and their recent nation-wide carbon tax proposal are used as examples in our numerical framework. Our results tend to indicate that the double-dividend policy dominates in revenue-recycling effect and tax-interaction effect and results in relatively higher social welfare.

Abstracts for Parallel Session II

Speech IV

Title: Sensitivity analysis of net zero pathways for UK industry

Speaker: Ahmed Gailani (University of Leeds, UK)
Co-authors: Samuel Cooper (University of Bath, UK); Stephen Allen (University of Bath, UK); Peter Taylor (University of Leeds, UK)

Abstract: Industrial products are essential for daily life and a vibrant economy. However, the UK government estimates that the industry produces 16% of the total UK emissions. The Chinese industrial sector accounts for 28% of the total energy-related CO_2 emissions. Although industrial decarbonisation is challenging, it is vital to reduce industrial sector emissions to avert dangerous climate change. Industrial sector modelling plays a major role in informing government policies, developing net-zero industrial pathways, and analysing the deployment of new technologies and infrastructure. This paper provides a sensitivity analysis of net-zero pathways for the UK industry using the Net-Zero Industry Pathways model. The results show that industrial net-zero pathways are highly dependent on carbon pricing and that carbon capture and storage technologies are vital to this transition by 2050. At the moment, assumptions about resource efficiency and energy efficiency are exogenous to the model. Further work is needed to explore the trade-off between these measures, which reduce the demand for energy by industry, and the technology and fuel options in the model that reduce the carbon intensity of the energy that is used. Future work includes comparing industrial sector decarbonisation pathways between the UK and China to decarbonise sites beyond major industrial clusters in both countries.

Keywords: Industrial Decarbonisation; Industrial pathways; Industrial modelling

Abstracts for Parallel Session II

Speech V

Title: Observing technology reserves of carbon capture and storage via patent data: Paving the way for carbon neutral

Speaker: Jianing Kang (Beijing Institute of Technology, China)

Abstract: Under the premise of being a mature technology, carbon dioxide capture, storage, and utilization (CCUS) is an important part of a global climate solution that can help achieve near-zero emissions. However, the CCUS development falls well short of what had been anticipated by the public. At present, global CO_2 emissions and the target of climate mitigation are so broadly divided that international climate governance is in grave shape. Here has probably become the optimum time to make an inventory of CCUS technology reserves in various economies to enable the advanced deployment of technology research and development, dramatically reduce technology costs, and accelerate CCUS commercial deployment. Based on patent data, this study uses a dynamic programming algorithm combined with topic modeling to identify key technology clusters and main development paths from a complex patent network. With such a broad range of open monitoring modes for CCUS technology, potential breakthroughs in the evolution paths can be detected quickly.To some extent, it is possible to address the problems of limited decision-making information and poor accuracy of CCUS technology monitoring. We dissect the development status of the global CCUS patent market and outline the patent layout strategy of CCUS in major economies. From 36,854 patents retrieved, 27 key technology paths are screened, 9 of which are emerging ones that need to speed up the layout; while 57 potential breakthroughs are identified (35 for CO_2 capture and 22 for CO_2 storage and utilization). These findings are informative for micro-level CCUS research and development in enterprises and provide decision support for the macro-level national science and technology strategic layout.

Abstracts for Parallel Session II

Speech VI

Title: Global green corridors: A view of China's domestic and regional first movers' potential

Speaker: Camilo Ernesto Velandia Perico (UMAS, UK)
Co-author: Tristan Smith (University College London, UK)

Abstract: Previous technological transitions have demonstrated that a complete paradigm change follow a S-shaped acceleration curve that starts with a flat/slow initial uptake and the shipping energy transition is not exemption. Earlier work from UCL's Energy Institute and UMAS estimates that to achieve net zero emissions by 2050, 5% of the fleet's fuel consumption should be covered by Scalable Zero Emissions Fuels (SZEFs) in 2030. To contribute to the development of a strategy to reach this target, this project reviewed current shipping activity to identify the routes with the highest potential for decarbonisation. Per voyage energy demand was grouped and clustered around departure ports, while a route matching algorithm used AIS data to select routes and vessels with the highest operational regularity and renewable fuels production potential. Our initial findings indicate that 10.6% of global fuel consumption has first movers' potential. From this, almost a fifth (1.8%) is burnt by vessels registered in China or Hong Kong. Furthermore, 1.3% (~860 ktH2e) is consumed exclusively between Chinese ports. China's first mover's potential covers almost 40% of the required volume to trigger the full global deployment of SZEFs. It also demonstrates the reach that Chinese domestic policy could have in the development of a local green industry.

Abstracts for Parallel Session II

Speech VII

Title: The triplet dynamics of carbon emission, economic complexity, and income inequality: Perspectives from a global panel study

Speaker: Yite Zhu (Tsinghua University, China)
Co-author: Zhen Ye (University College London, UK)

Abstract: The article analysed a triplet link between carbon emission, economic complexity, and income inequality. Carbon neutrality, or even reductions, have often been viewed as costly economic endeavor, and carbon inequality is shown to have link with income inequality. Here we show through a global panel data set that carbon emission can be reduced without costing economic growth or inequality. The research utilized the Economic Complexity Index (ECI) and the indicators of inequality to illustrate a triplet dynamic linked to carbon emission. The findings suggest an optimized route for the carbon neutrality based on certain stylized development trajectories which reconciles the co-existence of Veblen and Pareto effects, suggesting that policy makers need to be fully aware of path dependency and economic complexity of development process in designing a carbon neutral national economic development strategy.

Keywords: Carbon neutrality; Economic complexity; Income inequality; Veblen effect; Pareto improvement

Abstracts for Parallel Session II

Speech VIII

Title: Country-level carbon dioxide removal pathway towards the 1.5°C goals

Speaker: Pu Yang (University College London, UK)

Abstract: The deployment of carbon removal technology is essential to achieve the net-zero and 1.5°C goal, yet how much countries should deploy and which carbon removal option is viable is still unclear. We identify thirteen global cost-effective carbon dioxide removal (CDR) pathways consistent with 1.5°C and allocate the CDR quota dynamically (from 2020 to 2100) to 170 countries according to six equity principles. Given there is no guarantee every country possesses a sufficient natural biogeophysical endowment to unilaterally meet its quotas, we further compare national removal liability with ten land-based CDR potential and geographical carbon storage potential. The results provide a portfolio of CDR options for domestic deployment. The land-based CDR approaches can provide a considerable amount of carbon removal but are still insufficient for 25 countries to meet its removal liability. For 70 countries, land-based CDR is necessary due to the shortage of geographical carbon storage. The mismatch over removal capacity and liability calls for further international cooperation to accomplish the negative emissions globally.

Abstracts for Parallel Session II

Speech IX

Title: Techno-economic analysis of integrated carbon capture and utilization with syngas production

Speaker: Yuanting Qiao (Queen's University Belfast, UK)
Co-authors: Weishan Liu (Zhejiang University, China); Shuzhuang Sun (Queen's University Belfast, UK); Ruonan Guo (Zhejiang University, China); Mengxiang Fang (Zhejiang University, China); Chunfei Wu (Queen's University Belfast, UK)

Abstract: Carbon capture and utilisation (CCU) has been paid attention to widely as it can both reduce CO_2 emissions and consume fewer fossil resources. However, in the traditional CCU process, CO_2 should be extracted from the sorbents before the utilization. In contrast, the Integrated Carbon Capture Utilization (ICCU) process combined CO_2 captured and utilization in one system, which can increase the production, decrease energy; thus, the cost can be reduced by simplifying the procedures. Calcium Looping (CaL) is a proven technology for efficient post-combustion CO_2 capture from fossil fuel-fired power plants and reverse water-gas shift reaction (RWGS) is a promising candidate for producing fuels by converting CO_2 and H_2 into CO and H_2O. This paper is focused on the comparison between the ICCU process and CCU process, based on the ASPEN simulation and economic analysis including $CaCO_3$ consumption, purge production, annual CO production, energy efficiency, the total annual cost and the CO cost. ICCU process can produce more CO, less purge and less consumption of $CaCO_3$ with a higher energy efficiency. Therefore, ICCU is confirmed herein to be a better choice for further industrial applications.

Keywords: CO_2 capture; Calcium looping; Reverse water-gas shift reaction; Integrated CO_2 capture and utilization; CO_2 capture and utilization

Abstracts for Parallel Session II

Speech X

Title: Dynamic optimization modeling on regional environment-economy system: A study on optimal path of air pollution abatement

Speaker: Tingru Yang (Beijing Institute of Technology, China)

Abstract: There is a bidirectional link between environmental system and economic system, since environmental pollution is primarily generated by economic activities and at the meantime responds to social and economic activities. Besides, some pollutants can even travel across regions by a large distance, or linger around the atmosphere for long. Thus, conventional one-way wisdom cannot render a cost-effective environmental governance plan. This paper presents two models—REED and REEG—to integrate environmental pollution and its regional transmission with economic growth, which closes the loop from economic growth, pollution emission & its regional transmission, health loss and eventually back to economic growth loss. Both models explicitly characterize the production function, emission abatement cost function and labor damage function, and hence couple the environmental system and economic system intertemporally. Two models serve to analyze the optimal pollution abatement path for North China from 2017 to 2050, under the regional cooperative and non-cooperative scenario respectively. The results show that non-cooperative policy is strictly inferior to cooperative one both for achieving given emission reduction goals or maximizing social welfare. More specifically, North China shall increase the abatement rate from an initial level of 3% to 5% in 2040, and hold still afterwards. Each province shall take differentiated abatement efforts, with the highest for Hebei whose $PM_{2.5}$ concentrations takes the lead in North China, followed by Tianjing and Beijing, Shanxi and Inner Mongolia.

Abstracts for Parallel Session II

Speech XI

Title: How will the future climate change affect the electricity system security in China?

Speaker: Hao Chen (Renmin University of China)

Abstract: With the increasing frequency of extreme weather events, cyber attacks and natural disasters, power system reliability is facing unprecedented challenges. To contribute to a more targeted electricity reliability policy in China, this study estimates the potential impacts of future climate change on the electricity system security. First, this study firstly employs a downscaled climate system model to project temperature paths in the future. Then, an integrated model is established to quantify the impacts of long-term future temperature rise on the existing electricity supply infrastructure, while an econometric model is established to assess the impacts of temperature rise on the peak load in different provinces. At last, the combined results from both the demand side and supply side are used to analyze the impacts of climate change on the electricity system security.

Abstracts for Parallel Session III

Energy Economics and Policy

Speech I

Title: Banning Diesel Vehicles in London: Is 2030 too late?

Speaker: Mengqiu Cao (University of Westminster, UK)

Abstract: Air pollution contributes to thousands of deaths annually in London and diesel vehicles are considered a major source of lethal air pollutants. Consequently, the UK government announced its intention to ban the sale of diesel vehicles by 2030 to achieve a sustainable zero-carbon road transport system. Since no empirical studies have used a bottom-up approach to seek Londoners' views, it is, therefore, worth investigating the public opinion regarding this forthcoming ban. This research aims to fill this research gap by taking London as a case study. A survey was designed, and fieldwork was conducted to distribute questionnaires to Londoners. Completed questionnaires were analysed using both quantitative and qualitative methods. The findings revealed that the majority of Londoners would be in favour of the ban if they were sufficiently exposed to the appropriate sources of information and were favourably disposed towards environmental protection measures. The results also showed that Londoners were more likely to switch to electric vehicles (EVs) if they were offered generous incentives and encouraged to use scrappage schemes. The present study makes a strong case for enforcing the ban well before 2030. The significance of this research is to provide clearer signals regarding the future of diesel vehicles, which in turn will strengthen the EV policy and uptake.

Keywords: Low carbon technologies; Low carbon transition; Decarbonisation; Zero-carbon; Air pollution; Diesel ban; Electric vehicles; Transport policy; Transport planning; London

Abstracts for Parallel Session III

Speech II

Title: Does temperature change the energy efficiency gap: Evidence from air conditioner purchase in the United States

Speaker: Pan He (Cardiff University, UK)
Co-authors: Pengfei Liu (University of Rhode Island, USA); Yueming Qiu (University of Maryland College Park, USA); Helen Liu (University of Rhode Island, USA)

Abstract: Energy efficiency improvement is critical in meeting the target of Net Zero emissions which is often hindered by the energy efficiency gap where consumers underinvest energy saving products. One possible explanation is that consumers pay limited attention and underweight the information of energy efficiency in the purchase decisions. This paper examines the effect of short-run weather fluctuations in filling such a gap by focusing on air conditioner purchases in the United States from 2006 to 2019. Using the transaction-level purchase records, we investigated if temperature affect the purchase of air conditioners labeled with Energy Star. The results show that the probability of purchasing an Energy Star air conditioner increases as the weekly temperature before the transaction deviates from 20-22°C due to a combinative effect of projection bias and salience. A larger response is related to higher electricity price, cooling degree days, and stronger concern of the climate change issues. Our findings have profound policy implications for effective intervention in stimulating the demand-end change to incorporate the potential impact from the ambient physical environment for enlarged effectiveness.

Keywords: Energy efficiency gap; Weather; Projection bias; Salience

Abstracts for Parallel Session III

Speech III

Title: Substitution strategies for cooking energy: To use gas or electricity?

Speaker: Hui Li (Beijing Institute of Technology, China)

Abstract: The Chinese government has called for clean and effective energy substitution for cooking in rural areas. To provide references for implementing substitution strategies for cooking energy, this report focused on the environmental and economic impacts assessment of various types of cooking fuels and stoves in China. According to the assessment results, the environmental impacts are highly influenced by the types of fuels and the efficiency of stoves used for cooking. Using biogas, liquefied petroleum gas (LPG), and natural gas for cooking instead of solid fuels can significantly reduce environmental emissions. In addition, the economic assessment results show that the most expensive source of cooking fuel is LPG, with an average annual cost of 1700 yuan, while the cost of straw and firewood is the cheapest, at less than 100 yuan. The average annual cost of electricity is higher than that of natural gas. Regarding the substitution effects, using natural gas for cooking is better than using electricity. The environmental benefit of electricity substitution is only 10%~20% of natural gas substitution, and the corresponding increasing cost for residents is 1.5 times that of natural gas substitution.

Abstracts for Parallel Session III

Speech IV

Title: Evaluation of PV power generation projects in China: A real option approach

Speaker: Yifei Lei (Zhejiang University, China)
Co-author: Hernan Botero (SRUC/The University of Edinburgh, UK)

Abstract: With an ever-increasing consumption of fossil energy, climate change and environmental pollution have become increasingly severe. As the largest carbon dioxide emitter in the world, China faces tremendous pressure to reduce emissions. Promoting investment in photovoltaic (PV) power generation projects can effectively ameliorate energy shortages and climate change. Since investment in renewable energy is uncertain and irreversible, traditional investment evaluation methods cannot accurately evaluate PV power generation projects. The real option approach (ROA) is an effective method for evaluating investments in renewable energy projects since it overcomes some of the shortcomings of traditional investment evaluation methods, recognizes the characteristics of renewable energy projects, and captures management flexibility. This paper develops a real option model that uses the CO_2 price and investment cost as uncertain factors to evaluate the investment value and optimal investment time of PV power generation projects in China. The evaluation of PV power generation projects is performed under two scenarios: a carbon emission trading mechanism does and does not exist in the economy. The results show that a carbon trading mechanism delays the optimal investment time of a PV power generation project but has a positive impact on its value. In addition, this study conducts a sensitivity analysis of prices, project operating times, and electricity price subsidies in the presence of a carbon emissions trading mechanism and proposes relevant policy recommendations.

Keywords: Photovoltaic power project; Real option approach; Uncertainty factor; Carbon emissions trading mechanism

Abstracts for Parallel Session III

Speech V

Title: Non-price energy conservation and household energy consumption in Bangladesh

Speaker: Shaikh Eskander (Kingston / LSE, UK)
Co-authors: Ahsanuzzaman (Maryland, USA); Asad Islam (Monash, Australia); Liang Choon Wang (Monash, Australia)

Abstract: This paper uses a randomized controlled field experiment to examine the relative effectiveness of energy conservation information in influencing residential energy consumption. The experiment involves 2300 households in three cities in Bangladesh to test three types of energy conservation information: (i) advice on electricity conservation methods (knowledge treatment); (ii) (median) electricity consumption of others in the suburb (suburb comparison); and (iii) (median) electricity consumption of neighbors (neighbor comparison). Our results suggest that providing advice on saving energy could reduce households' energy consumption significantly. The effects are stronger and significant for advice on electricity conservation compared to neighbor and suburb comparisons. Our results suggest that the effects of providing own electricity consumption relative to neighbors' electricity consumption is similar to the effects of giving information about own electricity consumption relative to households in the same suburb. The effects among households who were inefficient users in neighbor and suburb comparison groups are almost as strong as knowledge treatment group. The effects across treatment groups become stronger over time as they receive repeated information.

Keywords: Bangladesh; Energy consumption; Social norms; RCT

Abstracts for Parallel Session III

Speech VI

Title: Fuel economy standards and regulatory loopholes: A bunching analysis on China

Speaker: Jingwen Wu (South China Agricultural University, China)

Abstract: Fuel economy/consumption standards have long been implemented to improve the fuel efficiency of vehicles worldwide. The weight-based fuel economy standards in some countries provide a regulatory loophole for automakers' compliance. Based on the data of all passenger vehicle models from 2010 to 2019 in China, a counterfactual econometric model is used to explore manufacturers' behavioral responses to the weight-based standards. Obvious bunching responses are found at the regulatory thresholds, and local-brand manufacturers are inclined to situate vehicle models on the right side of thresholds strategically by increasing vehicle weight, accounting for approximately 10% of local-brand models. This regulatory loophole not only affects the weight distribution of local brands but also biases automakers' technological inputs in fuel efficiency for both joint-venture and local brands.

Abstracts for Parallel Session III

Speech VII

Title: Addressing public health risks and climate change concerns from road transport-related emissions in Lagos State – designing a novel approach

Speaker: Babatunde Anifowose (Coventry University, UK)
Co-authors: Barbara Hoffmann (Heinrich-Heine-University of Düsseldorf, Germany); Babajide Alo (University of Lagos, NIGERIA); Bisi Akin-Alabi (InterContinental Eduresearch Consult, UK); Rose Alani (University of Lagos, NIGERIA); Femi Esuruoso (InterContinental Eduresearch Consult, UK); Arnt Diener (Heinrich-Heine-University of Düsseldorf, Germany); Juana María Delgado-Saborit (Universitat Jaume I, Spain)

Abstract: Lagos State is the most populous city in Africa's most populous nation, Nigeria. In 2015, road transport constituted 20% of total GHG emissions (CO_2 equivalent) in the State. The populace are heavily reliant on used (second-hand) imported vehicles from Europe, Japan, USA, etc. Yet, factors such as affordability, absence of requisite institutional arrangements and policies, intermittency of electricity and associated infrastructure, all make an earlier uptake of Electric Vehicles challenging at this stage. In addition, most developing economies have less stringent emissions standards, such as below Euro 3, still in place. While Lagos State has made some progress through its Climate Action Plan currently in its Second Five Year (2020-2025) and other deliberate government policy interventions, transport and traffic management has remained chaotic, especially at peak-hours. This is a critical problem because peak-hour congestions increase transport-related emissions partly due to engine stop-starts and vehicle kinematics (e.g., rapid speed variation, idling, acceleration). Lagos is notorious for traffic congestion problems in Africa; therefore, for the first time, this study seeks to evaluate novel approaches to peak-hour traffic reduction with stakeholders' buy-in. This should minimise road transport-related congestion, which increases pollutants that negatively affect public health (e.g., NO_2, $PM_{2.5}$) and climate change (e.g., CO_2). The study has technical and policy implications per the newly released 2021 WHO Air Quality Guidelines for assessing the seriousness of public health risks to Lagos residents.

Keywords: Transport-related emissions; Climate change; Public health; Lagos State; Africa

Abstracts for Parallel Session III

Speech VIII

Title: Comparing expert elicitation and model-based probabilistic technology cost forecasts for the energy transition

Speaker: Jing Meng (University College London, UK)

Abstract: Understanding the future costs of energy technologies is crucial for energy transition. We conduct a systematic comparison of probabilistic technology cost forecasts produced by expert elicitation and model-based methods. We assess their performance by generating probabilistic cost forecasts of energy technologies rooted at various years in the past and then comparing these with observed costs in 2019. Model-based methods outperformed expert elicitations both in terms of capturing 2019 observed values and producing forecast medians that were closer to the observed values. However, all methods underestimated technological progress in almost all technologies. We also produce 2030 cost forecasts and find that elicitations generally yield narrower uncertainty ranges than model-based methods and that model-based forecasts are lower for more modular technologies. Future research should focus on further method development and validation to better reflect structural changes in the market and correlations across technologies. In addition to the production side solution, the demand side solution, such as behavioural change, also contribute to climate change mitigation.

Abstracts for Parallel Session III

Speech IX

Title: Life cycle assessment of nanoparticle synthesis methods for large scale environmental applications

Speaker: Peyman Babakhani (University of Leeds, UK)
Co-authors: Tanapon Phenrat (Naresuan University, Thailand); Mohammed Baalousha (University of South Carolina, USA); Kullapa Soratana (Naresuan University, Thailand); Benjamin S. Twining (Bigelow Laboratory for Ocean Sciences, USA); Michael F. Hochella Jr (Department of Geosciences, Virginia Tech, USA)

Abstract: Engineered nanoparticles (ENPs) are considred for large-scale environmental applications. However, the sustainability of their uses especially for climate change mitigation is under question. For practical applications of ENPs in atmospheric carbon dioxiee removal (CDR) techniques, the amount of emitted CO_2 during ENP production and processes must be a lot less than the amount of CO_2 captured. Currently, there is a paucity of research into CO_2 emission qunatities during the production of various environmentally-relevant nanoparticles based on different synthesis methods. Here, I investigate CO_2–equivalent emissions for each kg of ENP synthesis through life cycle assessment (LCA). These ENPs include nanoscale-zerovalent iron (NZVI), SiO_2, Al_2O_3, ZnO, and CeO_2 ENPs synthesized with different green, chemical, and mechanical laboratory-based methods.

The results show that considering the most efficient synthesis methods for NZVI, SiO_2, and Al_2O_3, CO_2–equivalent emissions during manufacturing of 1 kg of these ENPs is 6.1 to 10.8 kg, suggesting that the amount of CO_2 captured during such ENP applications in CDR needs to be larger than this range in order to obtain a net CO_2 sequestration. Green (plant- or algae-based) synthesis methods reduce CO_2 emissions during ENP production by ~3 times compared to other methods.

Keywords: Envionmental nanoparticles; Life cycle assessment; Climate change mitigation; Carbon dioxide removal

Abstracts for Parallel Session III

Speech X

Title: Hydrogen technology foresight and economic analysis of green hydrogen in China

Speaker: ShuoXu (Beijing Institute of Technology, China)

Abstract: Hydrogen energy, as a carrier of clean energy, will play an important role in addressing climate change, attracting wide attentions in recent years. However, due to the long industry chain and technology diversification of hydrogen energy, the developments of hydrogen technologies are full of uncertainties, and the high cost becomes one of the key factors hindering its application. To clarify the development progresses of hydrogen technologies, this work presented the technological S-curves of different links of hydrogen industry using bibliometric method, including hydrogen production, hydrogen storage and delivery, and hydrogen fuel cells, and identified the research hotspots and cutting-edge technologies using sliding window method and literature analysis. In view of the significance of green hydrogen supply, the costs of four hydrogen production routines from renewables in China were estimated. Hydrogen generated from PEM water electrolysis combining photovoltaic power would be a preference among green hydrogen routines in the future, and it would be price-competitive to hydrogen generated from coal reforming with CCS in 2050. Furthermore, the costs of three hydrogen delivery approaches were analyzed. An appropriate hydrogen transport mode should be determined by the transport distance and hydrogen volume.

Abstracts for Parallel Session III

Speech XI

Title: Energy demand scenarios compatible with China's 2060 targets

Speaker: Gabriel D Oreggioni (Imperial College London, UK)

Abstract: Direct emissions from final energy uses – such as: buildings, transportation, and industries – accounted for 54% of fossil CO_2 emissions in China during 2018. Reaching the recently announced 2060's net-zero ambition will involve drastic reductions for these emissions and an unprecedented effort in terms of technology incorporation.

In this work, we investigated the emission reduction potential and the associated impacts on final energy and power consumption for key decarbonisation measures, namely: the increase of building envelope efficiency, heat pump uptake, electrification of passenger cars and light duty vehicles, widespread of electric arc furnace production methods for steel industries, and carbon capture processes within cement and chemical industries.

Our estimates show that penetration rates similar or higher than the ones compatible with the forecasts for the European Union's climate neutrality objectives are required to meet the sectoral emission caps, prescribed in the impact assessment studies conducted by the Chinese government. These changes would lead to reductions in final energy consumption close to 20%, rises of 52% in power usage, and cuts of 92% in fossil CO_2 demand related emissions by 2060 in comparison with nowadays.

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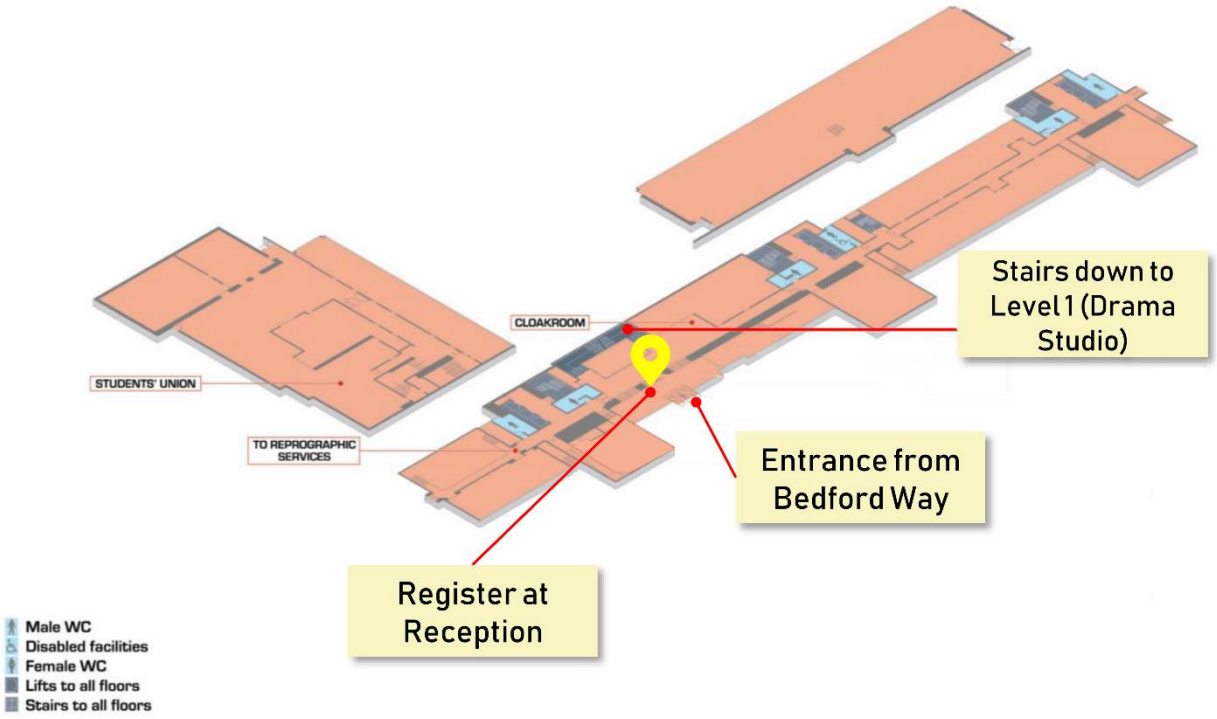
Conference Venue

UCL Institute of Education (IOE), 20 Bedford Way, London WC1H 0AL

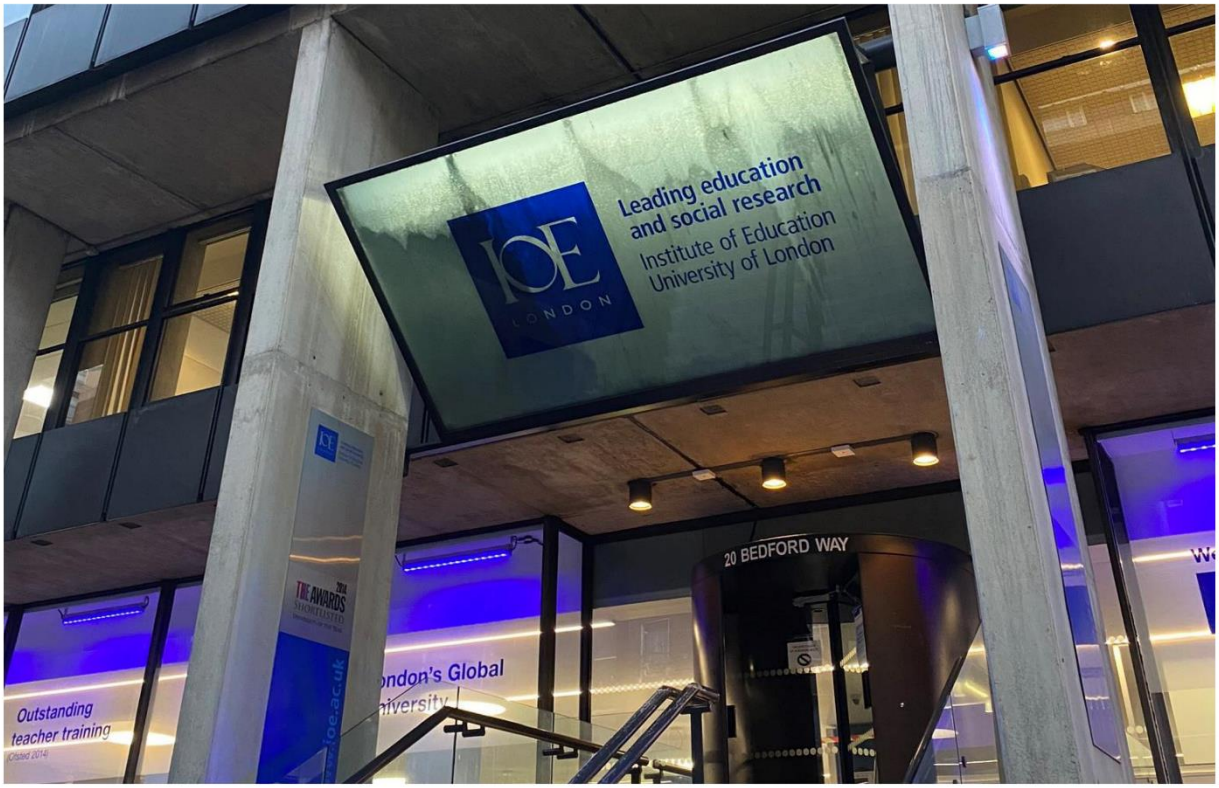
Conference Venue

Register: Level 3

LEVEL 3



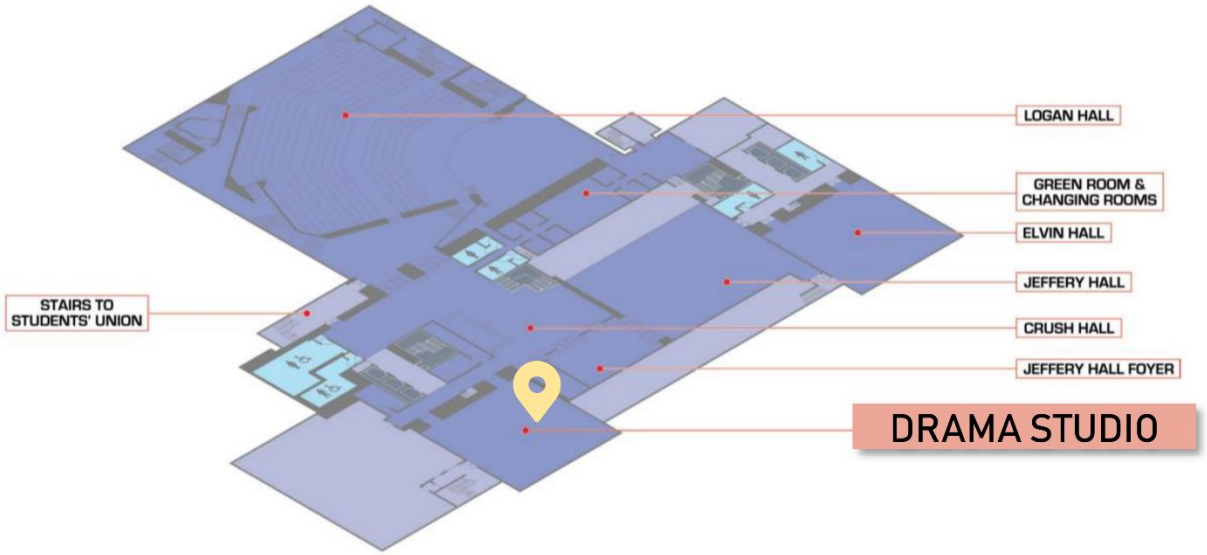
Note: please register as a visitor at the Reception when entering the building.



Conference Venue

Plenary Session: 102 - Drama Studio

LEVEL 1

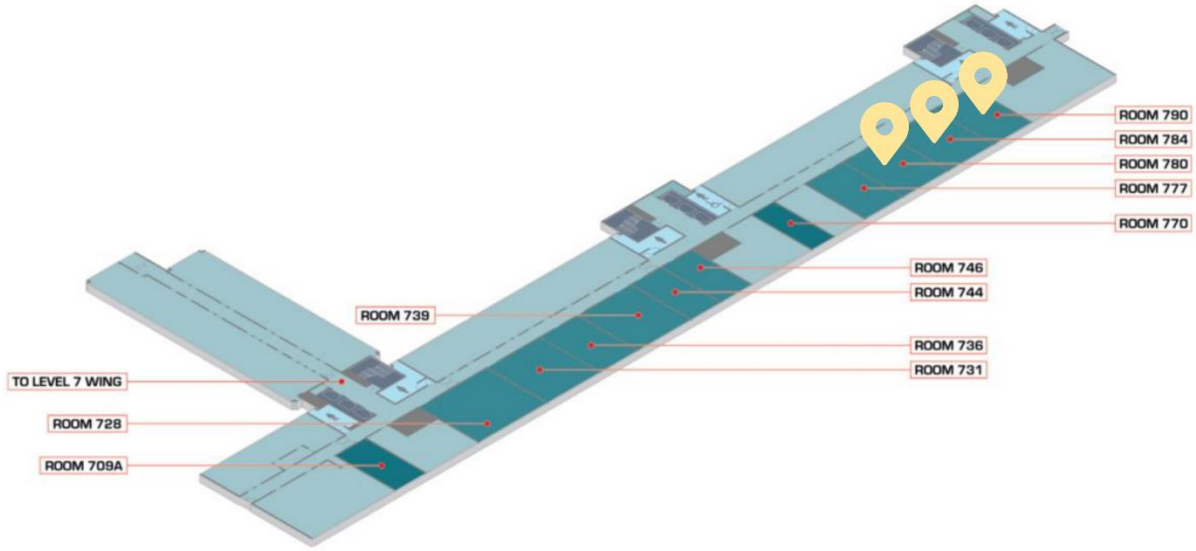


Male WC
Disabled facilities
Female WC
Lifts to all floors
Stairs to all floors

Conference Venue

Parallel Sessions: 780/784/790

LEVEL 7



Male WC
Disabled facilities
Female WC
Lifts to all floors
Stairs to all floors